FOOD & BEVERAGE

Conquering supply chain complexity in food and beverage

The food and beverage industry is undergoing fundamental changes in how consumers buy and what they want to know about the products. At the same time, the industry faces an **increased focus on healthy eating** by consumers, companies, and governments. Adding to this is a rapidly changing competitive environment with a proliferation of new channels, producers, and products that compete with established brands and outlets.

If these challenges weren't already enough, today's companies are also facing unprecedented changes that stress innovation, business model evolution, and supply chain agility. Having the right products with the right content and characteristics, and the right information clearly displayed is necessary. But even all that isn't enough to guarantee success. The products must also be positioned in the right places at the right time for customers to be able to buy—and that's the job of the supply chain.

To keep up with all of this, an effective food and beverage supply chain must be fully in sync with the consumer through technology-enabled sensing to satisfy multiple channels with seamless visibility and fulfillment.

Re-engineering the supply chain

Once a slow-moving industry, dominated by shelf life and inventory challenges, food and beverage manufacturing and distribution companies are facing a perfect storm of **changing demand and expectations**.

These changes are primarily being driven by:

- How consumers buy, and what they want to know about products—including ingredient labeling, removal of undesirable ingredients, and sustainability information
- Increased focus on health by consumers, interest groups, companies, and governments—including nutrition, healthy/unhealthy content (artificial ingredients, GMOs, sugar, salt, etc.), and environmental practices
- Changing supply chain realities—including new channels and the growth of multiple channels (omni-channel), an influx of new producers and new products to compete with established branded manufacturers

Innovative products, producers, and distribution models are evolving to meet these challenges. As the mechanism that links supply and demand and brings the products into the hands of the consumers, the supply chain is at the eye of this storm. Supply chain agility, enabled by **sense-and-respond technologies**, is increasingly important for maintaining an effective response to changing market demands. Powered by the Industrial Internet of Things (IIoT) via the proliferation of connected sensors and smart devices, supply chain managers can now "see" events and activities in real time, while monitoring and analytics programs can immediately detect emerging situations and even initiate corrective action automatically.

Being innovative isn't just about creating new products. It's about value creation. The value delivered to the customer includes not only the physical product but also the information, availability, price, and perceived benefits (echoing the market four Ps of product, placement, promotion, and price). As such, improvements in any areas of value delivery add to competitiveness. Interestingly, innovation flows in both directions—from company to customer and vice versa. The digital world of social media and the Internet of Things (IoT) helps to create a new level of customer intimacy that both enhances the customer experience (adding value) and supports the need for more comprehensive and immediate sensing to drive supply chain agility.

While not traditionally distributed through e-commerce, food and beverage products are quickly moving in that direction. It's estimated that **global food e-commerce sales** will nearly triple through 2023, rising to $321 billion, and account for nearly 5% of total e-commerce revenues.

Food and beverage producers are increasingly required to reengineer their supply chains to operate in omni-channel distribution. Existing resources and management structures must adapt to serve multiple sources of demand to accommodate large quantity wholesale shipments and large numbers of small quantity consumer sales at the same time. To do this:

- Omni-channel distribution must be embedded into company strategy—and in its supply chain.
- The infrastructure must be adapted to serve the different types of demand responsively and efficiently.
- IT systems and technologies must support seamless visibility and fulfillment from end to end.

By nature, the food and beverage business is dynamic. The availability of supply is often unpredictable and ever changing. And it's not much better on the demand side.

Addressing the supply-demand challenge

For virtually any production and distribution organization, success depends on attaining the right balance between supply and demand. The right products must be in the right place at the right time—when and where customers want and expect them. The products need to be fresh and have a remaining shelf life if the products aren't to be consumed immediately. Producers must understand and follow demand, while managing supply and service-level agreements (SLAs) to meet availability goals.

It all starts with the forecast that needs to be as detailed and specific as possible—by location and by product—and it must be updated frequently to capture any changes or deviations. Distribution has to be flexible and responsive. Production must be agile, to accommodate changes in both sourcing and demand. And sourcing and production need to continually coordinate activities to effectively use the resources they have available to keep the pipelines flowing smoothly and efficiently.

Food and beverage supply chains cope with some additional requirements that aren't common outside of the industry. Many raw materials are agricultural or harvested from nature—so availability is seasonal; quality, purity, and nutritional attributes may vary; and supplies may only be available from specific regions of the world at specific times of the year.

Most food and beverage products face intense competition, which means that marketing and distribution are critical elements of success, and quality is especially important to maintaining a good product and producer reputation in the marketplace. All food and beverage products have a limit to their shelf life, adding another level of complexity to inventory control, distribution efficiency, and coordination of supply and demand. And because food and beverage items are by nature intended for human consumption, health and safety requirements are particularly demanding. Track-and-trace, deep and detailed quality processes, and audit trails are critical business requirements.

