Aberdeen Group
A Harte-Hanks Company

Food Safety and Traceability:

Ensuring Compliance and Enabling Supply Chain Visibility

December 2010

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Executive Summary

Major changes have occurred since our last study on *Food Safety and Traceability* (published in November of 2009); namely, the passing of the "Food Safety Modernization Act." With this new legislation we have seen major changes in manufacturers' focus on food safety and traceability as well as how organizations will have to handle these issues. This new research will examine these changes and make actionable recommendations for how your organization can best deal with the changing landscape.

Best-in-Class Performance

The Best-in-Class significantly outperform Laggard manufacturers in many key performance criteria; this differentiation is summarized below:

- 20% more products produced in compliance
- 34% more complete and on-time shipments
- 31% higher Overall Equipment Efficiency (OEE)
- 36 hours quicker track and trace response time

Competitive Maturity Assessment

Survey results show that the firms enjoying Best-in-Class performance shared several common characteristics:

- Best-in-Class manufacturers are over twice as likely as Laggard manufacturers to standardize escalation procedures for quality, non-compliance, and recall events across the enterprise
- Best-in-Class manufacturers are over twice as likely as Laggard manufacturers to implement GS1 standards based business processes for sharing information and collaborating with suppliers on quality
- Best-in-Class manufacturers are over twice as likely as Laggard manufacturers to incorporate compliance with a product safety and traceability management system like ISO 22000

Required Actions

In summarizing the specific recommendations in Chapter Three of this report, to achieve Best-in-Class performance, companies must:

- Establish food safety and traceability as key item on the executive team's agenda for focus and improvement
- Build traceability and compliance into production process with enablers such as automated: SPC, HACCP, GMPs, CAPA, and more
- Extend beyond the capabilities delivered by traditional ERP to deliver real time supply chain visibility and traceability across suppliers, manufacturing, retailers, and consumers

Research Benchmark

Aberdeen's Research Benchmarks provide an in-depth and comprehensive look into process, procedure, methodologies, and technologies with best practice identification and actionable recommendations

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Chapter One: Benchmarking the Best-in-Class

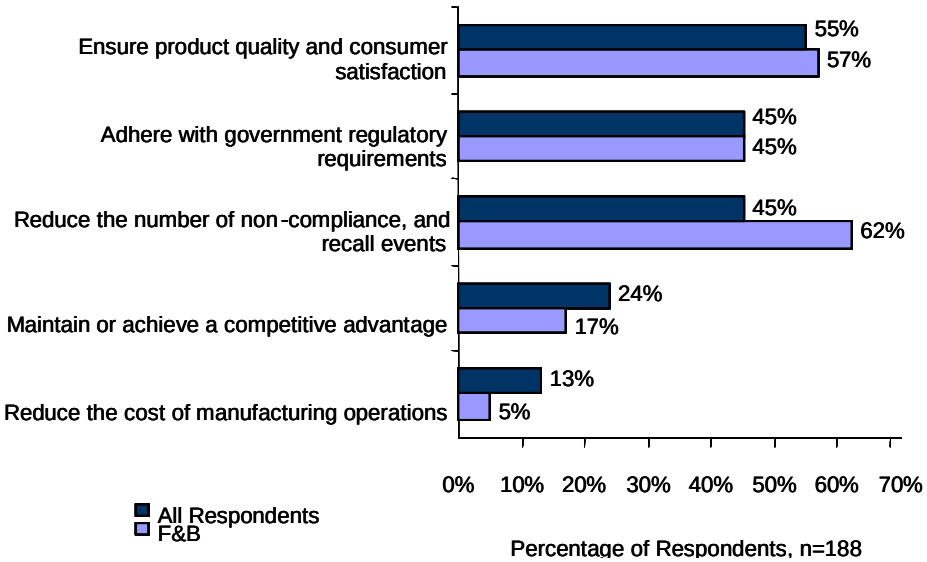
Business Context

This is the fifth year Aberdeen has conducted research in the food safety and traceability space. Last year's report started by citing President Obama's creation of an FDA working group focused on the topic and a prediction that "change is on the way." This year we will start by stating that change has arrived and the Food Safety Modernization Act has passed both houses of the Congress. It will be interesting to see exactly how this law plays out both in the US and globally but initial assessments are as follows:

- FDA has increased headcount and means to enforce existing as well as new laws
- FDA has increased power to enforce laws, including the ability to shut down companies and force recalls
- A working Hazard Analysis and Critical Control Points (HACCP) plan is mandated for all regulated companies; small companies have time allotment to conform
- FDA established the "traceability network," and details are to be determined later

Clearly the law is aimed at three main goals: improving the enforcement capabilities of the FDA, improving the food safety processes in manufacturing and distribution, and improving overall product traceability in the supply chain. The law is also having an impact on the pressures driving manufacturers to focus on food safety and traceability.

Figure 1: Market Pressures (2009 Study)



Source: Aberdeen Group, November 2009

Fast Facts

Best-in-Class enterprises significantly out-perform their competition in all four KPIs. These manufacturers enjoy:

√ 99% products in compliance

√ 98% complete and on time shipments

√ 89% OEE

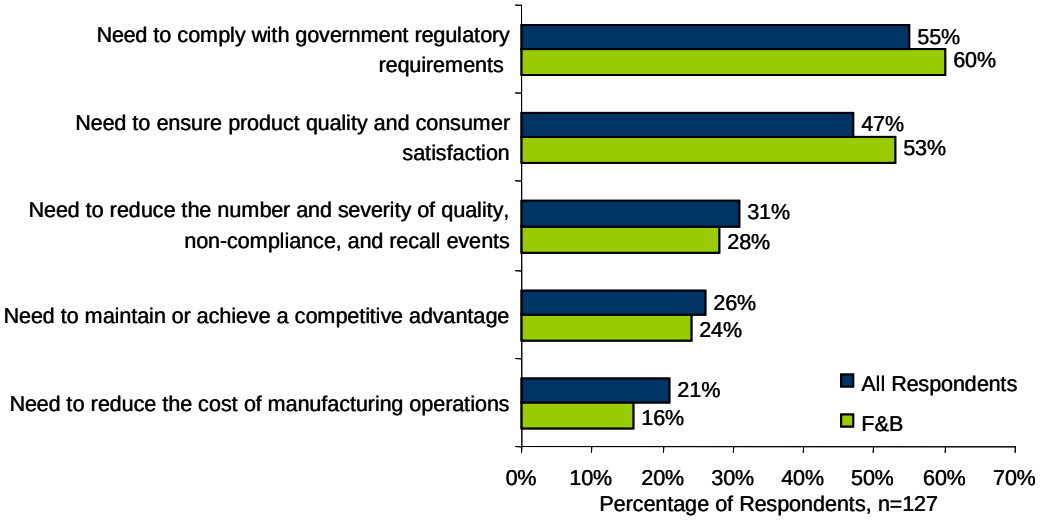
√ Four hours track and trace responsiveness

