

Managing the Product Recall Process

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Abstract

The large number of recalled products, the low proportion of recalled products returned for repair or replacement, and the high costs (lawsuits, communication, product repair and/or replacement, government agency fines and lost sales, etc.) associated with product recalls indicate the need for firms to properly plan for the inevitable product recall. Factors that account for the high number of product recalls include heavily concentrated supply chains, use of global supply chains, and improved technologies in identifying unsafe food products. This article develops a six-part strategy for planning and implementing a product recall. These stages are (1) organizing for the inevitable product recall, (2) reducing the discovery-to-recall time interval (3) planning an appropriate overall recall response strategy, (4) measuring product recall effectiveness via the completion rate, (5) improving product recall responsiveness, and (6) recapturing recall-related expenses via insurance and supplier hold-harmless agreements.

Introduction

Despite the large media attention surrounding major product recalls, the percent of recalled goods returned for repair or replacement is still very low. A study conducted by the National Highway Traffic Safety Administration's (NHTSA) Strategic Plan 2016-2020 found that the auto recall completion rates (the percent of recalled products returned to the vendor for repair/replacement) are unacceptably low.¹ According to several studies, the average response rate to a product recall is between 6 and 10 percent. *Consumer Reports* reported that the average recall response rate is 6 percent. The Consumer Product Safety Commission (CPSC) estimated that about 10 percent of consumers typically follow up on product recalls each year.² The completion rate for products marketed to children has been estimated at 10 percent by Kids in Danger (KID), a nonprofit organization devoted to improving product safety for children.³

There is an especially large number of open (uncompleted) recalls for motor vehicles. On average, 20 percent of the vehicles currently in use in the U.S have an open recall.⁴ The Consumer Federation of America estimated that between 70 to 84 million cars have been recalled but not repaired.⁵ Carfax estimates that there are over 57 million recalled vehicles that have not been repaired.

Poor data from product manufacturers, inadequate recall planning and implementation, and the lack of legislation all contribute to the high number of open recalls. KID reported that the quality of the data from manufacturers on corrective action taken 12 months after 2016 recalls was so deficient that the organization was unable to draw any conclusions relating to the effectiveness of a recall plan for goods marketed to children. Of 93 product recalls in 2017, KID received full reports on only 8 recalls and these did not contain a full year's worth of data.⁶

One study reported that despite the increased number of product recalls, companies are still unprepared to manage the recall process and that the number of studies investigating product recall from a managerial perspective is still scarce.⁷ According to the head of the product recall team at Chubb, of the roughly 260,000 manufacturing companies in the U.S., 70 to 80 percent do not have a product recall policy.⁸ Many firms have adopted a reactive versus a proactive strategy due to the high long-term costs associated with product recalls.⁹

The first part of this article examines factors that contribute to the high growth in reported safety defects, the high costs of product recalls to a firm (including lost sales, loss in brand equity, and loss in stock market value). The second portion discusses strategies firms can implement in planning and implementing recalls.

Factors Contributing to the Growing Number of Safety Defects

According to a global insurance company executive, “we are now seeing and experiencing product recalls on a scale not seen before, bringing record levels of activity and costs.¹⁰ The large number of recalled products can be attributed to three factors: heavily concentrated supply chains, long and globally-based supply chains, and the improved detection of unsafe food products. These will be discussed in the following section.

Heavily Concentrated Supply Chains

Heavily concentrated supply chains exist among pharmaceutical, microprocessor, touch display, smartphone chip, motor vehicle, chemical, and food and beverage producers.¹¹ A single safety defect can affect a large

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number of brands and models due to the same vendor selling goods to competing firms.

Takata's airbag recall affected 42 million vehicles from 14 different vehicle manufacturers in the U.S. and an additional millions of vehicles in foreign markets. As many as one in every four of the 250 million vehicles in the U.S. were affected by the Takata recall.¹² While the Peanut Corporation of America (PCA) had only a 2 percent market share, its salmonella-contaminated peanuts were used in almost 4,000 products made by 361 different companies.¹³ Some of the contaminated peanuts were purchased by firms that were two or more levels removed from PCA. PCA's peanuts were also used in such diverse products as Valentine's Day candy, crackers, toppings, cereal, ice cream, frozen cookie dough, dog biscuits, dressings, seasonings, chicken satay, snack and energy bars, peanut butter cups, brownies, cake and pies, donuts, cake toppings, and even stuffed celery.¹⁴