All the requirements described above play a role in matching supply and demand, which is essential for success. They can be seen as complicating factors that underlie any consideration of coordination/collaboration, agility, and planning. As the focus of supply and demand operations, the supply chain is responsible for understanding demand and delivering products to satisfy customers by sensing and responding to demand. Keep in mind that the supply chain is not limited to external operations and partners—internal production and inventory operations provide the vital link between raw material acquisition and product distribution.

Improving supply chain collaboration

While the perception is that companies compete with other companies, it's more like supply chains compete with supply chains. Companies are increasingly dependent on trading partners—suppliers, transportation providers, distributors, retailers, and more—to acquire, produce, and deliver products to customers. To be effective, the supply chain must be set up to provide incentives for each participating organization to share information and fully support the overall goals of meeting demand and making a profit.

For most of today's supply chains, collaboration is a combination of some data sharing and some coordination on the forecast. In fact, collaboration and data sharing are key strategies employed by many supply chains to improve performance, reduce inventory, and increase availability—no matter what strategy is employed in the distribution chain.

Fortunately, new technologies are extending both the extent of collaboration possibilities and the impact of the collaboration. Today's enterprise resource planning (ERP) and supply chain systems incorporate the increased visibility of IoT with data sharing and collaborative functions like workbenches, supplier and customer portals, and direct links between systems—all aimed at facilitating joint awareness and coordinated decision-making.

The need for collaboration spans the supply chain from the suppliers' suppliers to the far end of the distribution chain. It also includes appropriate links to and through internal resources. One industry best practice is to enable and support collaboration through industry-specific workflows that transcend the internal information silos and bring trading partners into the loop at the same time. Jointly developed and managed intelligence supports more precise and appropriate scheduling; tighter inventory management; reduced costs for logistics; and better management visibility for financial modeling, planning, and performance monitoring. The result is fresher products delivered to customers.

Collaboration is especially important on the demand side. Because downstream partners are closer to the ultimate consumer, they likely have deeper insight and more timely information about demand, competition, and market conditions that can translate into more accurate forecasts. It's particularly important for food and beverage manufacturers to model the peculiarities of their specific market. Partners can help fill in the details, such as the seasonality and variation of demand, changing consumer preferences (including product variants like package size, different presentation, and derivative products), and more.

This collaboration is often focused on the forecast and sales-and-operations plan. Forecasting, which is critically important in consumer goods markets, benefits from any insights and data that can be gathered from other members of the supply chain. The forecasting process can benefit greatly from collaborative input from distributors, dealers, retailers, and customers. These supply chain partners are closest to the actual consumer and likely have more information and insight of consumer habits, interests, and plans that they can bring into the forecasting process.

Beyond forecasting, information about actual demand—as close to real time as possible—helps direct distribution operations to respond to on-going demand changes and refine forecasts at a micro level (such as individual stores, outlets, and distribution points).

Key supply chain collaboration strategies include:

- **"Push"**—When the supplier takes responsibility for managing distribution inventory
- **"Pull"**—When the priority is based on order flow from the consumer-end up the chain to the supplier
- **Hybrid approach**—When push at the supplier end (for optimum inventory and transportation performance) is combined with pull at the retail end (to maximize availability and customer service)
- **Plan-based approach**—A more focused approach that can use either push or pull methods, such as distribution requirements planning (DRP)

Emerging IoT and social media inputs add a new dimension to demand tracking and prediction tasks. It's now far easier to gain insight into what consumers are thinking, as they increasingly share their observations and feelings on open social media networks. While this is certainly not scientific polling, it's nonetheless good market intelligence that can help spot emerging trends before they show up in sales statistics.

Real-time transparency of demand signals, inventory positions, shipment status, in-transit goods, and actual sales enable the supply chain to "substitute information for inventory" by reducing uncertainty and providing the earliest possible warning of any changes or occurrences that might affect availability or efficient operations. This helps the supply chain become more proactive in responding to the dynamics of the market. As the various parts of the supply chain are brought together by shared data and operational coordination, common metrics will drive collective success.

Developing an agile supply chain

Another key to supply chain success in food and beverage is agility in the ability to change. In the supply chain, being agile means being able to change production rates (either up or down); change product mixes; introduce new products or withdraw existing products; serve new markets; or redirect distribution of products without undue delay, disruption, or prohibitive extra cost.

The need for agility is spurred by the recognition that things change, and being able to deal with those changes quickly and effectively is a prime requirement for overall success. The food and beverage supply chain tends to be more subject to change than many other product markets.