In 2009 only 45% of respondents from food companies chose the need to adhere to government regulations as a top two market pressure. In 2010, this percentage grew to 60% and topped the list, showing a marked increase among executives. The second most prevalent pressure from 2009, the need to ensure product quality and satisfaction, held steady and was again the second most prevalent pressure in 2010. Anecdotally, this pressure is becoming more common among thought leaders and Best-in-Class companies, with many wondering how investments in food safety and traceability can eventually be leveraged to create a personalized customer experience.

"Traceability is the ability to trace and follow raw materials, work in process and finished products through all stages of receipt, production, processing and distribution. We apply controls and monitoring at critical traceability points across our operations. These are specific to the process, location, material and product complexity and routes to market. Currently we apply the 'one up / one down' approach."

~Manager of Food Safety, Food Manufacturer

Figure 2: Market Pressures (2010 Study)



Source: Aberdeen Group, December 2010

The Maturity Class Framework

Aberdeen analysis found Best-in-Class companies are gaining significant competitive advantage when compared with Industry Average and Laggards. Aberdeen classified research participants into one of three performance categories. These include the top 20% of performances (the Best-in-Class), the bottom 30% of performers (Laggard), and the remaining 50% (the Industry Average). The four key criteria that were used to measure and categorize the performance of respondents are:

- **Percentage of products in compliance,** is measured as a percentage of products produced that were in compliance to processes against total products produced
- **Complete and on time shipments,** is measured as the percentage of shipments delivered on time and complete versus original commitment
- **OEE** is a composite metric accounting for availability, performance, and quality

- **Response time to non-conforming shipment;** given that a nonconforming product has shipped, this is the average time needed to locate and hold product after detection

Table 1 details the average performance of Best-in-Class, Industry Average, and Laggard companies across these four metrics.

Table 1: Top Performers Earn Best-in-Class Status

Definition of Maturity Class	Mean Class Performance
Best-in-Class: Top 20% of aggregate performance scorers	▪ 99% Production Compliance ▪ 89% OEE ▪ 98% On Time and Complete Shipments ▪ 4 Hours Response Time to Non-Conforming Shipments
Industry Average: Middle 50% of aggregate performance scorers	▪ 97% Production Compliance ▪ 77% OEE ▪ 94% On Time and Complete Shipments ▪ 16 Hours Response Time to Non-Conforming Shipments
Laggard: Bottom 30% of aggregate performance scorers	▪ 81% Production Compliance ▪ 68% OEE ▪ 73% On Time and Complete Shipments ▪ 40 Hours Response Time to Non-Conforming Shipments
Food and Beverage Industry	▪ 92% Production Compliance ▪ 73% OEE ▪ 88% On Time and Complete Shipments ▪ 18 Hours Response Time to Non-Conforming Shipments

Source: Aberdeen Group, December 2010

The above four KPI's provide a holistic measure of success in any organization, but are especially telling when examining the success of a food safety and traceability initiative. Clearly, the first and last metrics: production compliance and the speed of forward and backward traceability directly impacts food safety. However, with such thin margins, it is essential that this is not at the expense of supply chain or operational efficiency. For this reason, OEE and complete and on-time shipments are also considered; which ensures that the Best-in-Class are not achieving success at the expense of other business requirements.

It should also be noted that food and beverage manufacturers are not doing as well as many would hope for. In fact, food and beverage manufacturers are below the Industry Average in all four metrics. This then begs the question: In the area of product safety and traceability, what can the food and beverage industry learn from other industries like high-tech, automotive, aerospace, defense, and the life sciences, that have been investing in these areas and in many ways are already more mature?

The Best-in-Class PACE Model

Ensuring food safety and traceability across a global supply chain can be a daunting task. Table 2 summarizes some of the strategic actions, business process capabilities, and technology enablers Best-in-Class companies have implemented to address these market pressures.

Table 2: The Best-in-Class PACE Framework

Pressures	Actions	Capabilities	Enablers
▪ Need to comply with government regulatory requirements	▪ Build in compliance and traceability to production processes ▪ Improve visibility of quality across design to delivery business processes	▪ Standardized procedures for handling customer complaints ▪ Standardized escalation procedures for quality, non-compliance, and recall events are across the enterprise ▪ Business processes are in place for collaborating with suppliers on quality ▪ All levels of the organization have visibility and defined responsibility in the case of a quality, non-compliance, or product recall event • Cross-functional continuous improvement teams are focused on improving enterprise quality processes	▪ ERP ▪ SCM ▪ Traceability Engine ▪ Manufacturing Operations Management ▪ Quality Management System ▪ Traceability and Genealogy ▪ HACCP ▪ CAPA ▪ Supplier Quality Management ▪ Supply Chain Visibility ▪ Critical Tracking Events ▪ Audit Management ▪ Compliance Management