The number of recalled PCA-based products was so extensive that proper communication of the recall to both intermediate and final consumers was impeded. While one study found that 93 percent of Americans surveyed were aware of the peanut recall, fewer than one-half of these consumers knew that the recall affected snack bars, cakes, brownies, and cookies.¹⁵ Heavily concentrated supply chains can substantially increase the total costs of a recall. While a recall of contaminated sugar resulted in a \$2.5 million loss for the first affected party, the recall ultimately cost over \$16 million after the product recall costs were extended to 11 other companies.¹⁶

Firms can minimize the impact of a supply disruption by using multiple suppliers for each region. This strategy reduces recall-related communication costs as well as product repair and shipping costs. Samsung's Galaxy Note 7 batteries that were recalled in the U.S. and Korea were made by Samsung SDI based in Korea. The Chinese-made recalled batteries were produced by Amperex. Firms that use a distributed strategy (the use of different supplies for specific regions) include Burger King, Coca-Cola, Kraft, and Nissan.¹⁷

Long and Global-Based Supply Chains

One study attributed high levels of product recalls to offshore and captive outsourcing of manufacturing and distribution.¹⁸ Global supply chains can be characterized by poor communication between users and suppliers, different regulatory standards across countries, socio-cultural diversity, and problems associated with coordinating and exchanging information.¹⁹

The complexity of a global supply chain can also make it difficult to determine a manufacturer's location.²⁰ In the pharmaceutical industry, supply chains commonly involve outsourcing, manufacturing, packaging, and distribution functions. Each of these functions can be performed by a

separate corporate entity in a different location.²¹ Long and geographically-distant supply chains also increase the risk of product contamination, key ingredient substitution, and counterfeit products.

While many managers carefully monitor foreign plants for potential safety defects, one study found that captive plants are more likely to incur safety issues than plants run by independent offshore firms. This study found that local managers were more likely to “hide” the quality and safety issues in captive as opposed to outsourced firms.²²

Improved Detection of Unsafe Food Products

The amount of food recalled by the Food and Drug Administration (FDA) increased from 1.4 million units to over 118 million units in the first half of 2016.²³ The United States Department of Agriculture (USDA) recalled over 54 million pounds of unsafe food products in the second quarter of 2016 as compared with only 1 million units earlier in the year.²⁴ There were 22 different outbreaks of food poisoning resulting in product recalls in 2018. This resulted in more recalls than any other year in the previous 10 year period.²⁵

The significant increase in food product recalls can be attributed to Whole Genome Sequencing technology that traces and detects unsafe products. Genome sequencing enables regulatory bodies such as the FDA and the Center for Disease Control to locate the origin of small outbreaks. FDA’s GenomeTrakr contains a database of food-based pathogens that enables the FDA to trace the specific source of a contamination within a multi-ingredient product. Prior to genome sequencing, consumers would commonly attribute the symptoms of contamination to the flu or a stomach ache.²⁶ The North Carolina Division of Public Health estimates that foodborne pathogens account for about 48 million illnesses, 128,000 hospitalizations, and 3,000 deaths each year in the U.S.²⁷

Estimating Product Recall Costs

Firms often underestimate the total product recall costs due to not including all costs and/or by under budgeting key costs. Product recall related costs include costs of identifying the safety defect, disposing of the defective product, replacing and repairing defective goods, communicating the recall to all channel members, correcting the defect, litigation-related expenses, the loss in brand equity and market capitalization, government agency fines, and channel-member reimbursement. See Table 1.

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Table 1. Costs Associated with a Product Recall

Communication-related expenses:

- ✓ Notifying regulatory bodies, supply chain partners, and consumers to encourage consumers to return product
- ✓ Communication costs to rebuild sales

Logistics-related expenses:

- ✓ Pulling recalled products off the shelves
- ✓ Transportation costs to receive and dispose of defective products as well as returning repaired products
- ✓ Storing, transporting, and destroying recalled products

Engineering-related expenses:

- ✓ Investigating cause of safety issues
- ✓ Redesigning defective product components
- ✓ Closing, sanitizing, and modifying plants

Litigation-related expenses:

- ✓ Legal fees associated with customers, suppliers, and government agencies
- ✓ Product liability settlements
- ✓ Customer reimbursement costs

Loss in brand-equity and market capitalization:

- ✓ Reduced short and long term sales
- ✓ Reduced stock market price

Government-agency related expenses:

- ✓ Fines to government agencies
- ✓ Complying with government mandated safety testing

