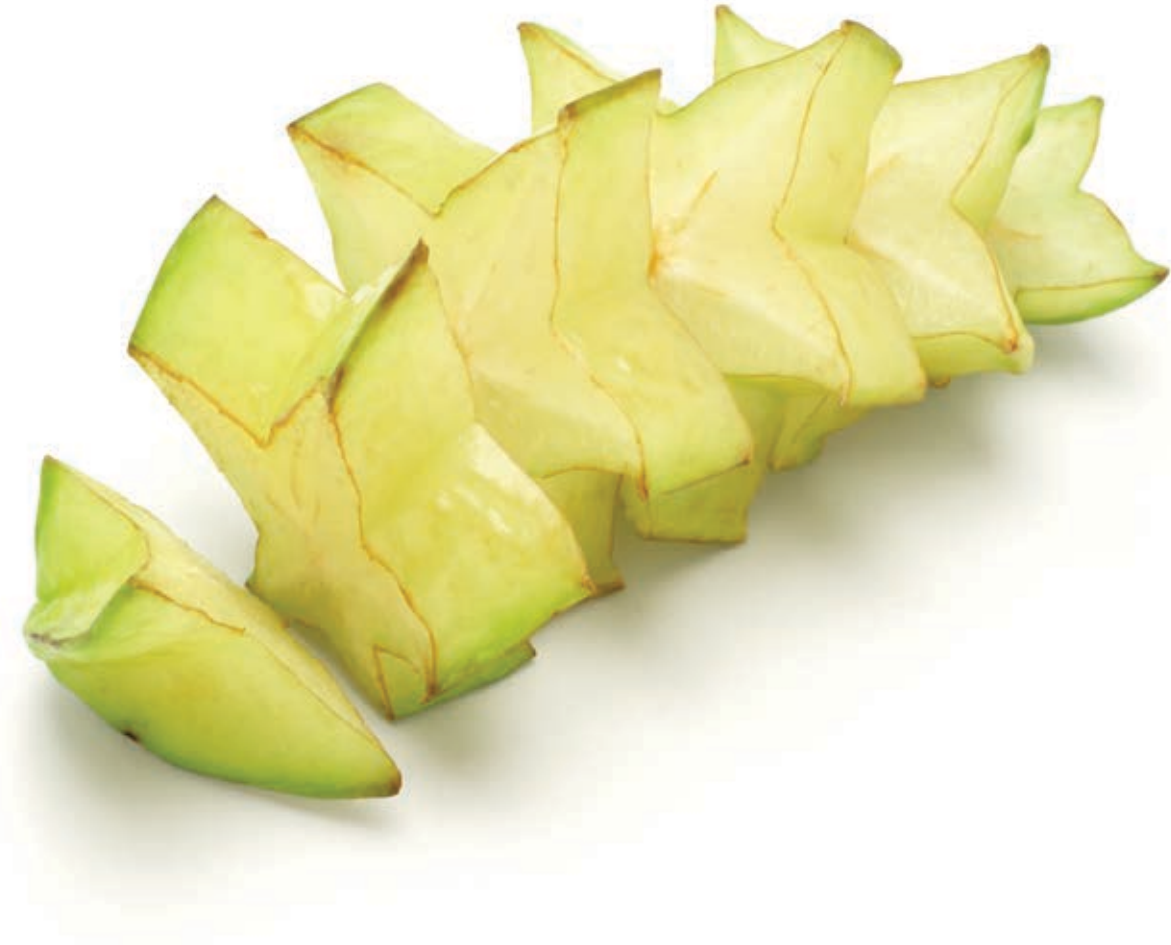


The food value chain
A challenge for the next century



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Introduction

In October 2011, the world population passed the 7 billion mark. This milestone was celebrated in the global media with photos of the symbolic 7 billionth baby, born in the Philippines. Clearly, such precision in accounting is impossible, but it is true that our population has reached a new record. Further, the world population is projected to exceed 10 billion¹ by the end of the century. Such growth will put a massive strain on the global food supply. Most of this growth will occur in emerging markets. These markets have traditionally been agriculture-based economies, but in recent years they have witnessed explosive growth of the middle class, driven by greater industrialization and urbanization. An emerging middle class creates changing dietary habits, such as consuming more meat and dairy. These foods are more resource intensive, which puts local supply chains under greater pressure. These factors alone make the production and distribution of food a critical issue for the 21st century.

While change in emerging markets is dramatic, the developed economies are also experiencing a shift in consumption patterns. Modern North American and European consumers are more health conscious than ever before. They are worried about the content of their food, its origin, freshness, and safety. These consumers are increasingly concerned about the sustainability of food production and its impact on the environment. Modern farming techniques, such as genetic modification, are being debated and are often perceived as negative. Buying local and the organic food movement are growing trends that have taken hold with the modern consumer.

Product distribution and sales channels are also changing. Retailers are increasing the number of convenience stores in strategic locations that cater to the “grab and go” consumer (e.g., gas stations, public transport stations). To supply these small shops, which maintain little inventory, the underlying distribution network must be able to match supply and demand with the rapid replenishment of stock. The food and beverage sector is also participating in the growing popularity of online shopping. To offset the costs of home delivery, companies will need to establish a network of convenient pickup points and closely collaborate with logistics partners.

Further complicating the global food supply chain is the resource intensity of food production. Water and energy are two scarce resources in heavy demand in the production and distribution of food. Water is a scarce commodity in many parts of the world where the population is growing the fastest. Climate change is also impacting water supply in some areas of the world. At the same time, pumping, treating, and moving large volumes of water requires a great deal of energy. Modern farms use large amounts of energy to plant, fertilize, irrigate, and harvest crops. In many cases, traditional fossil fuels are used to provide this energy, and a change to more sustainable energy resources will be required. Finally, commodities such as corn are now consumed as a source of energy as well as of food production and are therefore, more expensive. The result is a dramatic rise in the cost of food worldwide.

Such volatility and imbalance in the availability of resources relative to demand can be seen as a disaster in the making and something that only governments can solve. However, while government clearly has a role to play in regulating and facilitating trade, members of the food value chain are likeliest to have the most impact on solving these problems.

This document sets out the premise that the food industry, throughout the value chain, has a tremendous opportunity, as well as an obligation, to meet the needs of new, more sophisticated and more demanding consumers while satisfying shareholders’ demands for returns—and in doing so creating a sustainable food supply for the new millennium. The report addresses stakeholders across the value chain: producers, primary and value-added processors, retailers and distributors, consumers, and governments/NGOs/regulators. As the world’s largest advisory organization, with a large number of staff and clients in the food sector, Deloitte member firms are committed to helping those in the food value chain achieve this vision. We hope you find this report compelling.

Macro-level food trends

Two centuries of improvement

For the past 200 years, there has been a persistent concern that human population growth would not be met by sufficient increases in agricultural production. Yet the opposite has been true. The supply of food has increased dramatically, fueled by increasingly capital-intensive agriculture, continuing application of biological/genetic science to food production, greater ability to save crops from pests, and greater ability to preserve perishable products during transport.

Yet the question arises as to whether this process of improvement can continue to meet the needs of a growing and more affluent global population. The answer is probably yes. There remains plenty of room for increases in land productivity. Consider the fact that the amount of coarse grain yielded from a hectare of land in the United States is three times greater than the average for the rest of the world. If land productivity in the rest of the world can be increased, food production will rise accordingly.

This is important given the trends taking place in the global marketplace. In the coming decade, it is likely that a disproportionate share of global economic growth will take place in emerging markets. In these markets, the number of middle-class consumers will rise rapidly. In part, this will be driven by continued migration of rural inhabitants into the cities. Already today, about half of the world's population is urban. Middle-class consumers tend to consume far more meat, fish, and dairy products than poorer consumers. In addition, these products require more grain inputs to achieve a given level of calories. Thus, not only will food demand rise due to a rising population, but also due to rising incomes.

