

Performance Management in the Value Chain

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Introduction

Performance management in the value chain is a critical task for companies confronted with increasingly complex global value chain networks. Managing global material flow and shipments between continents, tracking prices and volumes in global customer and supplier markets, and ensuring reliable and timely delivery of orders are only a few issues that can benefit from professional value chain management concepts. Performance management, one management concept in the value chain, includes strategic, tactical and operative concepts to measure and monitor as well as ensure performance and stability in the value chain. Value chain performance should be tracked regularly and measured transparently, and exceptions and unplanned events should be proactively identified and managed.

The objective of this article is to provide a practice-oriented view of performance management in the value chain as well as current frameworks and industry case examples.

Value Chain Management

The value chain is a company model developed by Porter (see Porter 1985) focusing on cross-functional orientation in the company. Porter's value chain model is structured by primary activities such as service, marketing and sales, operations, and outbound and inbound logistics and support activities such as procurement, technology development, human resource management and company infrastructure. Companies used to concentrate on the management within these individual functions instead of focusing on cross-functional value chain optimization. Therefore, value chain management focuses on optimizing volumes and values based on cross-functional management concepts and integrated decision making throughout the value chain (Schulz et al. 2007).

Complexity is one major reason why these efforts are slowed or often difficult to implement. Different departments, and different suppliers and customers, are involved and must work together cooperatively to manage the value chain successfully. Therefore, companies typically follow a three-stage evolutionary path from supply chain to value chain management.

The first stage is characterized by the internal management of company functions such as sales, marketing, production, logistics and procurement. This focus on function can reflect the best result in a single area but not necessarily the best result for the entire value chain. For example, in procurement, long-term purchasing contracts with high volumes can help to achieve minimum costs. However, binding contracts can lead to high inventories and additional logistics costs if contracted raw material volumes will not be fully used in production because there is a lack of demand for finished products.

In the second stage, the supply chain can be optimized by more integrated decision making. Supply chain management as a concept is widely discussed in theory and applied in practice (Stadtler 2004). The core idea of supply chain management is to manage integrated flows of material and information within the company but also between and among companies in order to minimize inventories and achieve optimum utilization of production resources. Therefore, the objective of supply chain management is to minimize the supply chain costs, to deliver a defined service level and to meet customer demand. Supply chain management focuses therefore on integrating decision making on production and distribution volumes. Volume and specifically price decisions in sales and procurement are often not in scope and considered as given. Without an integrated approach however, costs minimized in supply chain management do not automatically produce the best profits for the company.

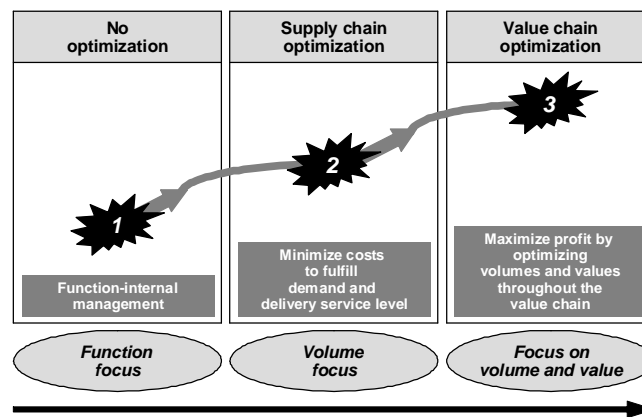


Fig. 1 The evolution towards value chain management

The third step in the evolution of managing the value chain is value chain optimization. Optimization means integrating all volume and value decisions to maximize profits across the entire value chain from sales to procurement. An optimized value chain is a milestone for a company because it means managing profitability, volume flows and services in a future-oriented manner (Figure 1).

The Framework of Value Chain Management

Value chain management is based on an integrated framework in which processes and management concepts to manage the value chain are included. The value chain is structured according to the company's key functions sales, distribution, production and procurement; it also includes dedicated negotiation and collaboration interfaces with suppliers and customers. The framework makes a distinction between:

1. The process view, which deals with strategy, planning and operations processes at the *strategic*, *tactical* and *operative* levels respectively; and
2. A required management basis, which includes performance management, organization, and information technology (IT) (Figure 2).

