

How Technology Delivers Mass Personalization for Food Supply Chains

As Consumer Tastes Increase Complexity, Companies Must Find the Right Blend of Technology and Business Processes to Keep Pace



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Executive Summary

In 2015, grocery, restaurant and food services accounted for over 20 percent of U.S. retail spending.¹ Food choices have evolved from simply being about nourishment to becoming a statement of character akin to statements on personal fashion. People have become defined by the restaurants they frequent or by espousing a vegan, gluten-free or paleo diet. Consumers frequently scrutinize their food: Is it GMO-free or organic? On social media channels, people are exchanging recipes on Pinterest, friends are checking in at the latest sushi bar on Facebook or posting a picture of their In-N-Out burgers on Instagram. Food has become a part of who we are, or at least a part of the image we want to convey. Foodie has become a moniker many wear proudly!

Layer these realities onto an already complex supply chain and it's clear what a daunting task food purveyors face. The food supply chain is challenging enough when it comes to the growing, harvesting, processing, transporting and distribution of food so that humans can safely consume it. As grocers, food manufacturers and restaurants strive to keep up with consumers' needs and preferences, they must have the discipline to continually explore how technologies and processes can buttress their efforts to meet the evolving demands of regulatory compliance and consumer preferences. In addition, they must continuously battle for profit margin and market share that are being threatened from multiple angles.

This report looks at what companies in the food supply chain need to consider to thrive in these challenging times. Sticking to "business as usual" not only threatens these businesses but also prevents them from seizing significant opportunities. This report offers insights on four of Constellation's business research themes: Consumerization of Technology, Matrix Commerce, Data to Decisions, and Technology Optimization & Innovation.

Customers Seek Mass Personalization at Scale and Food Supply Chains Must Respond

Consumer expectations and mass personalization at scale drive the food supply chain evolution. Today's supermarkets and restaurants offer unprecedented variety and selection. The modern food supply chain is complex and is crucial to not only the retail space but also to society's ability to function.

Both the grocery segment and the restaurant sector face intense pressures from consumers to constantly evolve. They must evolve both in the products they offer but also the services associated with their distribution. Constellation sees five growing demands that affect food supply chains:

- 1. Growing desire for more locally sourced products.** Looking toward 2016, the National Restaurant Association identified the top 20 food trends in restaurants, which included locally sourced meats and seafood, locally-grown produce and hyper-

¹ "Estimated Monthly Sales for Retail and Food Services, by Kinds of Business," U.S. Census Bureau, January 15, 2016. Overall retail sales in the U.S. for 2015 were \$5.3 trillion. Of that total, food and beverage stores accounted for \$606 billion and food services and drinking places for \$622 billion.



local sourcing.² This localization spins a more complicated web for sourcing nodes and distribution channels. It also adds a layer of complexity when it comes to tracking, tracing and ensuring the quality and integrity of food sources. While the food may travel a shorter distance, it comes from a larger number of smaller sources.

- 2. Ever changing sophistication of consumer desires.** Look in an American supermarket and you'll see there are typically over 48,000 products for sale, which is more than five times the number of products available in 1975, according to the Food Marketing Institute.³ Consumers not only demand this variety of products but also a mix within a variety. Whether these products are GMO-free, gluten free, have added fiber or are organic (to name a few possibilities), this combination of more products that are more complex brings new challenges to the supply chain.
- 3. Mass migration of populations from rural to urban settings.** There continues to be a movement toward urbanization. According to the World Bank, by 2050, two-thirds of the world population will be living in cities.⁴ Why does this place a strain on the supply chain? While customers are more concentrated, the ability to replenish densely populated cities that are already clogged will only get worse. Space in these locations is also strained, making it challenging to store refrigerated or bulky items.
- 4. Mass blending and evolution of distribution points.** Food distribution has continued to evolve. From grocery stores to convenience stores, consumers are able to purchase groceries from an ever-growing number of places. Grocery stores offer finished meals, competing with restaurants. New delivery services such as Plated or Healthy Chef Creations threaten the grocery stores. Even convenience stores such as Duane Reade offer groceries and finished meals. Grocers' and restaurants' market shares are being threatened from multiple angles.
- 5. Support for ever growing regulations around food safety.** Expensive, cumbersome and piecemeal approaches to addressing food safety regulations no longer pass muster. Participants in the food supply chain must all assume responsibility to ensure the integrity of the products. Food-borne sicknesses such as the 2015 crisis with some Chipotle restaurants must be avoided. In addition, contingency plans must be maintained to rapidly address the situation if and when such an issue arises.

Taken together, these trends are forcing both restaurants and grocers to continue to work on their supply chains and the supporting technology and business processes that can help them keep pace with what consumers expect.

² "What's Hot in 2016, Chefs Predict Top 20 Restaurant Menu Trends for 2016," National Restaurant Association, <http://www.multivu.com/players/English/7077455-nra-what-s-hot-forecast-2016/>.