What next for global food production?

Boosting land productivity in the emerging world will require several things to take place. First, there will have to be a more capital-intensive form of farming similar to what now takes place in affluent countries like the United States. Capital investment, in turn, will require that the prices of farm output be set by the forces of supply and demand rather than by governments.

Today, subsidized agriculture in rich countries leads to low-price farm products being exported to poor countries. This harms the ability of farmers in poor countries to remain competitive. In addition, some poor countries engage in policies designed to support the needs of urban dwellers, thus discriminating against farmers. Changing these factors is politically difficult but necessary.

In addition, farmers will need to have proper access to credit to fund new capital investments. They will also need to be assured of property rights as an incentive to increasing productivity—and value—of the land for future sale. Finally, there is considerable room for improvement in food distribution throughout the emerging world. In some poor countries, a large share of perishable food is lost during the process of distribution because of inefficiency or lack of refrigerated transport. A good solution to this problem is the development of modern retailing. Allowing foreign retail investment into poor countries has been an important tool in creating greater efficiency in the supply chain. The result of this is not only greater availability of food, but lower prices and, consequently, greater purchasing power for poor consumers.

For now, it does not appear that the world's agricultural productivity is rising sufficiently to keep up with increasing demand. One reason is the increase in global food prices in the past decade. Another is the shift in land away from farming toward urban use, which is likely to continue. Still another reason for rising food prices is the rise in global energy prices. This may continue in the coming years as demand in emerging markets grows rapidly. On the other hand, vast increases in energy production are now possible in several parts of the world where new discoveries and new technologies are changing the dynamics of the global energy market.

The food value chain

The food value chain is the network of stakeholders involved in growing, processing, and selling the food that consumers eat—from farm to table. This includes (1) the producers that research, grow, and trade food commodities, such as corn and cattle; (2) the processors, both primary and value added, that process, manufacture, and market food products, such as flour and bread; (3) the distributors, including wholesalers and retailers, that market and sell food; (4) the consumers that shop, purchase, and consume food; as well as (5) governments, non-governmental organizations (NGOs), and regulators that monitor and regulate the entire food value chain from producer to consumer.

Collaboration among the various stakeholders along the food value chain is more important than ever. The interdependencies between stakeholders are no longer mainly between the functions most closely linked along the chain but can encompass stakeholders anywhere in the network. Because of the global food supply chain and a number of high-profile global food recalls, food safety and traceability have become a major concern.

Every stakeholder must be responsible and accountable for the sourcing, handling, and quality control of food because a food-related illness due to a mishap anywhere along the value chain can ruin a company's reputation, even if it is not specifically at fault. Therefore, food safety policies and regulations require the input and collaboration of all stakeholders.

Knowledge and data sharing (e.g., food storage best practices, consumer trends, inventory levels) is another area where collaboration among stakeholders can improve efficiency along the value chain. In addition, greater vertical integration within the value chain (e.g., retailer private label programs) means that individual stakeholders are taking on additional roles and responsibilities.

The following sections delve further into the key issues, trends, and leading practices of each of the stakeholders outlined above and provide opportunities for improvement and collaboration across the supply chain.

Stakeholder	1. Producers	2. Processors	3. Distributors	4. Consumers
Role	<ul style="list-style-type: none"> • Research and development • Farming • Ranching • Trading 	<ul style="list-style-type: none"> • Harvesting • Butchering • Processing • Value add processing • Manufacturing • Marketing and sales 	<ul style="list-style-type: none"> • Distributing • Retailing 	<ul style="list-style-type: none"> • Shopping • Consuming
Key issues	<ul style="list-style-type: none"> • Management capabilities (e.g., brand and risk management, skill gaps) • Strategy (e.g., market strategy, M&A for scale) • Financial issues (e.g., input and sale price volatility) 	<ul style="list-style-type: none"> • Strategy (e.g., going global, regulatory) • Achieving scale (e.g., M&A) • Supply chain strategy (e.g., vertical integration, security, safety) 	<ul style="list-style-type: none"> • Strategy (e.g., consumer) • Supply chain strategy (e.g., vertical integration, traceability) 	<ul style="list-style-type: none"> • Food prices (e.g., high prices, price volatility) • Food security (e.g., availability) • Food safety (e.g., traceability) • Health and wellness (e.g., obesity)
Stakeholder	5. Governments/NGOs/Regulators			
	<ul style="list-style-type: none"> • Public health and safety • Public policy 			
	<ul style="list-style-type: none"> • Food and product safety • Security (e.g., resource, land and food availability and allocation) • Policy and support 			

Producers

Economic growth in developing countries—leading to a more protein-based diet—coupled with the overall growth of the global population to 10 billion by the end of the century will require a near doubling of food production. This will be a big challenge for the world's food producers who must deliver against the ill winds of climate change, soil degradation, and competition for land and water resources also needed for urbanization—e.g., the California experience.

So who are the world's food producers? They are millions of small farming businesses, often third- or fourth-generation family farms, with few national and even fewer international corporate players. These farming businesses are small in scale compared with the global input suppliers (e.g., seed, fertilizer, machinery) and have concentrated sector-oriented customers. The consolidation in the supply chain that has occurred over the past 30 years has not played out at the producer level, and it is the weaker for it. This is why it is often said that farmers buy retail and sell wholesale!

But the world has changed. Farmers have moved from trying to sell what they produce to producing what they know they can sell. For the past 30 years the talk has been "subsidy" and "surplus," but these words will be replaced by "shortage" and "security of supply" in the next 30 years.

Consumers could be forgiven for thinking that food inflation costs them but profits producers, but they would be wrong. The recent rise in grain prices in response to downgraded harvest estimates has hit dairy, pig, poultry, and beef producers hard, and few are making money. Even grain producers are suffering because the high prices do not compensate for the lower yields and high fertilizer costs. Sitting uncomfortably between powerful suppliers and retailers, they cannot pass on the cost increases. Nobody wants food inflation, least of all governments seeking re-election, so the pressure is on the supply chain to absorb the increase with consequent erosion of margin. Producers and primary processors bear the brunt of this, and so are trapped between the proverbial rock and a hard place.

Issue #1: Efficiency

Throughout the world, the majority of farms are small, privately owned, family enterprises. Whether they are small plots in an emerging country providing food to a handful of citizens to larger acreages in North America and Europe, these independent operations often struggle with economic scale. Farming is a capital-intensive business and productivity is enhanced with investment in new equipment. Similarly, marketing channels are more difficult to access for smaller producers.

Collaboration within the supply chain has only really happened during periods of agricultural crisis, as farmers are notoriously independent. However, the 20th century saw increasing collaborative behaviour, including the establishment of local buying/marketing groups; sharing of machinery and farming operations; and establishment of producer organizations and larger cooperatives. The most successful of these are now expanding across borders (e.g., Arla Foods/Milklink merger in July 2012). This is set to continue, particularly in the more specialist sectors of dairy, pig, fruit, and vegetables, where scale and linkage with primary processing is critical. At the operational level too, producers will collaborate to achieve scale, production efficiency, and risk management. In the UK, there are now groups of grain farmers effectively pooling their acreage and sharing the enhanced profit on a simple area basis. It works, and there is huge potential to capture the benefits of scale and professional management with such arrangements.

Issue #2: Market Volatility

Volatility of input costs and selling prices, coupled with the unpredictability of weather and yields, is particularly difficult to manage in farming because of the long production cycles and the inability to respond to market movements. Grain producers can have working capital tied up in their crops for up to 18 months before realization, and they have to consider price, exchange rate, and interest rate movements before planting.