Value chain strategy covers *strategic* decisions that determine a company's value chain network. These might include investments in new production facilities, explorations of new markets or strategic sourcing alliances. The strategy also determines business rules for planning the value chain network volume and values such as inventory boundaries, minimum market share targets, procurement contract limits and production parameters such as capacities and minimum utilization. The value chain strategy defines the network and network planning rules and is conducted e.g. annually with a horizon of one to several years.

Value chain planning is the *tactical* process usually carried out monthly; this process is also known as sales and operations planning (S&OP). The objective of value chain planning is to determine the volumes and values in the company's value chain network. Most important in the planning process is integrated decision making about all volumes and values: sales, distribution, production and procurement. Sales volumes, transportation and inventory quantities, production and procurement quantities, and prices and costs should be included.

Value chain operations is the *operative* integration of all order schedules in the value chain. Production schedules must be synchronized with customer and transportation orders and purchase orders. Value chain operation processes, such as customer or purchase order management, are based on the value chain plan with defined volumes and values to ensure the stability of value chain operations.

All three process levels share a common management basis in performance management, organization and IT. A value chain management organization includes roles and teams that run the value chain processes. Information technology

is required specifically to plan and operate complex global value chain networks in an automated way and to ensure data consistency and integration among process levels as well as decision support. Finally, performance management is the element of the value chain concept that includes the elements cockpit, monitoring and event management to reach performance transparency and react in case of unplanned events.

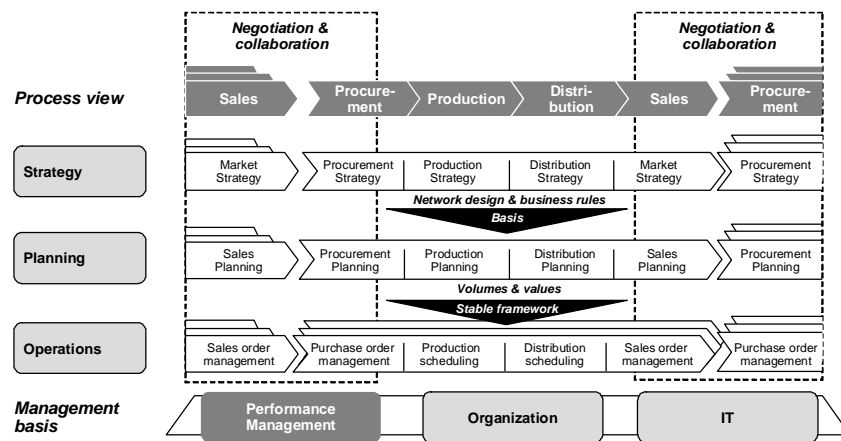


Fig. 2 The value chain management framework

To summarize, the focus of value chain management should be on the most profitable businesses, while less profitable businesses receive lower priority as they compete for internal resources. Such concepts are well known on a business unit level. The challenge is to introduce these concepts into strategic decision making, tactical planning and day-to-day operations. Applying this value chain management framework in a holistic and consistent way, the company becomes more agile and better able to take advantage of the most promising business opportunities on an ongoing basis.

Performance Management Concepts in the Value Chain

Managing performance in the value chain can be matched to the process level in the value chain management framework. A cockpit can be used to manage performance related to strategic and tactical concepts, while value chain monitoring and event management are the preferred concepts on the level of operations.

Management uses a cockpit to obtain transparency on the overall performance of the value chain with a global or regional focus; updates are required on a quarterly or even monthly basis. The cockpit concentrates on aggregated results; for

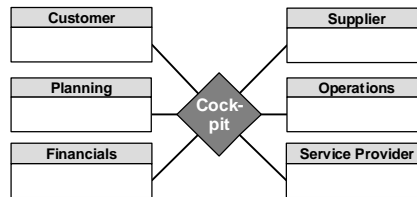
example, the focus is on the quality of global planning or overall utilization instead of the detailed results of individual transactions and orders.