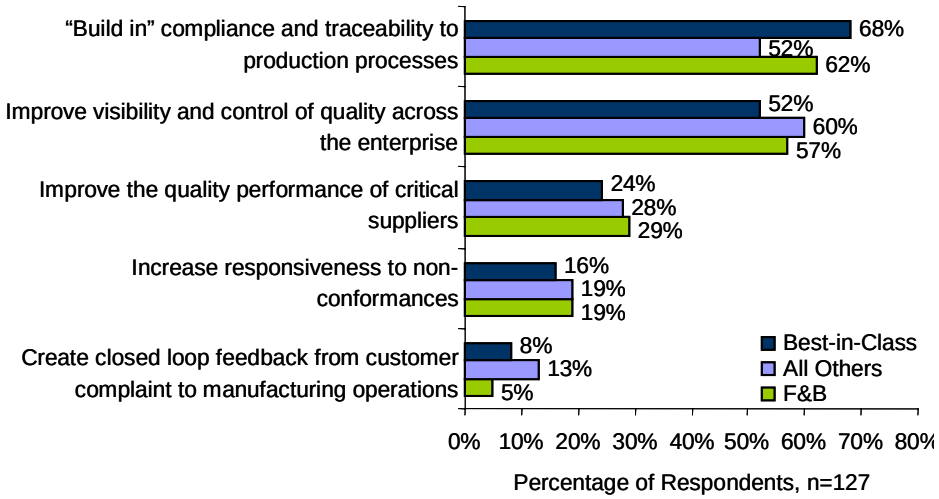
Source: Aberdeen Group, December 2010

Best-in-Class Strategies

Although there were major changes in the market pressures observed in 2009 and 2010, the strategic actions being deployed to address these market pressures has remained stable over the past year. In 2009, the top strategy being deployed was "building compliance and traceability into production processes" and this is still the top strategy in 2010 with Best-in-Class manufacturers being 31% more likely than other manufacturers to be pursuing this strategic action (Figure 3).

The strategy of building in compliance and traceability to production processes is one that is especially well suited for the food and beverage industry. This industry as a whole has a lot of experience with understanding the risks associated with a process, identifying the control points for those risks, and ensuring that within standard production processes control points are measured, recorded, and maintained each and every day. In specific terms this is referred to as Hazard Analysis and Critical Control Points (HACCP) and we will be hearing a lot more about HACCP as the Food Safety Modernization Act is rolled out.

Figure 3: Strategic Actions (2010 Study)



Source: Aberdeen Group, December 2010

"For our organization, traceability means having the ability to show an unbroken link from raw material to finished delivered product. Traceability is maintained by having a proactive quality department and using where possible ISO accredited suppliers."

~ Procurement Manager, $250 million to $500 million Food Manufacturer

The next step in this strategy for many manufacturers is connecting shop floor production processes data with real time traceability data. Although many manufacturers today in the food and beverage industry do a good job of managing food safety in production processes through HACCP, very few actually connect shop floor HACCP data to the overall traceability data. More often than not, the HACCP data is trapped in stand-alone temperature, pressure, or flow meter data historians, with no way for timely access in the case of an adverse event. Moving forward, the FDA intends to be very focused on the production process itself and how well standard processes ensure **both** food safety and traceability.

"For us 'traceability' is being able to understand by serial number what processes where followed to create the product including the bill of material used. Our ERP system can hold serial number information within the production orders. Currently, we are looking at how to automate the gathering of the data associated with each production order so we can cross reference that information to the serial number, and therefore provide us greater visibility into our products. "

~Manager of Procurement/Purchasing, Food and Beverage Manufacturer

Aberdeen Insights — Strategy

One strategy that is increasing in importance and is the only strategy being taken by more food and beverage respondents than Best-in-Class respondents is improving the quality performance of critical suppliers. It has always been the case that your suppliers' issues are your issues and with the degree of consolidation in food and beverage today, it has never been more true - brand matters. Given this assertion, many Best-in-Class companies are beginning to connect the idea of supplier quality management and traceability. In fact, we are beginning to see many sub verticals, like produce and seafood go well beyond just managing with certificates of analysis.

continued

Aberdeen Insights — Strategy

In these industries, large retailers and distributors are beginning to automatically collect item or case level traceability data from the field as well as quality and sustainability data such as the pesticides used or the environmental impact of operations. The beauty of this approach is that the traceability, quality and sustainability data are all in one location and format, opening it up for use in the case of a recall as well as for delivering this information to potential consumers. Ultimately, reducing the potential future costs of a recall and enabling a marketing differentiation on the store shelf.

Finally, there has been much clamoring about the equity of exemptions for small farmers and grocers in the Food Safety and Modernization Act and the impact it will have on whole traceability chain. Interestingly, the whole argument could become moot due to the benefits large retailers and food processors receive from the above described systems. It is probably a good thing that if small farmers want to sell a limited amount of food directly to local consumers or through local channels, it is not impacted by the new legislation. However, as soon as that local farmer starts interacting with the market in a way that it could impact a large brand name: retailer, chain restaurant, or food processor, it will have to start playing by the rules and those rules could be much stricter than those imposed by the FDA. In many ways, Wal-mart wields a much bigger carrot and stick than the FDA.

In the next chapter, we will see what the top performers are doing to achieve these gains.

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Chapter Two: Benchmarking Requirements for Success

The success of a food safety and traceability initiatives depends heavily on where in the maturity class framework an enterprise falls (Table 1). Maturity affects how an enterprise leverages supporting technologies and other business capabilities, and in turn, goes a long way to translating the strategies presented in Chapter One to ensure compliance and improve supply chain visibility.

Case Study — Seneca Foods Corporation

Seneca Foods is one of the country's largest processors of canned fruits and vegetables. Increasing food safety concerns, set off by recent food recalls, plus increasing domestic and foreign regulations and private customer audits, has driven the need for better information analysis. Seneca's agricultural department needed help with integrating and upgrading its crop monitoring documentation systems to track pesticide applications and automate and standardize traceability. To address these issues, Seneca implemented an integrated food safety and traceability solution to deliver timely tracking information to customers and regulatory agencies. Data was transferred from legacy information systems and paper-based records to a common, scalable, and web-based software application. The software was also integrated with ERP and warehouse systems and utilizes mapping technology to track planting from seed to harvest and chemical applications from "field to can."

By transferring data from legacy information systems and paper-based records, Seneca was able to immediately analyze quality assurance metrics across its grower base. They gained better visibility into chemical applications, concentration doses, and chemical compatibility, increasing the accuracy of pesticide application sprays and reducing pesticide application errors. By tracking plantings from seed to harvest, the goal is to analyze yield and plant growth by area. More importantly, the solution has allowed for harmonized agricultural business operations across their 2,500 contract grower base and has enabled consistent reporting and data mining. Analysis and reporting functions that took weeks may now be completed in minutes.