Channel member related costs:

- ✓ Labor costs to dealers to install new part
- ✓ Channel member reimbursement for costs related to customer notification
- ✓ Consumer incentives to encourage them to return goods and restore image

The total costs of a product recall have been studied by food, beverage, and consumer products firms as well as by trade associations. A study sponsored by the Grocery Manufacturers Association and conducted by Covington & Burling LLP and Ernst & Young reported that over 81 percent of the participating food, beverage, and consumer products firms stated that the financial risk of a recall was “significant” to “catastrophic.” For companies that have faced a recall five years prior to the data collection process, 77

percent estimated the financial impact to be as high as \$30 million, with 23 percent reporting even higher costs. The four largest recall-related expenses were: business interruption or lost profits, recall execution costs, liability risk, and reputation damage or loss of brand equity.²⁸ The Food Marketing Institute and the Grocery Manufacturers Association estimated that the average direct costs of a recall to a food company to be \$10 million. This amount did not include litigation costs, post-incident agreed or government mandated oversight expenses, damage to a brand's reputation, loss in market value, or declining profits due to lost sales.²⁹

A major product recall for General Motors (GM) involved a faulty ignition switch which shut off the car's engine without warning. The loss of power immediately disabled the vehicle's power steering, power brakes, and airbags. As a result, GM recalled 30.4 million cars worldwide. One source calculated GM's ignition switch-based recall costs at over \$6.7 billion. This includes \$4.1 billion to repair the recalled vehicles, \$870 million to settle death and personal injury claims, \$900 million in a settlement with the Department of Justice, and a charge of \$874 million to reflect the costs of future recalls.³⁰

The following section details two of the major costs associated with product recalls: the lost sales and the accompanying reduction in brand equity as well as loss in a firm's stock market value.

Product Recall Costs Related to Lost Sales and Reduction in Brand Equity

Unlike the direct costs of a product recall (communication, product disposal, and legal fees), the loss in profits due to lost sales and reduced brand equity is much more difficult to ascertain. This is typically the most costly product recall-related expense.³¹

A Harris Interactive poll found that 55 percent of respondents temporarily switched brands following a product recall. 15 percent of these consumers stated that they would never repurchase the recalled product. An additional 21 percent stated that they would never buy any brand made by the recalled product's manufacturer.³²

A number of factors can affect the loss in sales following a major product recall. One study found that a firm's reputation for socially responsible programs can create a reservoir of goodwill which reduces the loss in sales.³³ Another study found that in event of a severe recall, auto brands that have a functional brand image due to higher reliability ratings are more likely to experience a sales decline than those viewed as luxury brands.³⁴

Product recalls can also affect a rival brand due to "perverse spillover." Perverse spillover has the greatest impact on competitive brands from the same country as the recalled good. Pervasive spillover also has a stronger

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impact on highly dominant brands or models. As an example, a Toyota recall would have a negative effect on Honda and Nissan but would help Chrysler. One study reported that the recall caused same-country rival sales to fall by an average of \$3.8 million.³⁵

Loss in Stock Market Value

The impact of a product recall on a firm's market capitalization can be significant. As a result of the faulty ignition switch recall, GM's stock market value declined about 15 percent in 2014, a year when the overall stock market gained over 11 percent.³⁶

The loss in stock market value does not affect all companies equally. One study found that the stock market reaction to a product recall is more negative for announcements by retailers or distributors, for smaller firms, for toys with more severe hazards, and for firms with higher growth potential.³⁷ Another study found that a higher level of hazard results in a more severe stock market price penalty. This report found that the stock penalty was significant for manufacturers of pharmaceuticals and automobiles but not significant for toys.³⁸

Recall Planning and Implementation

This section describes a six-part strategy firms should follow in planning and implementing a successful product recall. These steps include (1) organizing for the inevitable product recall, (2) reducing the discovery-to-recall time interval (3) planning an appropriate overall recall response, (4) measuring product recall effectiveness via the completion rate, (5) improving product recall responsiveness, and (6) recapturing recall-related expenses via insurance and supplier hold-harmless agreements. See Table 2.