Risk management is now an integral part of farming. Producers mitigate operational risks through spreading of crops, farming across different weather regions/soil types, and using long-term customer contracts and commodity markets to hedge price movements.

Issue #3: Capital

Historically, capital has not been an issue for farmers whose farms have been in the family for generations. However, recent market volatility and weather-induced lower yields not only create risk as noted above, but also working capital strain due to the long cash cycle. The appreciation of land values is also creating a financing gap for newer farmers. Values are being driven up by a combination of urbanization and offshore investment. Both the private investment community and the sovereign wealth community have begun to invest in farm property as a safe haven.

Producers will need to be innovative in the way they grow their businesses, and there will be greater acknowledgement that landowning and farming are separate businesses with different risk and return models. There will be more land leases, joint ventures, and contract farming arrangements in response to this. Long term contracts with customers in the value chain will enhance farmers' ability to obtain working capital financing.

Issue #4: Innovation

Enhanced farm research is needed to increase efficiency and yield and to meet new consumer demands. In some countries governments have lowered incentives for this type of research, but the research must continue to help increase global food production. This is another area for value chain collaboration, particularly where other funding is not available. Customer information from the retail end of the value chain needs to be incorporated into its processing and farming elements.

Progressive farmers are investing in crop field trials and breeding programs either individually or collectively through agreements and producers' associations and co-operatives. Research on such arrangements needs to be performed with greater transparency and collaboration with other members of the value chain. In addition to the sharing of consumer information and preferences, there needs to be greater collaboration with manufacturers of fertilizers and pesticides to ensure continued growth in yields. Similarly, seed producers need to work with farmers to develop seed stock that is more resilient in the face of changing climate conditions. A long-term commitment, a strong balance sheet, and, ultimately, profitable farming are required in order for producers to deliver.

Processors

Processors are involved in both the preparation of fresh foods for market as well as the production of prepared food products. As such, food processing is composed of a relatively diverse collection of companies processing products at different stages: meat slaughtering and processing; fruit and vegetable preserving; grain and oilseed milling; seafood product preparation; sugar and confectionery, bakery, dairy, and other food product manufacturing.

Issue #1: Innovation to support growth

As the global population continues to expand, food processors will be challenged to continue to improve productivity. To date, the food supply chain has shown itself to be remarkably adaptive to evolving consumer demands. However, success in the future will require both adapting to changing demographics and consumer preferences as well as managing in an increasingly global and complex business environment.

Food processors are extremely important members of the food value chain that will need to support the expected global population of over 10 billion people mentioned earlier. To do this they will require significant changes to product line, distribution channels and supply chain.

Leading global producers are already working to address new consumer demands, globally diverse diets and calls for sustainable supply chains and manufacturing processes. However, collaboration throughout the value chain is extremely important to this group, as the manufacturing of food—the central activity of the value chain—requires both up-and down-stream collaboration.

Issue #2: Globalization of food

The increasingly globalized food industry has resulted in greater specialization in the processing community and more variety at lower prices. The overall trend over the past 10 years has been increased consolidation across all subsectors of the food industry. Global mergers and acquisitions have been critical to enabling many large multinationals to achieve economies of scale and find new avenues of growth. While this activity declined during the recent recession, it has been increasing steadily since 2010, with food companies brokering some of the largest mergers and acquisitions in the world. Nestle and Pepsico, for example, have done more than 80% of their still very numerous transactions in the last two years in emerging markets. The early 2013 purchase of Heinz was to-date the largest ever in the food industry.ⁱⁱ

The developing world will be a significant driver of the growth in demand for food. Feeding this growth will require a very significant change in the way food is produced and distributed, requiring much greater international trade. And modern approaches to farming, processing, and distribution will need to be adopted by many more countries in order to support trade on a larger scale. In addition, the growing global middle class of consumers, many of them in the developing world, will lead to dietary changes, with consumers seeking a diet that is more diverse and where meat and fish protein play a larger role.

Processors will need to continue to acquire assets to build scale and secure market channels. They will also need to look to an M&A or joint venture strategy to secure the raw materials required in their production process. This is no easy task when the strategy, most appropriately, includes building/acquiring facilities in emerging markets. Supply chains are complex in these parts of the world and infrastructure is often poor. The sourcing and delivering of raw materials—particularly of fresh product—on time and with minimized wastage (see issue #6) is a significant issue that can only be addressed through unprecedented levels of collaboration across the value chain, including government.

Issue #3: Secure/safe supply chain

Today, more than ever before, consumers are thinking about food—from how it's produced and what's in it, to where and when they eat it. They are also increasingly prone to anxiety about food safety. That's not surprising given that, on average, over 300 food recalls are reported every year, which result in more than 75 million food-borne illnesses, 325,000 hospitalizations, and 5,000 deaths.ⁱⁱⁱ Among food industry executives, product quality failure is considered to be one of the biggest risks.

Food & Product Safety (F&PS) has become a critical area of concern for companies whose success depends on the public's confidence in the safety of the nation's food supply and the products they consume. New regulatory requirements, increased supply chain complexities, and ongoing scientific developments present many challenges and opportunities

Leading companies are investing in securing their supply chain, developing plans to manage recalls, and enhancing product labeling and traceability. They are building compliance systems to ensure they are in compliance with all regulatory regimes where their product is consumed. Such systems include regular verification procedures to ensure ongoing compliance.

Systems are also improving supply chain transparency through track and trace technologies, often many different systems throughout the supply chain. Once again extensive collaboration and cooperation is necessary to ensure these systems operate effectively. Processors are also working with their partners in the value chain both up and downstream to enhance communication and to ensure all members of the chain understand the risks associated with a safety failure.

Issue #5: Energy efficiency

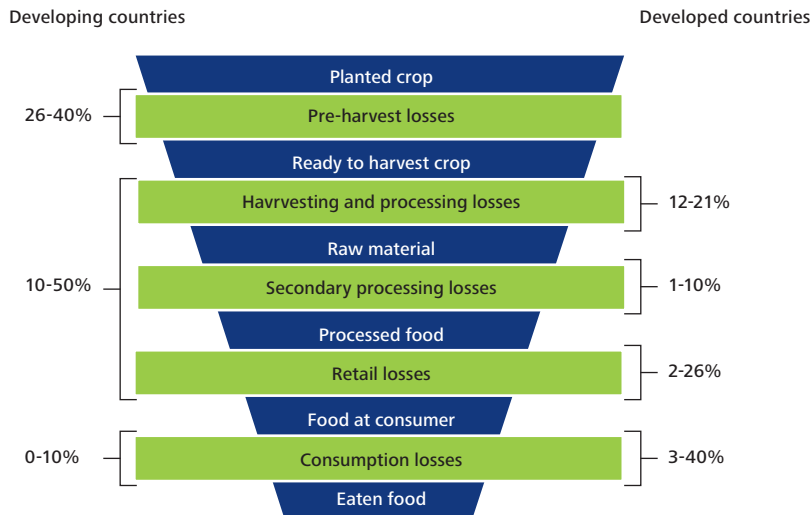
Food production consumes many resources but is particularly intense in the consumption of energy. Carbon-based fuels are used extensively in the production of food at the farm gate but also in the distribution of products both raw and finished to the customer. Manufacturing also consumes large amounts of energy in the form of electricity. Not only is this a large cost to processors but it is a major platform for many in the pursuit of a more sustainable business model. Carbon footprint disclosures are common in many public company filings and are increasingly seen as part of sustainable brands.