Compared with value chain monitoring, event management focuses more on detailed events that occur in daily operations, for example in order management, payment, production and shipments. Confronted with thousands of transactions, monitoring and event management require automated approaches and standard escalation procedures to ensure stability in daily operations (Figure 3).

Value Chain Cockpit

Strategic & Tactical

- Cockpit with strategic and tactical value chain key performance indicators derived from strategy
- Top management level
- Focus number of key aggregated indicators, low degree of automated decision making
- Global or regional focus
- Update quarterly to monthly



Value Chain Monitoring & Event Management

Operative

- Monitoring of defined operations and transactional events
- Operations team level
- Standard escalation procedures
- High degree of automation, high number of monitored events
- Daily to weekly monitoring

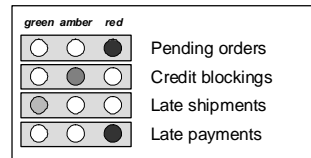


Fig. 3 The value chain performance management framework

Both concepts are required to ensure the overall performance and stability of the value chain. However, it is critical to differentiate strategic, tactical and operative layers when designing performance management concepts, which are detailed in the following.

The Value Chain Cockpit

The value chain cockpit consists of a number of key performance indicators (KPIs) to steer the value chain on the strategic and tactical levels. First, the KPIs are derived from the company’s business and value chain strategy for meeting objectives and measuring achievement. A premium supplier strategy, for example, requires different objectives and KPIs than a global cost leadership strategy.

Examples of KPIs depend on industries, utilization, customer satisfaction, profits and costs. KPI categories need to cover financial and non-financial as well as leading and lagging indicators in order to provide a balanced view of performance. According to these categories, all KPIs are consolidated into a scorecard that provides a stable framework for balanced performance management. Since KPIs are

an inherent part of the target agreement, the value chain cockpit plays an important role in the entire process.

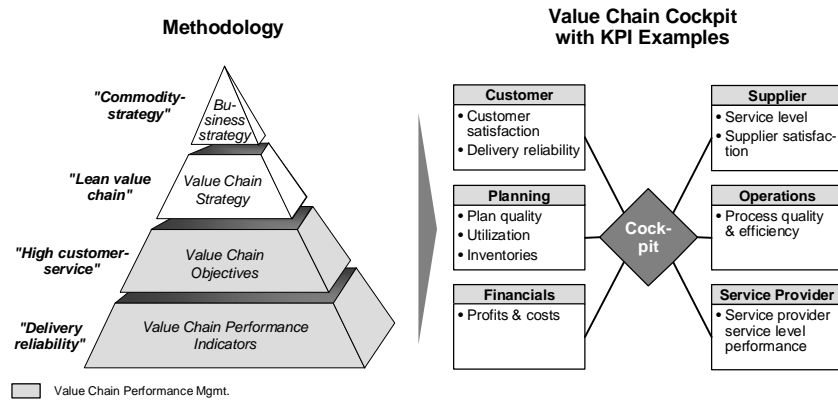


Fig. 4 The value chain cockpit

The number of key performance indicators should be limited, focusing on action orientation and meaningful measures. Otherwise, overly detailed reports will lead to high complexity in management decisions. The cockpit requires IT support such as a data warehouse. However, decision making to influence KPIs and to reach defined target values can rarely be automated. When important business decisions need to be made, software providers and researchers should be defensive in developing automated solutions or even agent-based decision-making frameworks. IT should not replace decision making by the company's CEO. The terrain of automated IT solutions is more appropriate to performance management concepts such as operations monitoring and event management.

Value Chain Monitoring and Event Management

Value chain monitoring and event management ensure the stability of the value chain in daily operations. Teams such as customer service or material management have to handle thousands of transactions such as purchase, production or customer orders in a year's time. Unplanned events always occur in these transactions, leading to delays or even cancellations of orders. These events can be attributed to various factors, such as losses incurred by a broken framework contract, delayed delivery of a time-critical order or negative effects on perishable foods in case of troubles within the distribution chain of cold products. These are only a few of many possible events. Because of their unpredictability, the events are a big challenge for a company since neither their timing, duration, type nor volume can be

always anticipated and only evaluated using statistical analysis. One thing they all have in common is that they destabilize value chain operations and may have a negative impact on company profits. This is a danger for every company, which needs to put these events on its watch list.