Fast Facts

- √ **Best-in-Class manufacturers are over twice as likely as** Laggard manufacturers to standardized escalation procedures for quality, non-compliance, and recall events across the enterprise
- √ **Best-in-Class manufacturers are over twice as likely as** Laggard manufacturers to implement GS1 standards-based business processes for sharing information and collaborating with suppliers on quality
- √ **Best-in-Class manufacturers are over twice as likely as** Laggard manufacturers to incorporate compliance into a product safety and traceability management system like ISO 22000 or SQF

Competitive Assessment

Aberdeen Group analyzed the aggregated metrics of surveyed companies to determine whether their performance ranked as Best-in-Class, Industry Average, or Laggard. In addition to having common performance levels, each class also shared characteristics in five key categories: (1) **process** (the approaches they take to execute daily operations); (2) **organization** (corporate focus and collaboration among stakeholders); (3) **knowledge management** (contextualizing data and exposing it to key stakeholders); (4) **technology** (the selection of the appropriate tools and the effective

deployment of those tools); and (5) **performance management** (the ability of the organization to measure its results to improve its business). These characteristics (identified in Table 3) serve as a guideline for best practices, and correlate directly with Best-in-Class performance across the key metrics.

Table 3: The Competitive Framework

	Best-in-Class	Laggard	Food and Beverage
Process	Business process incorporates compliance with food safety and traceability management systems (ISO 22000 or SQF)		
	52%	33%	47%
	Business processes are in place to support the use of industry standards and tools like those offered by GS1		
	64%	20%	30%
	Industry associations and standards (such as United Fresh and the Produce Traceability Initiative) form the foundation of how traceability programs are deployed		
	55%	15%	19%
Organization	All levels of the organization have visibility and defined responsibility in the case of a quality, non-compliance, or product recall event		
	83%	49%	55%
	Cross-functional continuous improvement teams are focused on improving enterprise quality processes		
	75%	53%	62%
	Compliance and Traceability is a key item on the Executive's agenda in your company		
	88%	55%	71%
Knowledge	Quality testing data is automatically collected and integrated with production systems		
	61%	43%	51%
	Real-time monitoring of adverse events		
	71%	47%	51%
Technology	Technology Enablers currently in use:		
	▪ 79% ERP (Enterprise Resource Planning) ▪ 48% SCM (Supply Chain Management) ▪ 25% Traceability Engine	▪ 68% ERP (Enterprise Resource Planning) ▪ 45% SCM (Supply Chain Management) ▪ 11% Traceability Engine	▪ 75% ERP (Enterprise Resource Planning) ▪ 49% SCM (Supply Chain Management) ▪ 14% Traceability Engine

	Best-in-Class	Laggard	Food and Beverage
Performance	Environmental conditions are monitored throughout the supply chain		
	70%	45%	59%
	Mock recalls are performed regularly and benchmarked to improve performance		
	52%	37%	60%

Source: Aberdeen Group, December 2010

Capabilities and Enablers

Based on the findings of the Competitive Framework and interviews with end users, Aberdeen's analysis reveals that Best-in-Class manufacturers significantly differ in how they manage their operations across a broad range of business capabilities and technology enablers.

Process

When it comes to food safety and traceability, process capabilities are perhaps the most critical area of investment and differentiation for the Best-in-Class. Because of this importance, there is no lack of groups and associations focused on improving processes and establishing best practices. When the use of these best practices is examined, it turns out that Best-in-Class organizations are well ahead of the curve in building these best practices into Standard Operating Procedures (SOPs).

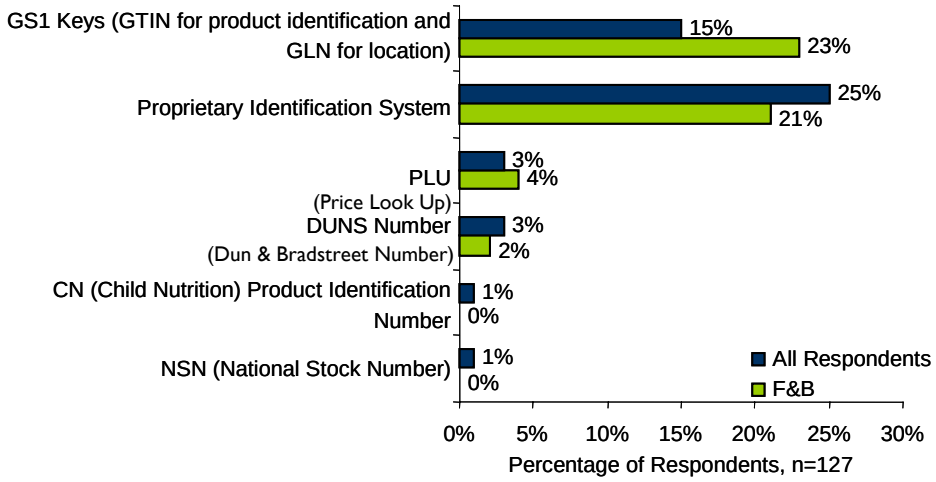
To start, the International Organization for Standards has extended the definition of a quality management system (defined in ISO 9000) to create a holistic Food Safety Management System in ISO 22000. This system defines the management system, as well as puts in place the change control and audit trail tools to ensure the system is adopted and maintained over time. Best-in-Class organizations are over 50% more likely than Laggard organizations to have built these systems into overall business processes. Additionally, as it will be shown in the upcoming technology enabler section, many Best-in-Class companies have automated many portions of this management system, including: HACCP, Good Manufacturing Practice (GMP), audit management, and compliance management.

GS1 US along with other industry associations like United Fresh, have also focused on best practices but more in the traceability and extended supply chain arena. These organizations have developed initiatives, like the Produce Traceability Initiative (PTI), to help companies better manage the flow of data within and between organizations. The initiatives also promote the adoption of Global Trade Item Number (GTIN) and Global Location Number (GLN); with the ultimate goal of achieving whole-chain case-level electronic traceability by 2012.

It should also be noted that the PTI is being used as a template for adoption across a number of industries outside of produce, including seafood, meat,

dairy, baked goods, and more. Finally, the Best-in-Class are again leading the charge in the adoption of these standards; with the Best-in-Class being over three times more likely than Laggards to be leveraging these standards in their business processes. Additionally, Figure 4 shows adoption rates of the different Auto-ID systems for sharing traceability data across trading partners. GS1standards are making major strides, specifically in the food and beverage industry, for sharing information between partners.