Large food producers have set clear energy usage goals that are closely monitored by large and influential NGOs. One company set a goal to improve energy efficiency by 5 percent and greenhouse gas intensity by 5 percent from its fiscal 2010 baseline. A major global Dutch food producer has set a goal to reduce GHG emission caused by transport. By 2020, CO2 emissions from its global logistics network are targeted to be at or below 2010 levels, while maintaining steady business growth. This would represent a 40 percent improvement in CO2 efficiency. A large soda company has a goal to reduce fuel-use intensity by 25 percent per unit of production by 2015 and is committed to reducing GHG intensity in the U.S. by 25 percent.^{iv}

Issue #6: Waste management

Waste management is high on processors' agendas. Total losses in the value chain in the developed world are as much as 40-50 percent (e.g., \$100 billion annually in the United States). In developing countries, average waste is estimated to be 30-50 percent of total spend on food. At the consumer level, 14-26 percent of food purchased by U.S. households and around 25 percent of food and beverages in UK households is wasted. Most of this food is thrown away untouched and still fit for consumption.^v

Manufacturers and retailers have improved their efficiency; however "hidden waste" is not accounted for in traditional waste disposal streams (e.g., products sold as by-product for animal feed). Despite generating income, it remains a loss in the food value chain. Increasingly important in eliminating waste along the value chain is reducing the waste caused by the processors of food. Total processing waste is more than 30 percent.



Source: World Economic Forum, Driving Sustainable Consumption

Consider developed markets like North America, the United Kingdom, and Europe, where the entire food supply chain has become very efficient but consumers tend to be wasteful. In developing economies, the opposite occurs. Improving supply chain capability and efficiency in emerging markets will be critical to support global trade and distribution of product to meet the growing population. Processors will need to consider creative solutions to infrastructure improvements if waste thorough transport is to be addressed. Solutions will likely include partnering arrangements with levels of government and other private companies.

Retailers and Distributors

Issue #1: The imperative of high quality

Retailing is widely recognized as a highly competitive industry in both mature and developing markets. Consumers have a wide choice of retailers, retail channels, and formats available to them. And retailers continuously try to differentiate themselves from their competitors and provide a good value proposition to consumers based on the right balance of price, quality, and service.

Food—especially fresh produce—is a product category whose quality level is easily determined by the consumer. Quality plays a key role in the consumer's path to purchase. Whether it is a locally grown food product or one associated with a strong national or global brand, the consumer will quickly assess the quality of the product before making a purchase decision.

The implications for retailers are significant, and the effective monitoring of vendors' quality assurance processes is becoming a key and challenging task that increases in complexity as the number of suppliers grows.

Around the globe, the level of quality assurance that consumers demand continues to rise. As a result, retailers are increasing their efforts to ensure that the quality standards for food products are met by their suppliers, and they are proactively communicating their high standards of quality and food safety to consumers. This is becoming a key differentiator for global retailers that compete in emerging markets.

In other markets, the notions of "sustainable," "organic," and "green" products seem to have a great appeal to specific consumer groups. Some retailers are trying to capitalize on these consumer trends with various levels of success. Retailers will continue to closely monitor consumers' willingness to pay for highly differentiated products that go beyond meeting the "high quality" criteria and appeal to the "green" consumer.

Issue #2: Managing the complexity of multiple channels and formats

The proliferation of retail channels and formats is a global phenomenon. The specific channels and formats that are gaining ground depend on the maturity of the market, the consumer's tendency to value convenience over price, and consumers' purchasing patterns. Over the past few years, for example, the smaller format "value" retailers have experienced significant growth, reflecting the fact that consumers increasingly value convenience and are making fewer pantry-loading store visits. In contrast, some developing markets are experiencing a surge of hypermarket and supermarket formats, driven by the rapid increase of emerging market middle classes with increased disposable income.

Although there is no right answer for all retailers, most continue to experiment with new retail channels and formats, customizing their portfolios to meet local consumer needs. There will be a sharp contrast in the way channels and formats grow by region, and global retailers will need to make these decisions at a regional or local level.

Further, food products likely will take a larger share of smaller-store shelves, which in itself poses great challenges for efficient supply chain architecture and distribution center design. Balancing the costs of a highly customized and dispersed supply chain with the benefits of offering consumers a wide choice of food products across channels and formats will continue to be a key challenge for retailers in the next few years.

Issue #3: The growing importance of the e-commerce channel

Online grocery shopping will increase over the next decade. Although its market share is not likely to be very large, the availability of online shopping plays a major role in consumers' perception of a retailer. Retailers with a popular online channel also perform better in their physical stores. E-commerce requires innovative solutions to make sure that the logistical process is cost effective and the advantages of an online sales channel are leveraged as much as possible. For online grocery shopping to grow, the costs of home delivery must be lowered, the delivery window must be small and punctuality high, and neighborhood pickup points and/or in-store pickup activities must be expanded.

To accommodate these requirements and create new value for consumers, both vertical and horizontal collaboration and consolidation will be needed. Retailers are cooperating closely with others along the value chain to fulfil consumer needs by putting joint effort into warehouse operations, including inventory management, order management, and fulfilment; creating and operating online stores; and providing home delivery. A significant number of sizable M&A initiatives continue to take place in the online retail market. By merging activities, retailers can broaden their product ranges while sharing operational processes, thereby enjoying the advantages of an online sales channel with reduced effort and cost.

In the coming years, retailers will continue to invest in innovative technologies to meet the changing needs of consumers who expect to not only purchase products at any time and from any location, but to also have full pricing and product transparency before making their decisions.

Issue #4: The evolution of packaging

Packaging is critically important for food and beverage products, given that an estimated 50 percent of all purchasing decisions are made at the point of sale. The differentiating effect created by packaging can be significant not only for communicating brand information to the shopper, but also for driving in-store sales.

In addition to its traditional role, however, packaging can now offer retailers value-added functionality, such as active packaging and smart tagging. Active packaging, such as a drip-absorbent pad in a package of chicken or an odor-absorbing pad in a package of fish, can distinguish products from each other and change consumers' buying behavior.

Smart tags using temperature and/or quality sensors can monitor freshness of a product through the entire value chain. Indicators of product status will be available to both sellers and consumers.

Many retailers have already taken action in the areas of innovative and "sustainable" packaging. Under the umbrella of wider sustainability initiatives (especially in the areas of energy saving and recycling), retailers are working closely with manufacturers to create smaller and more efficient packaging that better fits retail store shelves and display fixtures. Retailers will increasingly try to capitalize on these initiatives to generate significant cost savings and differentiate themselves from their competitors in the eyes of the consumer.

Consumers

Food security, food prices, and food safety summarize the multitude of concerns consumers have about food. Continuing headlines about the global food shortage, skyrocketing food prices, massive food riots, genetically modified foods, and global food recalls illustrate just some of the issues. Compounding the problems, consumers cannot change their consumption habits drastically enough to offset the world's growing population; the increasing demand for high-value, resource-intensive foods by the burgeoning middle class in emerging markets; the use of food ingredients for alternative energy; or the climate changes that are causing water shortages and low crop yields. Many consumers, especially those in developed markets, take food for granted and expect governments and the food industry to resolve food issues. In some instances, consumers in both developed and emerging markets have resorted to rioting, pilfering grocery stores, and causing political unrest when food availability and affordability become major problems.

Issue #1: Food security and high food prices

Food prices will continue to rise as demand for food and food-producing resources continues to outpace supply that is restricted by the limited availability of suitable land and water, climate-related poor harvests, and the growing demands for bio-fuel production. With an expected 2 billion more people by 2050, feeding the planet remains a concern of governments all over the world. In addition, 70 million new consumers are expected to enter the global middle class each year, affording them the opportunity to shift their consumption to more resource-intensive, high-value foods but putting additional pressure on crop yields and meat production globally.