Therefore, value chain monitoring and event management are built up in a structured approach that begins with the definition of the events to be monitored. Escalation procedures and responsibilities are derived from business rules and thresholds. For example, customer service is responsible for monitoring orders with credit blocking, since orders cannot be processed if the customer’s credit limit has been reached. Thresholds are set to check the timeframe of the blocked order and in a case such as this an immediate resolution must be found. Either the customer’s delivery requirements will still be met or the customer will need to agree on cancellation since the outstanding debt must first be paid.

In the next step, requirements for IT support and automation can be formulated and implemented. These might be required queries, red light mechanisms, alert mechanisms and, if feasible, automated resolution. But here as well, business-to-business orders can have significant value. Confidence in automated or agent-based decision making is often low, and the responsible employees prefer to have manual interaction when unplanned events occur. Software providers and researchers therefore should develop pragmatic and user-oriented solutions. Automated decision making should be designed and used only when its benefits and time savings are higher than the possible risk of an employee’s not having made a personal decision (Figure 5).

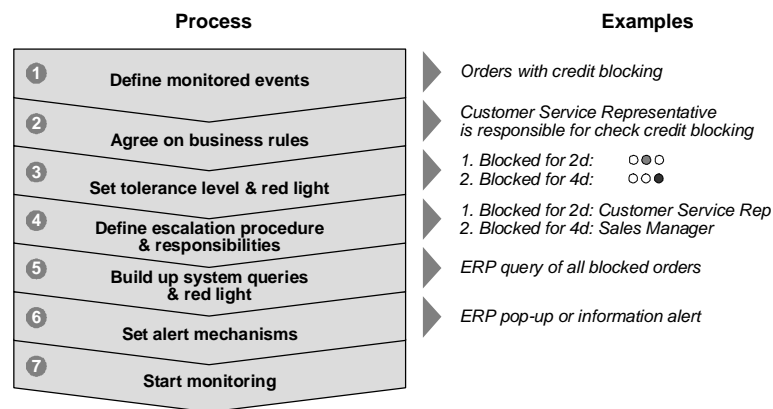


Fig. 5 Value chain monitoring and event management

In the sections above, we have introduced practice-oriented value chain management and performance management concepts. Their application in industry

practice and the precise problems they present are highly dependent on industry specifics. In the following section, we use three industry case studies to demonstrate the different priorities in value chain and performance management.

Industry Case Studies

The following case studies focus on the chemical industry, the fresh food industry and the retail sector. In principle, all three cases deal with inventories, although they differ in focus. The chemical industry case focuses on capital costs and fluctuating inventory values driven by volatile raw material costs that require specific monitoring and event management processes. In the fresh food industry, on the other hand, the management of shelf life is critical, requiring the integration of shelf life into value chain planning and monitoring. Finally, the retail sector example involves management of a complex assortment of more than 10,000 stock keeping units in a supermarket. These three disparate industries have their own strategic, tactical and operative requirements for value chain management and monitoring. Specifics are discussed in the following section.

Inventory Monitoring in the Chemical Industry

The function of the chemical industry is to supply many basic raw materials to different industries. Its product portfolio ranges from commodities such as basic chemicals and intermediates or standard polymers to specialties such as fine chemicals for food, pharmaceuticals, cosmetics or agriculture products, to name a few. The chemical industry is often characterized by production assets that are extremely capital-intensive, and it requires managing the substantial flow of goods (volume and value) in global, regional and local networks. This industry is confronted with the opportunities and challenges of globalization and its increased complexity and competition. The management of global value chain networks must ensure profitability and deal with volatile prices for crude oil and natural gas-based raw materials.