Figure 4: Auto-ID System for Product and Location Identification



Source: Aberdeen Group, December 2010

Organization

Being able to quickly coordinate and mobilize stakeholders during an adverse event, especially a product recall, is a key capability to reducing the impact of such events. As such, 83% of Best-in-Class manufacturers, which is nearly twice as many Laggard manufacturers, have the organizational capability to provide visibility and defined roles to these stakeholders in just such an event. For food and beverage manufacturers, the adoption rate is just above the Laggards at 55%. Given the high degree of publicity and scrutiny that is given to such events in the food and beverage industry, it would behoove many of these organizations to implement this capability. All too often, these capabilities are not invested in until a catastrophic failure has occurred; consider your organization warned.

From an organizational perspective, another one of the keys to success for Best-in-Class manufacturers is having food safety and traceability at the top of the executive agenda. When the rest of the organization realizes it is more than just some initiative relegated to the quality or supply chain departments, and really has enterprise-wide implications on the overall success of the firm, all different types of stakeholders begin to pay attention. With regards to the Best-in-Class, they are nearly 50% more likely than Laggards to have established this capability. With regards to the food and beverage industry, adoption (71%) is still not at Best-in-Class levels but it is

"Traceability is about tracking raw ingredients all the way to the end customer. We utilize our ERP system for manufacturing and distribution. The one area where we need to improve is to have the ability to case tag a product at a unique batch level."

~ Director

Large Food Manufacturer

up from last year, (64% in 2009). In casual conversation, many more than just 71% of food and beverage executives would say food safety and traceability is a key issue. For those organizations that have not yet formalized this commitment another warning should be considered. Corporate initiatives appear much more credible if they are enacted proactively, rather than as a knee-jerk response to an unfortunate event.

Finally, executive sponsorship dovetails nicely into establishing cross functional continuous improvement teams focused on improving food safety and traceability. In fact, Best-in-Class manufacturers are over 50% more likely than Laggard manufacturers to have such teams focused on these issues. Many companies, especially those in the food and beverage industry, have a lot of experience and proven success using continuous improvement teams. In fact, many large food companies, even today, are investing in and launching Total Productive Maintenance (TPM) initiatives. If such an established culture exists in your organization, don't be afraid to leverage it and launch a team or two focused on food safety and traceability.

Knowledge Management

The Best-in-Class differentiate themselves from how the Industry Average and Laggard manufacturers approach knowledge management in two key areas: integrating production and quality data and providing real time alerts triggered by adverse events in these areas. Both have their foundation in automated data collection. First, the Best-in-Class are almost 50% more likely than Laggard manufacturers to integrate automatically captured quality testing data with production systems. Second, the Best-in-Class are over twice as likely as Laggard manufacturers to use real time alerting to effectively notify decision makers of an adverse event or non-compliance situation. In regards to food and beverage manufacturers, the story is the same on both accounts. The food and beverage manufacturers are well below the Best-in-Class on both accounts and could benefit by more focus on knowledge management capabilities.

To improve in this area, food and beverage manufacturers should first focus on automated data collection. Food and beverage companies have traditionally underinvested in technology, especially when it comes to automated data collection. Far too often, in a manual data collection environment, the data is old and inaccurate, calling into question the validity of conclusions drawn by the analysis. With the advent of new solutions, the opportunity cost for food and beverage companies to not invest in these solutions is significantly higher, considering the impact of non-conformance and recalls on the organization's brand. However, special care should be taken to ensure that you don't invest halfway. If your organizations has decided to take the plunge and start using data strategically to make better decisions, invest in the quality of your data; it will directly impact the quality of your decisions.

Technology

Most manufacturing and distribution companies today, including those in the food and beverage industries, have adopted ERP as the major system of record and for managing end-to-end business processes. However, it is usually true that ERP is necessary but insufficient for delivering: whole-chain, item-level, real-time traceability. In most cases, ERP systems do not collect process and product data at a granular enough level across suppliers, manufacturing, quality, or distribution to deliver the performance desired. Similarly, since ERP is a transaction based system, it can not generally identify where a product or process is in real time, only where the last transaction was recorded and when the next transaction should be recorded. Finally, an organization would be ill-advised to store, within ERP, the amount of historical traceability data needed to deliver the response time and granularity required. Over time, the amount of data stored within the ERP system would bog down the overall system, leaving the potential for severe application performance issues.

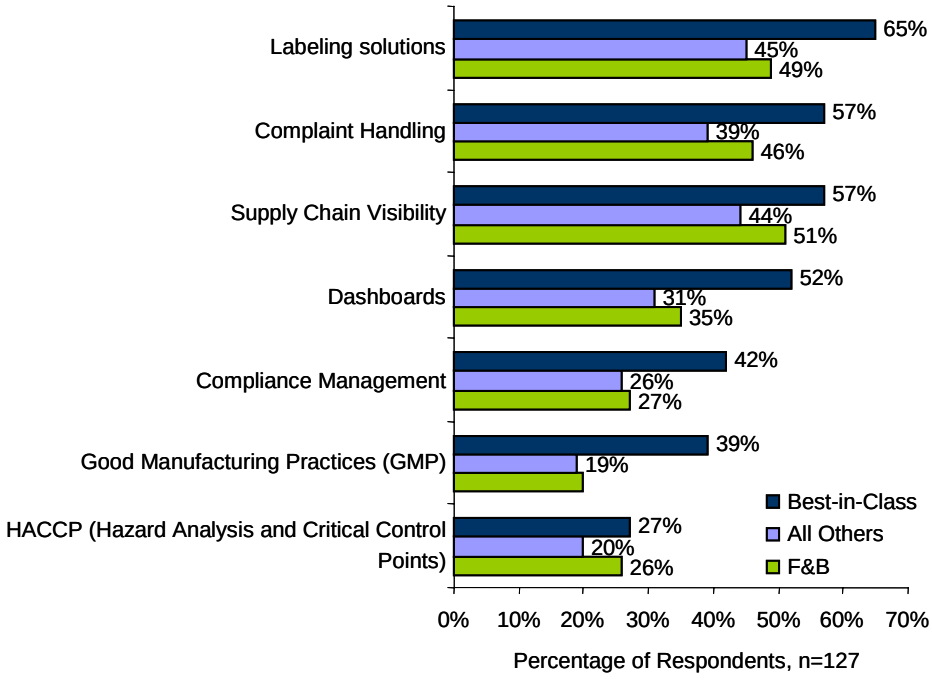
To address all these issues, Best-in-Class companies are extending ERP with best-of-breed applications like quality management systems, manufacturing operations management, product life cycle management, and supply chain management. These systems are sometimes offered by ERP providers and sometimes by third party application providers. The adoption rates for critical functionalities offered by these applications are shown in Figure 5.