The increase in demand, coupled with rising energy prices that feed into the cost of producing and transporting food, will result in higher retail prices.

News about the global food shortage will not likely compel consumers to eat less meat and dairy and consume more resource-efficient vegetables. However, the impact on their wallets due to the resulting high food prices will. Higher food prices mean many consumers in both developed and developing markets will have to become more prudent and selective in what they buy, if they aren't already. They will be incentivized to eat at home and buy cheaper local products and seasonal produce rather than high-priced imported foods, specialty foods, organic foods, and store-prepared meals. Especially in North America, consumers can be expected to adopt a more modest purchasing pattern, buying just the right amount of food and reducing waste as a result of over-buying. Given the greater share of wallet that food will require, consumers will also seek foods that provide more value and functionality. For producers and retailers, this may mean smaller package sizes, more functional foods, and better labeling and marketing to emphasize the value of their products.

Issue #2: Obesity, health and wellness

As consumers in developing economies become more affluent, the accompanying changes in their diet and lifestyle can lead to health problems already faced by consumers in developed markets. More consumers are shifting from grain-based diets to "high-value" foods including meat, fish, dairy products, fruits, and vegetables—as well as to fatty and sugary processed, packaged, prepared, and fast foods. At the same time, they are leading a more sedentary lifestyle, taking on less physically demanding jobs, such as working in an office at a desk, and leisure activities, such as watching television, compounded by greater use of technology and automated transportation. These changes in consumer behavior can lead to a greater chance of obesity, diabetes, high blood pressure, and other diseases and health problems. While many are well aware of the obesity epidemic in developed countries like the United States and the United Kingdom, obesity is becoming a major issue in emerging countries as well. More than 100 million Chinese are obese; half of them are children. Obesity in China is rising at 30 to 50 percent annually.^{vi}

As emerging market consumers become more aware of and educated about the need to combat obesity, aging, and disease, they will begin to change their food consumption patterns and lifestyles. Therefore, we will see in developing markets a trend toward healthier eating, a focus on health and wellness, and rising demand for functional foods that we already see in wealthy countries.

Government intervention will also become more pervasive as the cost of obesity-related health problems takes its toll on public funds and health care providers. For example, regulations on food labeling and marketing of "junk food" to children will encourage consumers to demand and consume healthier options.

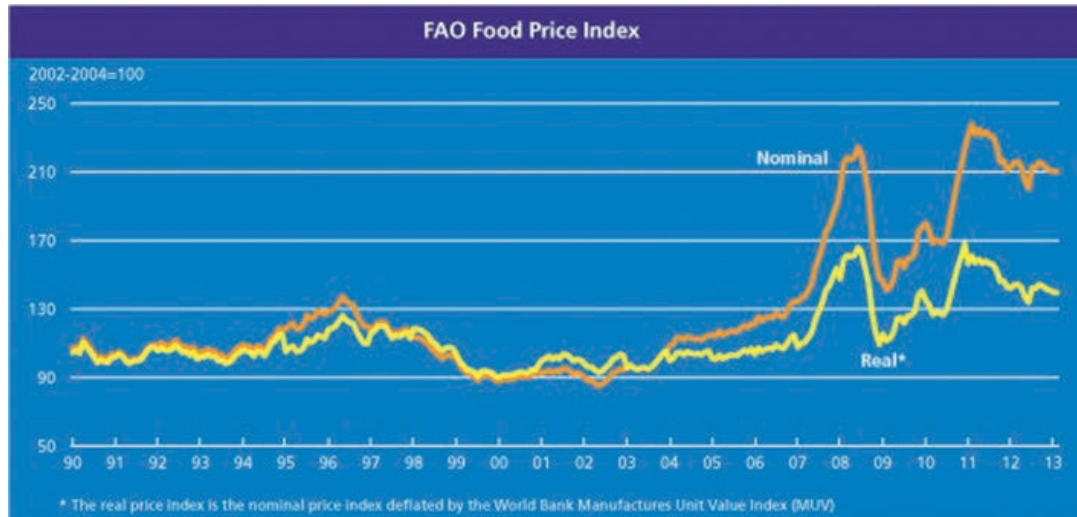
Issue #3: Growing concerns over food safety

As the food supply chain becomes increasingly global to meet growing demand around the world, the risk of contamination along the supply chain rises. This is evident in the number of high-profile, global food recalls in recent years. However, consumers' concerns about food safety go beyond bacteria contamination, animal disease, and poor food handling. Consumers are also concerned about whether farming practices, such as the use of antibiotics and growth hormones in livestock or pesticides on crops, and processing practices, such as the use of food additives and preservatives, are safe. They are also concerned about the cleanliness and freshness of their food.

An increasing number of consumers are demanding greater transparency in the food supply, including the origin and contents of the goods they buy. They are examining food labels more carefully and becoming more selective in their purchases. For example, "Made in Australia of domestic and imported ingredients" will no longer suffice. Increasingly, consumers want to know specifics about the source of each ingredient, and fewer will tolerate irresponsible practices. As a result, more online solutions are emerging that enable consumers to track their food from farm to table.

However safe food may be until it reaches the home, it can become contaminated during preparation, cooking, and storage. Educating consumers to practice safe food handling, storage, and preparation techniques at home through package labeling or pamphlets at point-of-purchase can effectively reduce the number of food-borne illnesses.

Regulators



Food markets and systems are globalizing to meet the demand to feed a growing and more affluent world population. According to the Food and Agriculture Organization of the United Nations (FAO), the demand for agricultural products will increase by 50 percent between now and 2030 and by 70 percent by 2050 (see chart). Advancements in technology and mass movements of people across increasingly more urbanized continents create new opportunities and challenges for regulators as international commodity, food, and beverage price indexes begin to rise again after the 2008-09 economic downturn. Food products are now produced and distributed on an unprecedented global scale, necessitating increased involvement from all stakeholders to strengthen systems that ensure safe, affordable, and sustainable food supplies. Consequently, traditional regulatory and trade facilitation responsibilities are changing, and new relationships are developing between public sector agencies and private sector participants in the food value chain.

Issue #1: Changing trade relationships between importing and exporting nations

International commodity trade has surged, with countries sourcing food from a much wider number of countries as well as producers within those countries in both the developed and developing world. Thus, securing food supply from existing and new trading partners has new challenges. In general, tariffs have decreased. Yet exclusionary non-tariff barriers have risen.

On the importer side, large importing nations are sourcing food supply from an ever larger group of importers, including relatively small producers in less-developed countries that are less accustomed to meeting stringent technical requirements, certification standards, and labeling and quality rules.

Developing nations are characterized by inconsistent national standards that have not been harmonized with global rules and insufficient investment in food quality certification bodies. Export taxes and licenses, inspections, and certifications are applied by governments unaccustomed to the requirements of large buyers. In addition, the poor, in particular, are vulnerable to the volatility of commodity and overall food prices. Thus, major exporting governments have been known to restrict exports, sometimes in rapid and arbitrary ways, causing shocks to the world commodity system. An example is Ukraine, the world's sixth-largest exporter of wheat, which in mid-2010 instituted export quotas for a period of 11 months.

A major player intervening heavily in the food market, via agricultural support, is the EU. By means of import levies, import quotas, production quotas, direct income payments to farmers, and the maintenance of an internal intervention price, the EU alters the world market. On top of the approximately €55 billion spent per year in the Common Agricultural Policy (CAP), the cost to consumers due to higher food prices was estimated at €50 billion by the OECD in 2008.