The seasonal and difficult-to-predict availability of raw materials makes it difficult to plan production and avoid inefficient peaks and valleys. So, production resources must be able to adapt to changing schedules and inconsistent loading.

Demand is also a factor, which not only varies with seasons, pricing changes, competitive offerings, and changing consumer preferences, but is also subject to unexpected swings brought on by unusual events. A quality issue or recall in one product—even a competitor's product—can cause immediate and dramatic changes in demand for similar and competing products, and possibly even for unrelated products from the same supplier. Fast reaction is absolutely essential to avoid being stuck with huge amounts of aging, unsellable inventory or missed market opportunities when demand shifts to a food and beverage manufacturer's products.

An agile supply chain is built on a closed loop collaborative infrastructure. Since most supply chains today are highly dependent on partnerships—outsourced functions not owned or controlled by the producer—those "outside" participants must also be agile and know immediately what changed and what's required to respond to the change.

A collaborative infrastructure pays off (in addition to improving forecast accuracy and responsiveness) by helping to coordinate information and activities that are key to food and beverage manufacturers' ability to quickly respond to changing conditions.

On the production side, agility is embedded in flexible systems—minimum set-up and changeover time between products and variants. Quicker changeover also costs less, increases the productive use of resources, and makes smaller batch sizes more economical.

Shorter lead times add to the ability to respond to changing demand. Most of the lead time to produce a product and get it to the retailer or customer is on the procurement side and in distribution. So, it pays to work with suppliers and transportation providers to make those times as short as possible. Food and beverage manufacturers should encourage suppliers to reduce their order lead times. Where appropriate, it's also a good idea to cooperate on ways to stage materials within reasonable traveling distance of the plant in anticipation of short-notice needs. Obviously, this won't work with perishables. But a shortage of packaging materials or labels can stop the production line just as effectively as a shortage of the product itself.

Sharing plans and forecasts with suppliers allows them to build their production schedules to best match production and plant capabilities with a food and beverage manufacturer's needs. The sooner suppliers can be notified of late changes in schedule, the more time they have to adjust. Suppliers should be considered partners, not just vendors—working along with a food and beverage manufacturers to satisfy ever-changing customer demands.

Creating the right plan

Sales and operations planning (S&OP) is the focal point for balancing demand and supply and thus is the core process for demand and production planning. While S&OP is essential, it's not the whole answer. It is, however, where the broad range of planning functions comes together into one, overall plan.

Essentially, S&OP is the formalized process wherein:

- Demand planning builds on the forecast (newly updated at the beginning of each month, immediately after finalizing sales [demand] data from the month just completed) together with the distribution plan, which results in a statement of what the market will absorb and when. The final demand plan lists demand as it hits the plant.
- Production planning develops a first-cut supply plan (from the demand plan) and makes any needed adjustments to optimize the use of resources and meet as much of the demand as seems advisable.
- Demand and supply teams get together and work out any differences between the supply plan and the demand plan. The end result may include additional supply actions (overtime, outsourcing, adding people or equipment, or changing schedules or priorities to boost more profitable products at the expense of less profitable products). There may also be some identified actions on the demand management side (demand shaping), including promotions, pricing, incentive changes, or changes in distribution to match demand to the agreed-upon supply plan.
- During a one-hour meeting, the executive team (C-level executives from throughout the company) can approve the final plan, commit their respective departments to supporting the plan, and resolve any differences or decisions that were beyond the authority of the working teams that developed the recommended plan.

The sales and operations plan is essentially an internal document that specifies how the company's resources are to be used to meet demand and generate a profit. The plan can't be successfully executed, however, without the full support and cooperation of the other members of the supply chain. S&OP data must be shared with suppliers, distributors, transportation providers, and warehousing managers so they can confirm that they have the wherewithal to keep up their part of the plan and the will and commitment to do so. Ideally, they should have been consulted as the plan was being developed to ensure that they would be able to accommodate the level of business required to fulfill the plan's objectives.

A critical part of S&OP is distribution, which can be overlooked in the planning process. The terminology of S&OP doesn't really recognize its importance—tucked away within the demand planning process. Nevertheless, demand planning may start with the forecast (at each retail outlet or consumer touch-point), but then it must be carried up through the distribution network to derive what actual demand will be at the plant. Distribution, transportation and warehousing can be outsourced functions and may represent a significant cost of business. They must be carefully planned, coordinated, and managed. Information sharing and collaboration are essential tools for this process to succeed.

Connecting the plan to operations

While it is hardly ever discussed as a separate topic, sales and operations execution—connecting the plan to real operations—is equally important to supply chain success. Having up-to-date information and fully updated plans and strategies is essential, but the plans must be executed effectively and efficiently. Integrated systems provide the link between planning and execution and enable the closed-loop environment where sense-and-respond actually takes place.