"Traceability in dairy is from 'farmer to consumer.' As a dairy manufacturer, we cover from our farmers to delivery of the fresh goods to retailers. We currently have a global MES platform in rollout (35 sites of 65 done) and it is the backbone of our traceability program as well as many other purposes."

~ Director of IT

Large Diary Manufacturer

Figure 5: Technology Enablers



Source: Aberdeen Group, December 2010

"System traceability and full lot control has been implemented across the business to improve our ability to accurately trace material movements and to be able to respond to any quality non-conformance issues. In doing so, we have the ability to accurately track the movement of all materials from point of receipt through to point of sale."

~ Manager of Operations

Food Manufacturer

Of these specific technology enablers, there are several that are much more likely to be adopted by the Best-in-Class and deserve specific attention. The first four in the figure (labeling solutions, supply chain visibility, complaint handling, and dashboards) all play a critical role in leveraging traceability outside the four walls of the factory. These enablers allow an organization to see what is happening throughout the extended supply chain and to respond more quickly to a potential adverse event or recall. Other enablers of importance include compliance management and automated tracking of GMP compliance. As mentioned before, the FDA is going to be increasing focus on these areas and companies with automated solutions to manage these processes are generally in a much better position to answer the questions and provide the data requested by auditors.

"We have the ability to track and trace all raw materials and packaging materials going into a batch. Within our ERP system, we can track one step up and one step downstream. Meaning, we have visibility all batches of raw materials going into products, and can follow the material throughout our processes. In addition, we can trace where all our batches of finished goods are distributed."

~ Manufacturing Manager

Large F&B Company

Finally, to bring all these disparate data sources together and effectively share data with trading partners and regulators in compliance with industry standards, Best-in-Class organizations are over twice as likely as Laggards to invest in a traceability engine. These solutions are generally web-based, have built industry standards (data formats and architecture) into the solution, and are purpose-built for the specific sub-vertical industry the solution is addressing, i.e. food service, produce, seafood, etc.

Performance Management

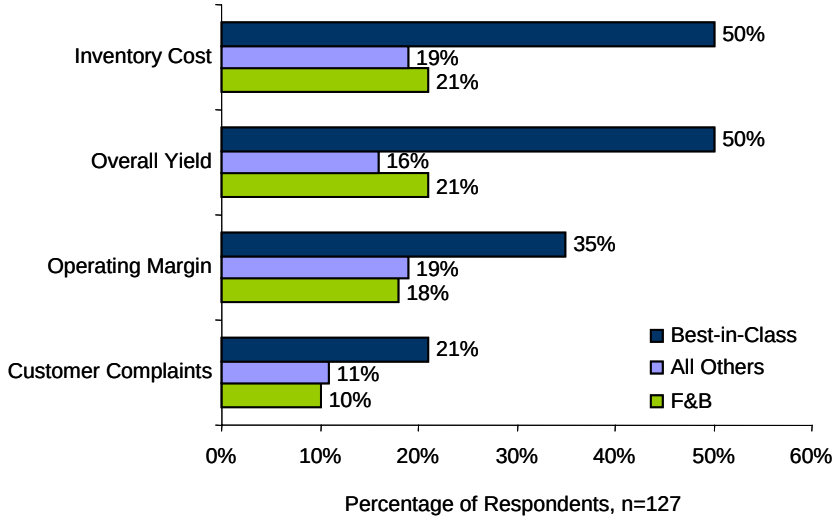
There are a number of innovative ways companies are better managing performance regarding food safety and traceability and in many cases food and beverage companies are the innovators, providing the path for many other industries to follow. The first way food companies are innovating is in monitoring environmental conditions throughout the life cycle of a particular item of food. Data points this can include are as follows:

- Chemicals applied in the field
- Critical control points achieved in production (i.e. temperature, flow, pressure, etc)
- GMPs conformed to in production (proper sanitation and food handling procedures by workers)
- Critical control points achieved in distribution

The food and beverage industry is also a leader in mock recalls, with many large retailers and chain restaurants mandating mock recalls throughout their supply chains. However, companies should not wait for an outside influence to conduct a mock recall. Every company will benefit and they are great for identifying gaps in current procedures or data.

There is also an added benefit to investing in food safety and traceability; Best-in-Class companies are much more likely to have real time visibility into KPIs than other manufacturers.

Figure 6: Real-time visibility into KPIs



Source: Aberdeen Group, December 2010

Companies that have real time traceability have invested so heavily automated data collection across the supply chain, visibility, and reporting; it is only natural for these capabilities to bleed over into other operational areas of the business.

Aberdeen Insights — Technology and Defining Traceability

There has been a lot of talk about what traceability is and how it can be defined. Many executives would say they have already been doing traceability for 20 years. Comments Aberdeen hear from executives fall along the lines of; supplier lots are recorded with batch numbers, HACCP and GMP data is saved at the plants, date codes, production orders, and shipment data are recorded in ERP, and any information you might want can eventually be found if there is an adverse event.