The CAP will be reformed in 2013, emphasizing the “decoupling” of aid from production and “cross-compliance” (aid is made conditional on the basis of environmental, food safety, phytosanitary and welfare standards), but it will not disappear anytime soon. Ensuring “a fair standard of living for the agricultural community” as well as stabilizing the markets and securing the availability of supplies remain objectives set out in the Treaty on the Functioning of the European Union (TFEU).

Technological advancements in storage, transport, and distribution are also leading to a surge in global trade between emerging economies such as China, India, and Brazil (the so-called South-South trade), which is changing the overall dynamic of global trade in food and increasing the complexity of trade relationships.

As market channels and purchasing power improve in emerging nations, multinationals are accessing new sources of supply that were once considered unattractive. Agribusiness multinationals are forming cooperative agreements with governments and non-governmental organizations (NGOs) to build sustainable and resilient supply chains; integrate smallholder farmers in increasingly rural areas; improve quality and transport infrastructure; and reduce the risk of food insecurity in exporting countries, which has the potential to disrupt their businesses. Trade agencies in importing countries are gearing up to support imports from new suppliers, including capacity-building support for compliance with standards, certifications and safety, labeling, and other requirements. Agriculture trade agencies, such as the USDA and the European Commission, are increasing their international footprint and investment in international capacity-building programs. In addition, as major developing countries become global drivers of both food consumption and production over the next decade, many are taking a new look at multilateral agreements, such as WTO, and investing in bilateral trade agreements both to secure supplies and mitigate against disruptions from trading partners. (Agriculture continues to block the conclusion of the Doha Round in the WTO. The EU and the United States refuse to reduce agricultural support unless they gain better market access—both in services and industry—to developing countries, e.g., Brazil and India. Preferential trade agreements, both on a bilateral and regional level, have sprung up recently; more than 200 were active by 2008.)

Issue #2: Increasing strains on food safety and agro/bio-terrorism infrastructure

The ability to sustain consistent and reliable distribution of safe food is one of the highest responsibilities for regulatory agencies. Nonetheless, recent outbreaks of food-borne illnesses indicate there is much yet to be done to assure consumers that food supplies are safe. Food safety is as much market-driven as it is public sector controlled. Food-borne illnesses that were once regional, then national, are now global, and outbreaks have the potential for much wider effect. The United States has one of the most stringent and sophisticated food regulatory systems in the world; yet, food-borne illness strikes millions of Americans each year. The estimated cost of required improvements to the country’s food safety systems will be in the magnitude of \$1.4 billion over the next five years.

After several devastating food-borne outbreaks, the U.S. produce industry has become a leader in food safety and traceability applications, culminating in the creation of the world-class Center for Produce Safety, a public-private partnership with UC Davis. The Center’s self-regulating industry practices are being adopted worldwide, illustrating industry’s beneficial role that coincides with public regulatory programs to rein in adulterous food practices. Similarly, harmonization of food standards by multilateral organizations and food industries is aimed at strengthening food safety worldwide. Organizations such as the U.S. Animal and Plant Health Inspection Service work to protect agriculture from plant and animal pests and diseases, working with international organizations, academia, and international trading partners to address problems in one part of the world that can quickly spread across borders. Various third-party auditors and certifiers are engaged, in line with global trade practices such as EuropeGAP, now transitioning to Global GAP.

In the EU, the European Food and Safety Authority (EFSA) was created in 2002 with the objective of producing independent and unbiased scientific advice to provide a sound foundation for EU policies and legislation, as well as for EU and member states’ risk management decisions. It constitutes the keystone of EU risk assessment in this field. EFSA’s remit covers food and feed safety, nutrition, animal and health welfare, plant protection, and plant health. The cross-compliance mechanism of the CAP helps to ensure food safety and quality by making support conditional on compliance with strict requirements. Increasingly stringent regulation of food labeling complements the EU’s “farm-to-table” approach by helping consumers make informed choices.

Further complicating food safety oversight is the growing threat of agro/bio-terrorism. Attacks against agriculture infrastructure and the food supply have been the subject of planning or execution recently. An agro-terrorist attack could cause major economic crises in the agricultural sector and loss of confidence in the ability of governments to protect the health and welfare of their populace. The U.S. Food and Drug Administration (FDA) has teamed with Customs and Border Protection to staff the Department of Homeland Security National Targeting Center to perform risk analysis and target suspicious food imports.

China's inability to maintain adequate food safety is a growing concern. The 2008 milk contamination scandals caused by the toxic chemical melamine, which resulted in global recalls and bans on products made with Chinese dairy ingredients, and the 2011 leather hydrolyzed protein boosting to increase milk prices, which led to the closing of almost half of China's dairies, are only two examples. More-developed nations also have recently grappled with food safety challenges and deaths, especially due to E.coli poisoning (fenugreek sprouts in Germany and beef, vegetables, and processed foods in the United States). Ironically, as the market demands more organic products, which could increase the possibility of E.coli, the use of genetic DNA engineering, irradiation, and other technologies that could make food safer are under-used due to "green" food lobbies and government over-regulation. (In the EU, legislation regarding genetically-modified organisms [GMOs] has been in place since the early 1990s. An approval process based on a case-by-case assessment of the risks to human health and the environment takes place before any GMO or any product containing them can be released into the environment or placed on the market.)

Public regulatory organizations have recognized that operating in isolation from industry has exacerbated the issue of food-borne illness. Thus, there is both a move toward more public-private partnerships within countries as well as an increasingly global approach to food security overall, and regulators must constantly evaluate these aspects of their policies. Such approaches are critical but will require increasing transparency between regulators in fast-growing emerging markets and developed economies. Standards such as HACCP and global coordination through initiatives such as the Global Food Safety Initiative are becoming more important.

In addition, increasingly global approaches to food safety require regulators and legislative bodies to consider the impact on small producers, who tend to have the most difficulty meeting new compliance legislation, and the associated costs involved with food safety standards.

Issue # 3: Rising global farm land acquisition

The volatility of commodity prices in 2007 and 2008 turned global investors' attention toward agriculture at a level not seen since the U.S. farmland boom and bust period of the 1980s. The UN, in the wake of spiraling food prices, set up the UN High Level Task Force on the Global Food Security Crisis (HLTF) in April 2008. Rising commodity prices coupled with increasing evidence that land, water, and food values will steadily increase with world population growth, has investors considering the potential for good returns in farmland acquisition. These trends are supported by a general trend from grain-based diets to protein-based diets in emerging markets, which will require an increase in average yields and cultivated area to keep up with demand.

Farmland acquisitions are moving quickly. An estimated US\$25 billion has already been committed globally, a figure that could triple in the near future. Precise data is hard to come by, but it is estimated that at least 50 million hectares of agricultural land—enough to feed 50 million families in India—have been transferred from family farmers to corporations since 2008. Land deals are increasing in number, size, and sophistication. There is significant attention on sub-Saharan Africa, Latin America, and the former Soviet Union where most of the world's potentially cultivatable land is concentrated. Even in the EU, agriculture and forestry represent 80 percent of the territory.

Deals occur at multiple levels, ranging from mid-size agribusinesses capturing 10,000 hectares, to transactions between sovereign governments and large corporations that amount to hundreds of thousands of hectares. Global financial institutions, such as UBS, Franklin Templeton, Morgan Stanley, and others, have incorporated farmland as part of their portfolios for long-term investment, channeling billions of dollars into cropland ownership. The World Bank found that institutional investors already have announced plans to acquire up to 125 million acres of global farmland, approximately the land mass of Germany.