In the context of the chemical industry, value chain management is a central framework used to guarantee the profitability and stability of volume flows in a global chemical value chain network that interfaces with suppliers and customers. Within this network, all management processes involving strategy, planning and operations are relevant, as are performance management, organization and IT. Specifically, the management of production and distribution volumes and values is critical. Capital-intensive production assets must be utilized in the most effective way possible, and working capital, particularly warehoused inventories, require professional management and monitoring.

Average inventory volumes in a global bulk chemical business can easily reach 100,000 tons, with inventory values amounting to several million Euros. Optimizing inventory volumes and values has a direct impact on delivery service and capability, as well as a company's return on its capital investment. The chemical industry needs to consider and manage several inventory drivers. First of all, inventory values are more unpredictable since they depend on price-volatile raw materials. The adequate size of inventory is critical for stable operations, to ensure delivery capability, to reflect campaign cycles and planned production shut-downs, or to hedge the risk of volatile raw material and sales prices. Companies that operate globally need to manage inventories in multi-site and multi-level networks, including inventories shipped by sea or other means of transport (Schulz et al. 2006).

Our specific chemical industry case study involves a global commodity business that produces standard polymers. Inventory management is an integral part of the overall value chain management concept of the business and covers strategic, tactical and operations aspects.

- The company determined their stock-keeping strategy, including the inventory boundaries required to operate and compete in different global markets. Specifically, in Asia, a dedicated concept was required because a decision needed to be made among local stock in several countries including China, Japan, Korea or a central hub, for example, Singapore.
- Tactically, inventory volume and values were managed in the planning process and integrated with sales, transportation, production and procurement volume and value planning. Inventory volumes anticipated shutdowns and supplier forecasts; inventory values were planned to account for raw material price forecasts and planned exchange rates that might change over the course of a fiscal year.
- In terms of operations, inventory was managed on a daily basis and allocated to customer orders and deliveries; in global operations, specifics to be considered included container sizes and adherence to container ship schedules.

In the case of this specific company, value chain performance management focused primarily on monitoring inventory volumes and values to ensure delivery capability but also to keep working capital costs low. Given the volatility of prices and volumes in a business that deals with commodities, the company was frequently challenged by high fluctuation in their inventory values and volumes, which were either too high if planned sales could not be realized, or too low to catch up with growing demand. Both situations would have a negative impact on the stability of the value chain and profitability overall. The company therefore defined global inventory ranges and established a monthly inventory monitoring process using monitoring gates and event management procedures.

A characteristic KPI is the inventory range measuring the actual inventory value divided by the actual sales value in the current month. Inventory ranges should be in a certain bandwidth (for example, between 40 days and 60 days), de-

pending on the company's value chain structure and inventory drivers (Schulz et al. 2006).

Inventory monitoring gates during the month need to be defined. In this case, two monitoring gates were determined for the middle and end of the month and one review gate in the next month. A clear event management process was defined in the event of deviations between the measured inventory range compared to the tolerated bandwidth. In this case, a structured event management approach needed to take place. As owner of the process, the supply chain management team, together with sales and production representatives, needed to begin a three-step process. First, internal resolution options were checked by supply chain management, production and sales; for example, the team identified additional sales opportunities or opportunities to cut sales in the event of excess demand. After two days without a solution, the team contacted customers and suppliers to discuss potential changes in the volumes of products delivered and supplied. If neither of these actions helped the situation, the team reported the situation to top management. Top management must be informed about any negative deviation in key reporting indicators because several million Euros of additional capital can be the consequence (Figure 6).