³ "The Tyranny of Choice, You Choose, If You Can Have Everything in 57 Varieties, Making Decisions Becomes Hard Work," The Economist, December 16, 2010, <http://www.economist.com/node/17723028>.

⁴ "World Urbanization Prospects, The 2014 Revision," page 1, United Nations, 2014, <http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf>.



Disruptive Technologies Revolutionize the Food Supply Chain, Starting on the Farm

For the most part, the majority of the food supply still begins on a farm. Large farms in North America have already gravitated toward greater adoption of disruptive technologies to better manage their yields. Simply look at how manufacturers such as John Deere and Toro, to name a few, are bringing machines to the farm that are fully equipped for the Internet of Things (IoT). This equipment relies on connected sensors, GPS and enhanced analytics to better manage crops. By using such technology, farmers can understand which fields will yield what quantity and quality of produce. They can measure a host of data such as sun exposure, water intake, and growing pace, to a name a few. This provides the food supply chain with a first view into what can be expected with regard to the raw materials that are so crucial to a multitude of products.

This ability to monitor and control the farming is becoming ever more crucial. For example, when water-intense crops such as almonds are being grown in California, which has fluctuating water access, the ability to use technology to better monitor and manage these crops is vital. Greater connectivity and remote management also open up new locations for food harvesting. For example, Catalina Sea Ranch, which is offshore southern California, is able to harvest seafood such as mussels, oysters and clams in ocean farms. These inhospitable locations are put in play with technological evolution – specifically, IoT sensors that can withstand the ocean environment. Finally, as a shrinking agricultural labor force operates a greater number of farms, technology to monitor and manage yields becomes paramount to maximizing assets. Smart infrastructure, better use of sensors on fields, and machines that tend to the crops are all examples of how the food supply chain is using disruptive technologies at the source of production.

The question becomes: Can the rest of the food supply chain use this data? Efficient growing is not only important to the farmers, but to the entire supply chain. Being able to foresee potential shortages in material or wild fluctuations in costs is important throughout the food supply chain. Large producers such as ConAgra, General Mills or Kraft Foods need to get ahead of costs associated with the sourcing of these materials. How will cost fluctuations affect products that rely on these materials to be manufactured? How will they affect production costs and profit margins? Later distribution points such as grocery stores or restaurants need to think about how they can integrate this information into what will end up on their shelves and in their kitchens. This leads to a second change in the food supply chain that is becoming increasingly important.

Visibility and Traceability at Distribution Nodes Take Advantage of Sensors and IoT

Visibility throughout the transportation and movement of food products is crucial. Being able to ensure the safety of the product once consumed is the most important characteristic of the food supply chain. Retailers must continue to take advantage of cheaper sensors and technical systems to better track their products once they leave the farm. This is especially important when it comes to food integrity, since the majority of safety issues come from



the handling process. One of Chipotle's food poisoning problems in 2015 was due to poor handling of the products, not the products themselves.

Confectioners such as Hershey's and Dylan's Candy are already adding sensors to their transportation to ensure products are properly handled and delivered to their final destinations. It is crucial to not only understand when and how products arrive, but it is vital to understand the way the product is being handled along that journey. Dylan's Candy, for example, must ensure that its main product, chocolate, stays within a specific temperature range, plus or minus five degrees.

Grocers such as Whole Foods are looking to find ways to better trace products that arrive in their stores. When a crate of carrots arrives at a store, it might become part of close to 100 finished products, such as soups, salads or muffins, to name a few. How can Whole Foods better trace that original crate of carrots as well as all the finished products that carrots become part of? The need for more precise and timely traceability is vital throughout these nodes in the supply chain.

Traceability might be even more important for perishable products that may also carry food-borne disease if not properly handled, such as meat. Companies like Checkpoint Solutions are working with grocers to bring better technology into grocery meat departments. Adding RFID tagging to meat packaging brings a much more sophisticated degree of intelligence to the product that sits in the meat aisle. This detailed information on specific meat SKUs allows grocers to better manage their shelves. When should they discount product, how should they better display the product, and at what point should they remove the product from the shelves? Because meat is a high margin but perishable product, it is crucial for grocers to optimize this product. The rich data that RFID tagging can add allows for vast improvements in the flowthrough and monetization of the meat aisle.

Grocery retailers can look at how they can bring enhanced technologies to provide greater visibility into their product lines. Being able to have deeper data on all their products will allow a more sophisticated understanding of which products move and which are more profitable, as well as allow for enhanced product safety.

Data Provides a Key Competitive Weapon for Market Leaders

Leaders wanting to make profitable decisions must employ technological solutions to extract actionable and timely insights from data. Being able to pull more data and insights is vital to the evolution of the supply chain. However, collecting more data for the sake of the data is not necessarily a goal. Food retailers must take the next step and employ more sophisticated technologies to extract sharper insights and draw more patterns in the data lakes they are creating.

Recipes are an important part of the food supply chain; these recipes contain a number of ingredients that have a number of variables. These variables range from perishability to taste and prices. The opportunity is to aggregate these variables and to understand how these variables can affect the final product as well as the customer experience.