Sensing—including planning and collaboration—is only a part of the equation. There's also the other half of the equation—execution. At the heart of every manufacturing or distribution company's technology strategy is an ERP system that is designed to manage information from throughout the enterprise in an integrated, closed-loop planning, and execution infrastructure. For food and beverage manufacturers, it's essential that their ERP systems recognize the realities and unique requirements of their products and markets—including potency of ingredients, co-products and by-products, graded ingredients and products, and shelf life.

Today's ERP systems extend beyond the traditional manufacturing system boundaries to either include or tightly integrate with the shop floor manufacturing execution systems (MES) and supply chain systems. The supply chain systems can include demand management, inventory optimization, warehouse management, transportation management, S&OP, customer relationship management (CRM) systems, and more. The term "enterprise systems" should be considered to include this extended view of ERP systems and the integrated ecosystem of solutions that make up the modern manufacturing and distribution supply chain infrastructure.

Integration is the most important characteristic of today's enterprise systems. All data is managed and controlled in a common relational database (or technologically integrated, fully synchronized databases). All needed information is instantly available to all participants, with no duplication or confusion over who has the latest and most accurate data. That's what enables the planning-execution link. Current plans and strategies are available at all times to the executing functions. Activities, events, occurrences, and status reports are instantly available at all times to all participants. This information is also shared with the system's planning functions, so that everyone is in the loop about what is happening and is empowered to accommodate any changes that may be detected.

Integrated systems play a key role in enabling collaboration and data sharing. Many systems now include electronic distribution of orders, acknowledgements, ship notices, provisional orders and plans, and other information directly to partners. In addition, many systems provide the ability to collaborate on forecasts or other documents synchronously or asynchronously over the Internet.

Food and beverage companies should take a good, hard look at their operations and technology and ask themselves:

- Do you have the necessary visibility of inventory levels, capacities, demands, in-transit inventory, and resources to respond to the changes that characterize today's markets and will become ever more significant in the future?
- Are your enterprise systems integrated in a closed loop that supports the sense-and-respond imperative for success in a rapidly changing environment?
- Have you set up (and are you using on a routine basis) collaboration links with suppliers, distributors, and retailers? Are you receiving and passing real-time data to key supply chain partners?
- Do you have an effective S&OP process in place with regular updating, continuous monitoring, and appropriate measurements to provide visibility and alignment to every operational function and supply chain partner?
- Is your plant floor control and management network fully integrated for bi-directional data and exchange for seamless execution and high agility?

Most systems support supplier portals and customer portals that allow trading partners to access information on a food and beverage manufacturer's systems at their convenience and enter information directly into the system (subject to security controls) through convenient, personalized windows into the items, orders, invoices, and schedules that define the relationship with the partner.

But technology is not the whole answer. A food and beverage manufacturer's choice in tools must be the right ones for its market and needs, effectively implemented, with knowledgeable and well-trained users who understand the information that drives the business and know how to use it to the organization's advantage.

Preparing the supply chain for success

Once a food and beverage manufacturer understands its current state of readiness, the next step is to develop a plan to bolster any areas that are lagging and bring the entire ecosystem up to the level needed to effectively apply sense-and-respond agility to supply chain operations. Whether or not additional technologies are required, it is imperative that:

- The overall corporate vision and strategy will need to be documented, updated, or enlarged to include an agile, collaborative view of the supply chain and information-based closed loop mode of operation.
- The entire organization, including trading partners, must be included in any restructuring of company policies, priorities, or strategies. A food and beverage manufacturer can't do this alone.
- Procedures will need updating, personnel will need training and orientation, and measurements and incentives must be redefined to reflect this new way of operating.
- All new systems, structures, procedures, and resources must be built for agility. Requirements and needs will change. A food and beverage manufacturer can't afford to get locked into resources that may prevent it from responding to those changed requirements.

Staying competitive in a challenging market

Food and beverage manufacturing is a challenging business, with constantly changing material availability, volatile demand, and an increasingly complex supply chain. Successful companies continually strive to balance supply and demand against these challenges by using information as a fundamental tool for planning, cooperating, and monitoring both conditions and performance.

Strong, secure, functionally rich, and flexible information systems play a key role in supply chain success, but they don't deliver benefits by themselves. They are simply enablers of the kind of information sharing and collaboration, planning and management, and measurement and improvement that are necessary to compete and grow. Ultimately, no company or supply chain can afford to have systems that either lack functionality or lack flexibility.

As food and beverage manufacturers strive for stability, or at least predictability, a healthy, well-functioning supply chain based on coordination, agility, and planning is the best secret to success.

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