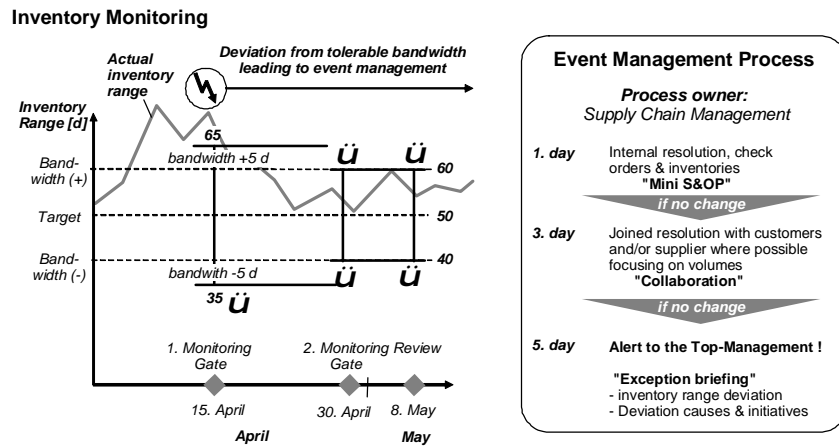


Fig. 6 Inventory monitoring in the chemical industry

Introducing this pragmatic inventory monitoring and event management helped the company to stabilize inventory volumes and values globally and respond proactively and more effectively to value chain and market changes. Monitoring also helped to prevent destabilization of the value chain. The process provided opportunities to apply automated monitoring and event management tools and decision support. However, given that investment in working capital related to inventories of bulk chemicals could easily reach several million Euros, automated decision

making was unlikely. Management should always be involved in the situation and be responsible for making significant business decisions.

IT based Shelf Life Management in the Fresh Food Industry

In Germany, the food processing industry is one of the main economic sectors, reaching an approximate turnover of €100 billion Euros. Nearly 50 percent of this amount is contributed by the fresh food industry, which includes fresh and processed meat, dairy, fish, fruit, vegetables and bakery products. In general, value chain management of fresh food production is a challenging task. Even more challenging are factors such as the high variability of raw materials, the quality of intermediate and final products, fluctuating prices and variable processing times and yields. One aspect is the most difficult of all to handle: shelf life, which is the most important factor to consider in planning fresh food production. The definition of shelf life is the period of time in which a food product will remain safe, be certain to retain the desired sensory, chemical, physical, and microbiological characteristics, and comply with any label declaration of nutritional data (Kilcast and Subramanian, 2000). In addition to time, product shelf life depends on appropriate temperature control during the entire process and across the chain.

In the fresh food industry, a typical value chain includes the farmers, producers, distributors and retailers. There are two types of industrial processors. The first transforms natural materials into intermediate products. An example is an abattoir in the meat industry, which delivers some of its products, such as fresh meat, directly to customers through wholesalers and retailers. The abattoir may also supply products to the processor of consumer products (e.g., sausage or ham producers). In other fresh food value chains such as dairy, only one type of producer is part of the value chain.

Within the past few years, the fresh food value chain has been subject to significant changes. Internationalization is an important factor, as many companies have quit their traditional orientation to domestic markets and become increasingly global. Another clear trend is toward consolidation across all stages of the fresh food industry value chain, from farmers to processors to retailers. The rise of private labels has also affected the value chain. These private labels, launched as the brands of individual retailers, are achieving remarkable market share and retail margins.

Private labels are closely related to another specific retail channel, the discount, which is characterized by limited assortments, concentration on only a few suppliers and price leadership in most categories. These various changes in the value chain have influenced the balance of power between retailers and manufacturers in the food industry. Retailers are now in a position to demand higher value chain performance from manufacturers, resulting in improved lead times and reduced average size of retail orders.

All of these developments lead to growing pressure on cost margins for all participants in the fresh food value chain. Many items yield very low margins. Today, food prices in the Western world are probably the lowest they have been in relation to average salary. Therefore, effective management of the value chain will be a decisive factor in the future success of all participants.

In the fresh food industry, effective management of the value chain is crucial and includes tight shelf life monitoring and active shelf life management, which both affect cost and revenue. With respect to costs, the main benefits of value chain management include reduced waste of raw materials and intermediate and final products, as well as optimized set-up and cleaning costs. The effects on the revenue side are even more important, as consumers usually tend to buy products that have the longest possible shelf life. In addition, retailers demand that manufacturers deliver products that are as fresh as possible and, in general, refuse products if a third of their shelf life has already passed.