For example, solution providers such as SCA Technologies are working with large restaurant chains to bring visibility into the volume and pace of data that flows between suppliers and restaurants. This visibility can add intelligence to the restaurants' planning and execution processes. Data on pricing, volume, mix, and suppliers, to name a few, are crucial to gaining a better handle on the availability of food ingredients as well as associated costs.

Restaurants and retailers need to ensure availability of product at the point of consumption. Optimized use of data to understand the total costs and the true availability of supply is the result of employing new software and technical solutions.

However, what is more powerful about these platforms is the opportunity for restaurants to be much savvier about margin protection and growth. Real-time data driven through analytical software engines enables faster, more profitable decision-making. For example, one restaurant that used the SCA Technologies software platform used real-time data on commodity pricing and availability coupled with enhanced supplier collaboration to make the process around new product introduction much more predictable. The restaurant was able to reintroduce a limited-time offer at a more optimal time due to the insights emerging from the data as opposed to following a "that's how we have always done it" methodology for product rotations and promotions. Due to these insights and recommendations, the restaurant reduced its overall costs by 5 percent while improving profitability on the product by 30 percent.

Supply chains have always been heavily dependent on data. The food supply chain is no exception. Couple this with variables such as perishability, shelf life, recipe mix, commodity price fluctuation, to name a few, and the ability to better use data in the management of food processes takes on greater significance. There is an important opportunity for cloud-based data-handling software to bring the scale and flexibility necessary to keep pace with the changing winds in the food industry. As restaurants and grocers look to keep up with consumer demands around food sourcing, the ability to quickly add new sources and their data can be handled by these platforms. Timely and actionable data is available to the food supply chain. It is up to food businesses to seize the opportunity.

New Technologies Must Be Woven into the Food Supply Chain to Keep Up with the Consumer

The food supply chain, both in supermarkets as well as restaurants, is witnessing an evolution that is driven primarily by the consumer. Retailers as a whole have been deeply affected by the shifting and growing power of the consumer. As a result of the growing complexities and challenges arising from shifting consumer preferences, food producers and sellers need to look at:

- **Continued usage of disruptive technology to collect data.** Whether it is revisiting RFID or investing in more advanced forms of the IoT, there are new technologies that allow food retailers to extract a larger amount of data from sources otherwise untapped. Some of the data is also available in real time, offering a new dimension to what the data can power. CxOs must constantly work their data strategy, figure out what real-time data is necessary, and determine the volumes of



data that can be collected. But this collection will not be very helpful if the data does not lead to actionable outcomes.

- **Better business processes to improve the supply chain.** Data, data, data - this can be said for a host of industries. But when it comes to a product that is eaten, data can be used not only for a better understanding of how to provide services or offerings, but also to ensure the safety and integrity of the products. Grocers and restaurants need to not only understand which types and quantities of data to collect, but which analytical software engines to employ. The data can be used to improve processes but also to uncover new opportunities otherwise not imagined. Keeping an open mind and seeking new processes with data is paramount for CxOs.
- **Employing new business models.** Mirroring other vertical industries in retailing, the food space is embracing new distribution models. Companies such as Blue Apron and Hello Fresh are bringing pre-made food boxes to customers' homes. Other firms such as Instacart are revisiting the grocery home delivery model. Grocery and restaurant supply chains need to take into consideration these new distribution models. How will the new models affect their businesses? Will they be competitive or complementary? CxOs in the food supply chain know that their market share is threatened from a number of angles and by new business models. Which of these are competitive situations and which models can they potentially adopt?

Consumers continue to take a different approach to food, making food more of a personal statement than simply about nourishment. These changing dynamics, coupled with a complicated supply chain, make this a challenging environment. However, more than ever, there are tools and technologies available to not only navigate these challenging seas but to flourish.

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Guy Courtin is Vice President and Principal Analyst at Constellation Research, covering Matrix Commerce.

Guy has over 15 years of experience in technology and specifically in the supply chain space. Most recently, he was Vice President of Research at SCM World, where he focused on the service providers that empower supply chains.

Prior to SCM World, Guy held numerous senior positions. He was responsible for product marketing at RSi, a retail supply chain solution provider. He managed RSi's go-to-market strategy around its leading cloud-based supply chain solutions. In addition, he spearheaded Progress Software's supply chain group, where he was responsible for driving revenue and market share as well as serving as an information resource on supply chain for clients and prospects. Guy also ran marketing for SmartOps and Technology Business Research as well as held senior marketing roles at i2 Technologies.

He began his career at Forrester Research, where he held both research and client-facing roles and watched the dot-com boom from a front row seat.

Guy holds an M.B.A. from the Olin School at Babson College, a master's degree from Loyola University in Chicago, and a bachelor's degree from The College of the Holy Cross. He has been quoted in publications such as American Shipper, Supply Chain Brain, Logistics Week, European Supply Chain Management and Supply Chain Management Review.



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