Table 2. Steps in Planning and Implementing a Successful Product Recall

1. Organizing for the Inevitable Recall
2. Reducing the Discovery-to-Recall Time Interval
3. Planning an Appropriate Overall Recall Response
4. Measuring Product Recall Effectiveness Via the Completion Rate
5. Improving Product Recall Responsiveness
6. Recapturing Recall-Related Costs Via Insurance and Supplier Hold-Harmless Agreements

Organizing for the Inevitable Product Recall

A product recall coordination team needs to be established prior to the discovery of the safety defect. This team should consist of personnel from multiple functional areas including marketing, production, engineering, information technology, logistics, purchasing, sanitation, quality control, public relations, and legal. An important function of this team is to formalize the firm's overall product recall strategy by developing a product recall manual. This manual should (1) develop a mock recall to measure a firm's recall readiness, (2) monitor potential sources of safety issues, (3) designate a complaint-accident threshold that triggers a recall response, (4) detail plans to communicate the recall to upstream suppliers, downstream customers, and the appropriate government agencies, and (5) conduct a post-recall review.

Firms that have never experienced a major recall tend to underestimate the necessary effort and expense involved with a recall. A common pitfall is when a firm overestimates its reverse logistics capability. The number of recalled goods returned for repair or replacement can easily exceed normal customer return levels. Recalled products may also require special handling due to cross-contamination concerns.

Small firms, or firms that do not have sufficient recall expertise, should consider outsourcing recall planning and implementation to firms that specialize in product recalls. These experts assess safety risks, analyze alternate means of communicating recalls, arrange for the shipping of recalled and repaired goods, and explore different strategies to restore consumer trust.

Reducing the Discovery-to-Recall Time Interval

The discovery-to-recall time interval is the time between a firm's initial finding of a safety-related risk and the announcement of the product recall. The first step in the discovery-to-recall time interval is the identification of the safety defect. Safety defect data sources that need to be continuously monitored include: internal quality assurance data, customer complaints, laboratory reports, regulator notifications, supplier feedbacks, and reports of safety-related issues from health officials, wholesalers, retailers, and consumers. An important part of this process is to identify the affected products via a product's ID code, part number, date of manufacture, and downstream channel members who have sold the good.

Too short a discovery-to-recall time interval may result in a firm's correcting its initial recall announcement by amending the affected products, affected batches and the appropriate corrective actions. A study of over 500 toy recalls found that a firm's reducing the discovery-to-recall time interval

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has a positive impact on consumers' willingness to purchase other products from the same company.³⁹ In contrast, too long a discovery-to-recall interval may result in additional bodily injury, property damage, and legal claims. A Kids in Danger study reported that companies and regulators wait too long to recall products. The study found that it typically takes 13 reports of a product design flaw and two injuries for a firm to implement a product recall.⁴⁰ Of 93 child-oriented products recalled in 2017, there were an average of 17.5 incidents per product. Three products had over 100 incidents reported prior to being recalled.⁴¹

There is little academic research that analyzes factors associated with short versus long discovery-to-recall time intervals. One study of auto recall reports filed by the six largest U.S. passenger car manufacturers found that the discovery-to-recall time interval is longer when recalls (1) are triggered by external as opposed to internal reports, (2) are attributed to suppliers versus automakers (3) are associated with design rather than manufacturing flaws, and (4) involve more models.⁴² The researchers found that it takes much longer to recall a product if the company announcing the recall is further away or upstream from the consumer. Another study also found that the discovery-to-recall interval is shorter for manufacturing defects as compared with design defects.⁴³

Planning an Appropriate Overall Recall Response

A firm's overall product recall strategy needs to reflect the seriousness of the peril. A useful risk classification system is the Class I, Class II, and Class III grouping developed by the FDA. Class I recalls involve serious health consequences or death. Class II recalls might cause temporary illness where the chance of serious injury is remote. While Class III recalls are unlikely to cause injury or illness, they violate an FDA regulation. These three distinct levels of safety risk suggests that firms should develop three distinct product recall plans.

A company's overall response to a product recall can be classified as being one of four levels: denial, forced compliance, voluntary recall, and super effort.⁴⁴ A common denial strategy is for a firm to blame customers for carelessness or for not properly following directions. Forced compliance involves a government agency's mandating a product recall. The CPSC has issued a mandatory recall by suing companies only six times in the past 19 years.⁴⁵ The vast majority of recalls are classified as voluntary recalls. Voluntary recalls can be initiated by the CPSC, by the affected company or by negotiation between the manufacturer or retailer and the agency overseeing the product category's safety.⁴⁶ In super effort, a company's

response is rapid, well-communicated, and provides generous compensation beyond any legal requirements.⁴⁷

Denial and forced compliance can be classified as a passive recall response with long discovery-to-recall time intervals. In contrast, voluntary recall and super effort strategies are proactive. Firms using a super effort strategy view the recall as a means of building brand loyalty and trust despite higher costs. The successful use of a super effort strategy can result in the service recovery paradox. This suggests that consumers may be more content after a super effort-based recall, in comparison to owning a product that was not recalled.