Land acquisition by large corporations and governments in developing nations has pros and cons. With it comes innovation and technology desired by developing countries seeking to increase production and post-harvest yields, improve infrastructure, and generate farm and non-farm employment. Likewise, the technology and know-how of investing corporations may help mitigate global warming impacts disproportionately affecting developing nations in the tropics and subtropics. The economies of scale of commercial agriculture can provide food staples at more affordable prices for the poor, while value-added processing can create off-farm jobs much in demand in developing countries. Yet, there are valid concerns including involvement of local people such as traditional farmers and pastoralists, sustainable use of water and land, and maintenance of food security for local populations. Where government or sovereign wealth funds (SWFs) are the acquirers, there are also concerns about sovereignty. Alert to the potential political backlash from perceived “land grabbing,” a number of governments and multilateral organizations are strategizing on ways to make large land deals more sustainable. The most prominent effort is the World Bank-led Principles for Responsible Agricultural Investment that Respect Rights, Livelihoods and Resources (RAI). The RAI has established voluntary principles that investors may apply when conducting large-scale farmland acquisitions. National and subnational governments also need to act. Land is local, and each country will have to place stipulations that are best for its conditions and people. This becomes more problematic for developing countries, where untapped resources cannot be optimized to improve the livelihood of their poor populations without outside investment.

The trend toward global land acquisition is not likely to subside. As the world economy rebounds, agriculture investments in developing countries—led by the rising markets of China, India, and Brazil—will likely increase significantly. Coupled with billions of dollars targeted by multilateral donors to support food security programs in developing nations, global agriculture may experience a second green revolution—one driven by a truly global market demand. How it is divided and shared, though, is to be determined and has wide-ranging implications. Public sector regulators must be prepared to ensure the resilience of their food supplies, provide a level playing field for national investors, and provide sustainable policies toward acquisition of farmland and a consistent stance toward acquisitions by governments and SWFs.

Global Food Value Chain case studies

Case study 1: M&A: Investment in growth markets

Investment in the food value chain, at face value, seems compelling. However, as with many facets of the industry, the drivers of M&A activity vary according to the acquirer’s position in the value chain as well as its chosen commodity exposure, size, and geographic footprint. Strategic players, financial buyers, and sovereign wealth funds (considered separately from the first two forms as they have different motives) are all drawn to the M&A sphere within the food value chain on the simplifying assumption of food security.

On a subsector basis, Food & Beverage historically has seen the highest level of deal activity by value. The F&B market accounts for approximately half of all M&A activity in the Consumer Business industry annually, with a fairly consistent trend of 700+ deals a year. The beverage side is more consolidated than the food side, with fewer deals but generally higher values. Overall, deals are expected to continue to focus on healthy, more nutritious food and beverage products as well as higher-value specialty food ingredients.

M&A will play out differently for each of the players. For some it is about gaining food security at the primary production level. For others, it is purely a financial investment in a dynamic industry sector. Strategic players see M&A as a way to develop their geographic footprint in regions of high growth, acquire technologies, or secure throughput.

In 2011, a combined Deloitte team from the China and Australia member firms advised a major Chinese food conglomerate on its acquisition of an Australian food distributor from private equity shareholders. The investment rationale was founded on the ability to leverage the products and channels of both companies across Australia and China.

Deloitte assisted the company in the key areas of financial, human resources, commercial and tax diligence, and tax structuring in addition to providing advice on the transaction documentation remuneration agreements and completion processes.

Working on a cross-border transaction with significant value and reputation at stake, the Deloitte team collaborated effectively with the principals and other advisers to achieve the client’s desired objectives.

The company signed the share sale agreement following a two-phased diligence approach and the provision by Deloitte of a suite of differentiated solutions that spanned the M&A lifecycle. Deloitte added value by leveraging its own proprietary information such as macroeconomic forecasts, sharing the insights gained from experiences with other Chinese-Australian cross-border deals, and bringing the broad transactional capabilities of Deloitte to the transaction in a seamless manner. The challenges typical to many cross-border transactions were successfully navigated through the combined efforts of the two member firms, with constant communication among all stakeholders being the key.

Case study 2: Supply Chain: Demand and Supply Planning Optimization

A team of supply chain practitioners from Deloitte Canada and Deloitte U.S. worked with a global manufacturer of branded consumer food products to redesign its demand and supply planning processes. The company had been facing severe customer service issues along with rising inventory, poor forecast accuracy, and substantial write-offs due to expired products. A seven week diagnostic revealed that demand and supply planning capabilities at the client were considerably lagging industry best practices.

Detailed designs for future state demand planning processes were developed using a workshop-based approach. The following capabilities were built into the new process:

- Optimized quality of statistical forecast by a) picking the most accurate position in the product/customer hierarchy for forecasting, and b) developing a process to select the best forecasting algorithm for a given product.
- Integrated S&OP, sales, and marketing forecasting processes with demand planning to enhance base (statistical) forecast with market intelligence.
- Reconfigured technology solution to align with new demand planning processes.
- Metrics and reporting to track and troubleshoot forecast accuracy performance.

To optimize supply planning, the Deloitte team worked with the company to develop inventory policies and statistically driven safety stock settings to improve product mix across the network and minimize inventory levels.

In addition, standardized technology-driven production planning processes were implemented in order to generate an effective master production schedule to drive production and procurement activities across the organization.

The following benefits were realized in the first five months:

- ~20% point improvement in forecast accuracy
- ~30% reduction in expired product
- ~35% reduction in cut cases
- ~10% reduction in baseline inventory

Case study 3: Food Safety and Security: Managing risk to protect the brand and consumers

Food and product safety has been a long-standing, critical area of concern for both the global food and beverage industry and consumers. In 2010, the Centers for Disease Control and Prevention in Atlanta, Georgia reported that an estimated 48 million people (1 in 6 Americans) get sick, 128,000 are hospitalized, and 3,000 die each year from food-borne diseases.^{vi} In January 2011, the U.S. government enacted the Food Safety Modernization Act impacting virtually all sectors of the global food supply chain in ways not seen over the past 35 years. One key area addressed in the Act is food defense. Guarding against the intentional adulteration of food products destined to enter the marketplace is a daunting task. The impact of adulterated food reaching the consumer can be devastating to the company, the brand and, most importantly, to the consumer. Early work conducted by Deloitte found that the average cost of a recall to participating food and consumer product companies is \$10 million, in addition to brand damage and lost sales.^{viii}

Deloitte & Touche LLP applied a holistic approach to assist a global food distribution client address food safety and food defense risks across its supply chain. The intent of the project was to assess current food safety and food defense risk management practices and to use that information to design and implement enhanced, science-based mitigation programs to minimize identified risks, positively impact customer confidence, and protect the brand. A two-phase program was used. First, baseline assessment of food safety practices was conducted to characterize the current efficacy of food safety and food defense practices and capabilities.

The objectives for Phase 1 were:

- Categorize high-level food safety/food defense risks (e.g. regulatory, brand, reputation, financial, crisis response, public health, business continuity, etc.).
- Leverage information identified from the baseline assessment to confirm uniformity and/or major gaps within the existing food safety/food defense practices.
- Assist the project team in prioritizing identified gaps (e.g. knowledge gaps or process gaps) in terms of their impact to the client and their risk.

The objectives for Phase 2 were:

- Recommend a food safety risk prevention program, from purchase through delivery to customers.
- Apply leading science-based industry practices to identify and address critical knowledge and process gaps prime for remedial action, based upon the assessment during Phase 1.
- Engage subject matter specialists for each area to be redesigned to recommend effective and efficient components to support the new food safety practices.
- Develop a “roadmap” for implementation, where each aspect of the various changes to the existing food safety practices will be prioritized based on regulatory, operational, and possibly customer requirements.

All objectives were met and were completed ahead of schedule. In addition, the team developed a critical food safety documentation control and records management program to monitor for ongoing compliance and facilitate forward-looking practices.