Longer shelf life is a pivotal competitive advantage for fresh food producers. Therefore, value chain management systems provide significant support for the planning process. Driven by developments in supply chain management and information technology, value chain management systems focus on material restrictions and capacity constraints at the same time. This is an important differentiating factor, since the widely-used and implemented Enterprise Resource Planning (ERP) systems address these topics only successively. The entire value chain network could be optimized by integrating several production sites, distribution centers, suppliers and customers into a single planning model. Surprisingly, in the fresh food industry, the number of value chain management systems being implemented has not increased significantly. The leading providers report rather low numbers but no considerable implementation in these industries.

As this detailed analysis has revealed, shelf life management supports these systems with several existing basic functions. Available data fields provide information about total product shelf life, minimum maturation time and the customer's minimum requirement for shelf life. Because shelf life is not only relevant for final products but also for raw materials and intermediate products, value chain system production scheduling modules usually report shelf life daily and continuously (Luetke-Entrup 2005). In addition, various alerts are scheduled when shelf life exceeds product maturation times or minimum customer requirements.

However, at present, value chain management systems are not technically mature. Some important shelf life functions related to fresh food production are currently available only in selected systems or not at all. Examples are missing data parameters on minimum and maximum maturation times or blocking and quarantine times; missing support of shelf life propagation (when the shelf life of a product depends on the shelf life of the raw materials, as in the processing of fruits and vegetables); or an incentive to optimize the freshness of the products. These technical problems must be solved.

Management of the fresh food value chain is a compound challenge, with shelf life remaining an essential issue. Organization of the entire value chain could be considerably improved by management systems that bring more profit to the entire chain, including manufacturers, retailers and consumers. Without management systems that provide optimized coverage of shelf life, a pivotal precondition for success is missing.

Assortment Management in the Retail Industry

Value chain management in the retail industry provides significant opportunities for improving efficiency and effectiveness in the core competence of the retailer: managing the store assortment. Using modern merchandise management systems, retailers can optimize their value chain on the strategic, tactical and operational levels.

Value chain management and performance concepts, as well as skillfully implemented merchandise management systems, need to take into consideration the following retail-specific challenges and requirements:

- Retailers' assortment management is challenged by increasing uncertainty in consumer demand that causes lengthy response times for stock replenishment and order fulfillment. Because of these long response times, the outlet's safety-stock increases. At the other end of the value chain, suppliers' safety stock also rises because of poor communication about changes in demand. Additional problems are a high number of reconsignments and internal transfers of items involving too many extra trucks between distribution centers and stores.
- The order-to-cash cycle is often too long, driven by as-is order scheduling. Retailers without an effective merchandise management system also have no chance of quickly tracking items linked to an order because the status of orders is not transparent.
- Another well-known problem is a potential stock-out before any alert or corrective action can take place. And lastly, unnecessary order schedule changes can consume time and cost.
- From the retailer's perspective, it is often not possible to monitor the supplier's performance and their contribution to profitable operations.

Modern value chain management concepts and merchandise management systems are automating major value chain management and monitoring processes on the strategic, tactical and operative levels and provide valuable information for strategic activities.

On the strategic level, an assortment and portfolio management system includes the analysis of items by categories and also keeps track of individual stock-keeping units (SKUs) detailed by sales and performance. This key information optimizes strategy related to market position, assortment, pricing, sales format, distribution and suppliers. Items with high turnaround rates, season-relevant items

and the management of fillers is part of the issues that require strategic management. Events such as permanent delays and poor quality of merchandise from Asian suppliers can result in the selection of a local supplier, especially for valuable or luxury goods. Having a well-defined strategy with the related KPIs is input for the tactical planning of the assortment volumes and value.

Tactical activities for retailers include planning order volumes and values, especially for goods with long order times. In this case, the lead time specifics of global value chain networks need to be considered; an example is the next seasonal textile collection which is produced in Far East and has a production and shipment duration of about three months. Planning order volumes and exact timing are important to meeting season-dependent customer demand. Modern value chain management processes are driven by category managers who can determine and manage volume flows based on historical and anticipated market data; in the case of textiles, they must also consider product details such as colors, sizes and quality. Tactical value chain monitoring of planned volumes and incoming deliveries is a key task in this context.