However, in today's day and age of real-time consumer information via Twitter and 24 hour news channels as well as mandates on time windows for critical information (i.e. 24 hours), the old approach won't work any more. Eventually, every large food and beverage company, regardless of its place in the supply chain, will have real-time, item-level, whole-chain traceability. For many, this is so far off it may seem impossible, but for others they are already achieved it. The Best-in-Class, on average, are already approaching real-time traceability (four hours) and 36% are already at item level traceability, Figure 7. This is the future of the food and beverage industry, most of the Best-in-Class is already there. If your company does not yet have the vision, don't wait and let the competition or regulators shut you down.

continued

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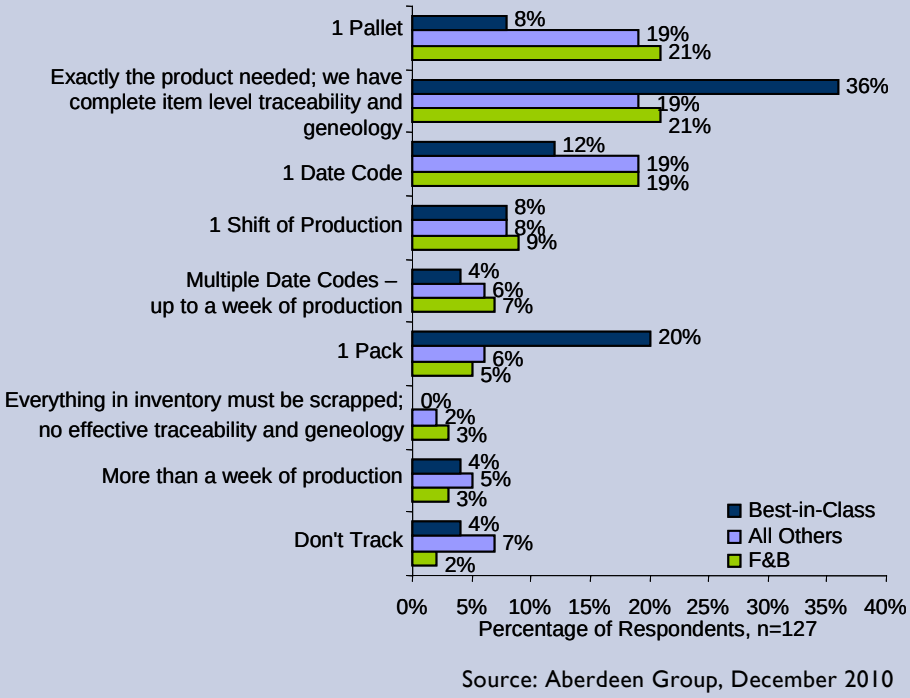
Figure 7: Traceability Accuracy



Source: Aberdeen Group, December 2010

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Chapter Three: Required Actions

Whether a company is trying to move its performance in food safety and traceability from Laggard to Industry Average, or Industry Average to Best-in-Class, the following actions will help spur the necessary performance improvements:

Laggard Steps to Success

- **Start with building compliance and traceability into the production process.** Best-in-Class manufacturers are 31% more likely than others to put programs and processes in place to build compliance and traceability into production processes. Integrating compliance and traceability into the production process enables companies to have critical information for improved decision making, such as how a products were manufactured, who worked on it, what components were used, and what assets / equipment was used.
- **Put food safety and traceability on the executive agenda**. Establishing executive focus is an important first step towards the journey to ensuring consumer safety and satisfaction. Best-in-Class manufacturers over 50% more likely than Laggards to have already established this executive focus. Establishing such a focus allows companies to align management goals, objectives, and metrics across the different levels and groups within the enterprise and will ultimately result in the increased buy in of critical stakeholders.
- **Use industry standards and best practices as the basis for food safety and traceability initiatives.** Best-in-Class manufacturers are over 50% more likely than Laggards to leverage ISO 22000 standards for food safety and are over three times as likely to leverage GS1 standards for traceability as a basis for business processes managing food safety and traceability. These standards help define the management system as well as put in place the change control and audit trail tools needed to ensure the system is adopted and maintained over time.

Industry Average Steps to Success

- **Leverage past successes with cross-functional continuous improvement teams in food safety and traceability initiatives.** Best-in-Class manufacturers are almost 50% more likely than Laggards to have a cross-functional continuous improvement team focused on food safety and traceability. In the absence of a cross functional team, with enterprise wide responsibility, it would be challenging if not impossible to drive towards consensus around key capabilities required to manage traceability initiatives across an enterprise in today's global manufacturing environment.

Fast Facts

√ **Best-in-Class manufacturers are 31% more likely than** their competitors to put programs and processes in place to build compliance and traceability into production processes

√ **Best-in-Class manufacturers are over 50% more likely than** Laggards to have food safety and traceability on the executive agenda

√ **Best-in-Class manufacturers are three times as likely Laggards to** leverage GSI standards for traceability as a basis for business processes for managing food safety and traceability

- **Establish role based visibility and defined responsibilities in the case of a quality, non-compliance, or product recall event.** Best-in-Class manufacturers are nearly twice as likely as Laggard organization to have established this capability. Establishing this capability can give employees a sense of security and confidence when operating in the most uncertain of times, like in the throws of a high profile product recall. Finally, remember, this is a much more effective strategy when implemented before rather than after an adverse event occurs.
- **Use mock recalls to identify and fill gaps in your organization's food safety and traceability technology stack.** Best-in-Class manufacturers are much more likely to have adopted technology across the overall technology stack. It is important to have an accurate view of your organizations strengths and weaknesses and addresses the weaknesses quickly. It is highly recommended to start with ERP if it is not already implemented. Then, as your organization matures, start implementing technology where it makes sense for your organization. Pay particular attention to suppliers, manufacturing, quality, and distribution gaps.

"Traceability is our ability to identify the source of product (grown or purchased) beginning with an individual product package at the customers' facility. This includes all dates and touches back to the date of packing. Our information system allows us to connect a customer order to the production order and the shipping record to provide seamless tracking of product."

~Manager

Food Manufacturer

Best-in-Class Steps to Success

- **Deploy a specific food safety and traceability technology solution.** Best-in-Class organizations are over twice as likely as Laggards to invest in a traceability engine. These solutions are generally web-based, build industry standards on data formats and architecture into the solution, and are purpose built for the specific sub-vertical industry the solutions is addressing (i.e. food service, produce, seafood).
- **Redefine what traceability means in your organization.** Best-in-Class manufacturers are leading the charge when it comes to implementing food safety and traceability solutions. For these organizations, the definition of what it means to have traceability needs to change and push the whole industry forward. To be a leading company in this field traceability should be thought of us real-time, item-level, whole chain traceability. It is possible and will soon be the reality.
- **Go beyond compliance to improve supply chain visibility and ultimately change the way your organization interacts with consumers.** The dialogue around food safety and traceability has quickly changed from reducing the impact of recalls to compliance over the past year with the passage of the Food Safety Modernization Act. Compliance is important but it would be folly for companies to invest in food safety and traceability and not gain tangible business benefits. Yes, these legislative based changes will benefit the consumer but ultimately it will also benefit innovative and market leading companies. These companies will use investments in food safety and traceability to improve relations with

suppliers, improve control and quality on the shop floor, and improve visibility across the supply chain. There are even some thought leading companies researching how investments in food safety and traceability can be used to interact with consumers in entirely new ways. The time for waiting and seeing on the topics of food safety and traceability is over.