For food defense (intentional contamination vs. unintentional contamination), the team recognized that food defense mitigation could be enhanced through increased monitoring and documentation. This addressed the possibility of potential food defense issues arising without an optimized response.

In addition to enhancing the overall food safety program and product handling capabilities and meeting or exceeding related regulatory requirements, some additional benefits were achieved:

- A more rigorous supplier evaluation process for high- and medium-risk products and supplier facilities.
- Incorporation of customer-driven requirements and impacts on revised policies and procedures.
- Updated and more uniform policies and procedures based on science-based information and guidance.
- Updated and more uniform food defense plans.
- Updated and more uniform allergen control policies and proper storage guidelines to minimize potential cross-contamination issues.
- More consistent food safety training deployment and tracking.
- A more formalized documentation control system to increase document organization and version control capabilities.
- A more proactive Active Management System to standardize monitoring and trending of food safety noncompliance for forward-looking control.

Deloitte member firms serve 81% (or 75 companies) of the 93 Consumer Business companies in the 2012 Fortune Global 500®, including:

- 20 of the 24 consumer products companies
- 30 of the 39 retail, wholesale, and distribution companies

Clients include:

Archer Daniels Midland (ADM)	Kerry Group
Bayer Corporation	Land O’ Lakes, Inc.
Cargill, Inc.	Nufarm Limited
Danone	Ridley
Delhaize Le Lion	Sainsbury’s
European Commission	USAID
Ferrero	U.S. Department of Agriculture
Glanbia	Viterra Inc.
Incitec Pivot	Woolworth’s Ltd

Deloitte's positioning

As one of the largest professional service providers in the world, the Deloitte network works with many stakeholders across the food value chain. This experience and knowledge are the basis for the focus on food as the key issue for the 21st century. The combination of issues affecting the security and safety of our food chain coupled with the demand/supply imbalance will require significant changes in business operations and government policy if the people of the world are to be fed. While government can promote and encourage such changes, it is private business that will need to make them happen. Businesses that recognize and seize this opportunity early on will be the leaders in the new food economy.

Deloitte practitioners at member firms around the world bring an impressive depth and breadth of skills to issues in the Global Food Value Chain. These practitioners represent multiple service disciplines and work across all stakeholder groups. This integrated approach enables the Deloitte network to provide holistic solutions that can help companies create the strategies most likely to seize the opportunity. The network's global breadth will also enable you to benefit from relationships and access to potential business opportunities wherever they arise in the world.

Changing business models, complex global markets, and shorter product life cycles are making effective management of a food business more challenging than ever, with customers demanding more flexibility, improved visibility, greater speed, and customized products. All these pressures require companies to have supply chain planning capabilities that enable them to deliver much greater customer support with far less inventory investment.

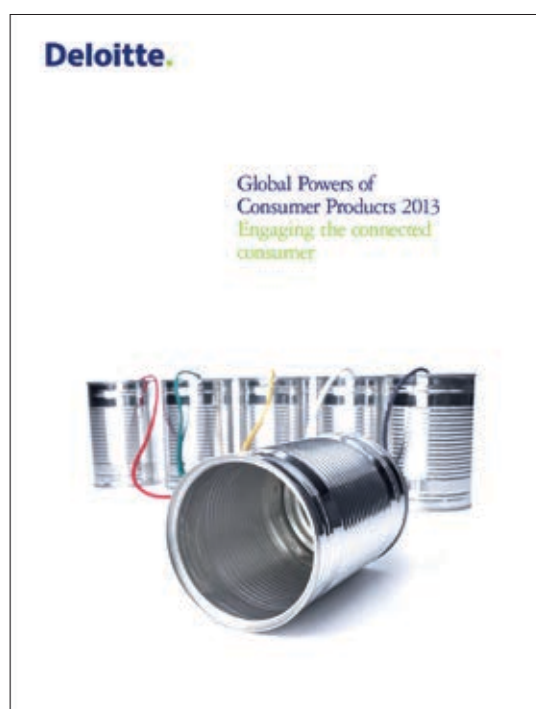
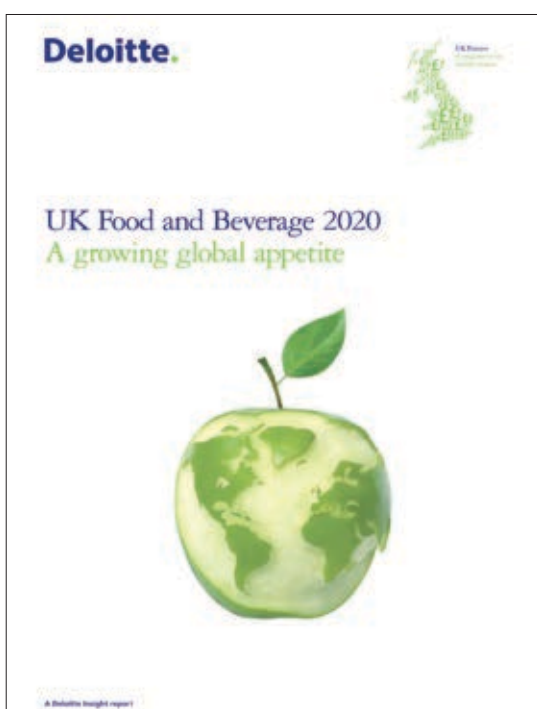
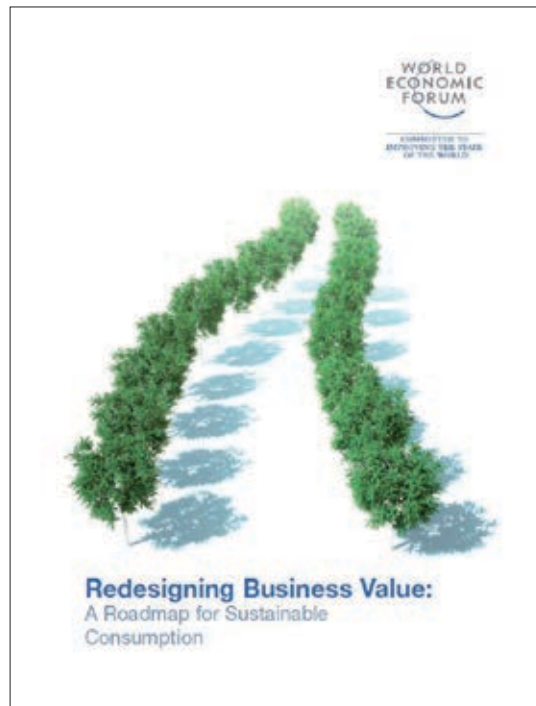
Deloitte member firm professionals understand the importance of supply chain planning to achieve optimal performance levels. They understand that technology alone is not enough and that the focus should be on planning how technology supports that process. They help you consider the organizational components of the solution, such as organizational structure, capabilities, and metrics to help your company achieve long-term benefits.

Whether evaluating strategic options within the food value chain, new ventures, proposed transactions, or enhancing existing operations, Deloitte brings a wealth of experience through a global network of Food Value Chain professionals. As a trusted advisor to a range of corporations, investment banks, private equity houses, and governments, the Deloitte network provides intelligent, rigorous, and independent advice.

If you are interested in meeting a member of Deloitte's Global Food Value Chain team, please contact any of the leaders on the last page of this document. They will be happy to speak with you about your business and share Deloitte's perspective on the global marketplace.

Deloitte's eminence and perspectives on the food value chain

Professionals at Deloitte member firms around the world gather and organize the knowledge and experience of engagement teams that have worked with companies across the food chain. In the spirit of knowledge sharing, the Deloitte network continues to develop provocative and relevant publications that address the issues that matter most to food executives. A sampling of the network's eminence includes the following:



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