Pricing and promotion management are additional tactical sales activities impacting volumes and values in the entire value chain. By tracking sales rates at different price levels through the year, reliable forecasts can be made to achieve optimal prices. Price management is an important aspect of promotions, which change almost weekly.

Promotion planning begins nearly one year in advance and is updated during the year. Constant monitoring of different events is required to launch the best weekly promotion. For example, current bad publicity about a meat product must be reflected in a promotion and lead to changed orders, otherwise tons of meat will go unsold. Other events to be monitored are the unavailability or shortage of items expected to be promoted, or a significant change in weather such as a heat wave that brings increased demand for beverages, ice cream and barbecue-related products. Depending on the status of printing and distribution of promotional materials, different responses are necessary. If there is still time to make a change, one potential response is to substitute the planned product by an alternative one. If an advertisement is already published, all stores must be filled with minimal amounts and additional orders to the supplier or other retailers need to be organized. The worst case is an early stock-out, which can be handled by offering a substitute product for the same price in the stores.

On the level of operations, retailers have recently put their highest emphasis on developing better processes and systems for automating operations. Nowadays, sales representatives in outlets can order directly online at the shelves instead of writing lists and calling suppliers. In the past, allocation of goods was made on paper in the distribution centers; today Pick-by-Voice systems facilitate item handling and also improve quality and reduce processing time. Online systems monitor major operational activities along the value chain and take corrective actions and provide alerts depending on the values of the recognized events. Automated solutions recognize defined, repeated events that cause trouble in the value chain

and corrective action can be taken. Table 1 shows a number of typical events that can be foreseen and the automatic actions that can be taken to correct them.

Table 1: Events and actions in retail assortment management

Events (Selection)	Actions (Selection)
Missing item in an order	If possible, reorder the item for the next delivery.
Wrong delivery of an order	Initiate a reshipment of goods that are not listed or not needed.
Delay in delivery	Provide an alert and prepare an alternative order for approval.
Stock at the distribution center is below the level of orders	Regroup orders to match as many as possible. Initiate new orders.

In summary, value chain management, including performance management and monitoring of assortment-related topics, are of key importance to retailers. Corrective tasks can be found on strategic, tactical and operative levels. Automated monitoring and event management are most relevant on the operative level, while transparency and decision support, such as support from the merchandise management system, are required on the tactical and strategic levels.

Summary

Performance management is an integral part of a value chain management framework. It must match strategic, tactical and operative process levels as well as interface with IT and organization management. Performance management itself must distinguish strategic and tactical cockpits based on KPIs for top management. Operative monitoring and event management must steer daily transactions. IT and automated event management solutions are more suitable for application on the operative level, while tactical and strategic performance management require human interaction and decision making.

These three industry examples show that each industry faces unique requirements, performance management issues and items to be managed. Inventory management is a key issue for high capital-intensive bulk chemicals; shelf life is a specific concern in the fresh food industry; and assortment management is crucial in retail, given the high complexity and different turnaround rates of selections in the stores. With these three industries as illustrations, scientists and practitioners should take industry-specific issues into consideration as they develop management concepts and software solutions.

References

- Kilcast, D., Subramaniam, P. The stability and shelf life of food. Cambridge: Woodhead, 2000.
- Lütke Entrup, M., *Advanced Planning in Fresh Food Industries*. Heidelberg: Physica-Verlag, 2005.
- Porter, M., *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press, 1985.
- Schulz, O., Kannegiesser, M., Disteldorf, H.: Inventory level – A corporate fever curve - Holistic inventory management is more than monitoring capital employed. *A.T. Kearney Executive Brief*. Dusseldorf, 2006.
- Schulz, O., Kannegiesser, M., Disteldorf, H.: Supply chain management – what’s next? Value chain management is turning into a key lever to boost profitability. *A.T. Kearney Executive Brief*. Düsseldorf, 2007.
- Stadtler, H., Supply chain management - An overview, In: H. Stadtler, C. Kilger (eds.), *Supply Chain Management and Advanced Planning*, 3rd ed. Berlin: Springer, 2004, 9-36 (a).

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