Aberdeen Insights - Summary

The next decade will be one of tremendous change in the food and beverage industry. Ten years from now, it is very likely that consumers will be able to scan, with a mobile phone, almost any piece of food purchased and know the complete life cycle of that product. The Food Safety and Modernization Act will change the way companies think about compliance and change the way consumers think about the food they eat. Moving forward, size and efficiency may not be the determining factor of success but rather how well a company manages the food safety and traceability processes in its business and how well it can use the generated data to communicate with its customers.

Appendix A: Research Methodology

Between October and December 2010, Aberdeen examined the use, the experiences, and the intentions of more than 120 enterprises focused on product quality and traceability, over 50 of which were food and beverage manufacturers

Aberdeen supplemented this online survey effort with interviews with select survey respondents, gathering additional information on strategies, experiences, and results.

Responding enterprises included the following:

- Job title: The research sample included respondents with the following job titles: Upper Management (CSO, CEO, COO, CFO, CTO, President, GM) (13%); Vice President (9%); Director (24%); Manager (37%); Other (17%)
- *Department / function:* The research sample included respondents from the following departments or functions: Logistics/Supply Chain (19%); Information Technology (14%); Quality Management (13%); Operations (10%); Corporate Management (9%); Manufacturing/Production (8%); Procurement/Purchasing (7%)
- *Industry:* The research sample included respondents exclusively from retail industries. Food and Beverage Industry was the largest segment with 40% of the sample.
- *Geography:* The majority of respondents (69%) were from North America. Remaining respondents were from the Asia-Pacific region (12%) and Europe (15%), and other (4%).
- *Company size:* Forty-four percent (44%) of respondents were from large enterprises (annual revenues above US $1 billion); 36% were from midsize enterprises (annual revenues between $50 million and $1 billion); and 20% of respondents were from small businesses (annual revenues of $50 million or less).
- *Headcount:* Twenty-four percent (24%) of respondents were from large enterprises (headcount greater than 1,000 employees); 58% were from midsize enterprises (headcount between 100 and 999 employees); and 18% of respondents were from small businesses (headcount between 1 and 99 employees).

Study Focus

Responding manufacturing executives completed an online survey that included questions designed to determine the following:

- √ The degree to which product quality and traceability is deployed in their manufacturing operations and the financial implications of the technology
- √ The structure and effectiveness of existing product quality and traceability implementations
- √ Current and planned use of product quality and traceability to aid operational and promotional activities
- √ The benefits, if any, that have been derived from product quality and traceability initiatives

The study aimed to identify emerging best practices for compliance and traceability usage in manufacturing, and to provide a framework by which readers could assess their own management capabilities.

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Table 4: The PACE Framework Key

Overview
Aberdeen applies a methodology to benchmark research that evaluates the business pressures, actions, capabilities, and enablers (PACE) that indicate corporate behavior in specific business processes. These terms are defined as follows: **Pressures —** external forces that impact an organization's market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive) **Actions —** the strategic approaches that an organization takes in response to industry pressures (e.g., align the corporate business model to leverage industry opportunities, such as product / service strategy, target markets, financial strategy, go-to-market, and sales strategy) **Capabilities —** the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products / services, ecosystem partners, financing) **Enablers —** the key functionality of technology solutions required to support the organization's enabling business practices (e.g., development platform, applications, network connectivity, user interface, training and support, partner interfaces, data cleansing, and management)

Source: Aberdeen Group, December 2010

Table 5: The Competitive Framework Key

Overview	
The Aberdeen Competitive Framework defines enterprises as falling into one of the following three levels of practices and performance: **Best-in-Class (20%) —** Practices that are the best currently being employed and are significantly superior to the Industry Average, and result in the top industry performance. **Industry Average (50%) —** Practices that represent the average or norm, and result in average industry performance. **Laggards (30%) —** Practices that are significantly behind the average of the industry, and result in below average performance.	In the following categories: **Process —** What is the scope of process standardization? What is the efficiency and effectiveness of this process? **Organization —** How is your company currently organized to manage and optimize this particular process? **Knowledge —** What visibility do you have into key data and intelligence required to manage this process? **Technology —** What level of automation have you used to support this process? How is this automation integrated and aligned? **Performance —** What do you measure? How frequently? What's your actual performance?

Source: Aberdeen Group, December 2010

Table 6: The Relationship Between PACE and the Competitive Framework

PACE and the Competitive Framework – How They Interact
Aberdeen research indicates that companies that identify the most influential pressures and take the most transformational and effective actions are most likely to achieve superior performance. The level of competitive performance that a company achieves is strongly determined by the PACE choices that they make and how well they execute those decisions.

Source: Aberdeen Group, December 2010

Appendix B: Related Aberdeen Research

Related Aberdeen research that forms a companion or reference to this report includes:

- *Food Safety and Traceability: Keeping Consumers Healthy and Happy;* November, 2009
- *Closed Loop Quality Management: Improving Customer Focus from Design to Delivery*; July, 2009
- *A Platform Approach to Manufacturing Operations Management;* March, 2009
- *Compliance and Traceability in Manufacturing*; December, 2007
- *Global Manufacturing Operations Management* August 2008
- *Manufacturing Operations Management: The Next Generation of Manufacturing System*; January, 2008
- *Benchmarking Traceability and Genealogy in Global Manufacturing Environment;* November, 2007
- *The Cost of Quality: Benchmarking Enterprise Quality Management;* July, 2007
- *Compliance and Traceability in Regulated Industries*; December, 2006

Information on these and any other Aberdeen publications can be found at www.aberdeen.com.

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