In addition to a firm's position on the company response stage, a firm needs to determine its restitution strategy. This can range from a partial to a full refund. With a full refund a firm provides the customer with a payment equal to the recalled item's initial purchase price. In contrast, a partial refund involves free repair, a replacement product (with the safety defect corrected), or a discount on a subsequent purchase. A study concluded that to the extent that immediate financial loss is bearable, companies should place more emphasis on the full remedy alternative as a means of increasing customer satisfaction and trust.⁴⁸

Measuring Product Recall Effectiveness Via the Completion Rate

A common measure of the effectiveness of a firm's product recall program is the completion rate. The completion rate for motor vehicles is computed by the following formula:

$$\text{Completion Rate} = \frac{\text{Count of Vehicles Remedied}}{\text{Count of Vehicles in Recall} - (\text{Vehicles Exported, Stolen, Scrapped, Other})}$$

While the numerator of completion rate formula is easy to ascertain, the denominator is more difficult to ascertain as it needs to deduct products no longer in use. The completion rate formula for vehicles deducts vehicles that were exported, stolen, and scrapped. The corresponding completion rate calculation for automobile tires would deduct tires that were disposed of prior to the recall due to having worn treads, being unrepairable, or in vehicles involved in a total loss accident.

Firms need to vary their completion rate goals based on the product category, purchase date, and channel of distribution. Low-cost recalled products typically have low completion rates since they are more likely to be discarded rather than being returned for replacement or repair. While a CPSC found that the overall completion rate was 6 percent, the completion rate ranged from 4 percent for products with a retail price of less than \$20 to about 32 percent for products with a retail price of \$10,000 or more.⁴⁹

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Products used by children and pets and products used daily (such as hair dryers and coffee makers) have higher completion rates.⁵⁰

Completion rates can also vary due to the time interval between a product's purchase and the date the recall was announced. Products purchased several replacement cycles ago may have been consumed, thrown out prior to the recall announcement, or resold.⁵¹ Newer model years vehicles are more likely to be brought back to the dealer for corrective action than older models. The completion rate for vehicles one to four years old is 83 percent, it is 44 percent for vehicles 5 to 10 years old, and it is 29 percent for vehicles older than 10 years.⁵²

A firm's completion rate objective also needs to reflect the location of recalled goods at the time of the recall announcement. Goods located at a company's facility (work-in-process inventory and completed goods at a company distribution center) or at wholesalers and retailers are relatively easy to identify via RFID. Goods sold by direct marketers should also have higher completion rates due to a firm's being better able to identify and communicate with purchasers of recalled goods. In contrast, it would be much more difficult to communicate with purchasers of goods sold via mass merchants, long channels, or exported.

Improving Product Recall Responsiveness

Many firms have not adequately communicated their product recall. A *Consumer Reports* study based on a national representative survey of 1,100 adults found that close to 70 percent of respondents stated that they had not heard of a recall in the past five-year period for any product they own. Of the group that heard of the recall in the past five years only 21 percent responded to it.⁵³

The U.S. Government Accountability Office studied 94 consumers in 12 focus groups concerning consumer willingness to repair a recalled vehicle. The study found that consumers overwhelmingly cited safety risk and convenience as the two most important factors they considered in their decision to remedy the safety defect.⁵⁴

The safety risk description should emphasize the severity of the risk, and should describe the risk in simple language. Auto manufacturers are now required to include the statement "IMPORTANT SAFETY RECALL" on the top of the recall notification letter. Convenience can be improved by providing better estimates of the time the repair would take, by picking up the affected vehicles at the owner's home or place of work, or having repairs done beyond the dealer's normal business hours.⁵⁵

An NHTSA study that found that most consumers preferred to receive a repair notification through at least one electronic means in addition to

regular mail. However, only 7 of 94 consumers reported receiving an electronic notification.⁵⁶ An additional communication factor to improve recall responsiveness involves the use of text-versus image-based information as warnings of product recall.⁵⁷

Honda, the vehicle manufacturer with the highest number of Takata-related airbag recalls, used innovative methods of contacting consumers. These include hiring private investigators, matching email addresses linked to specific vehicle ID numbers with car owner's Facebook accounts, and using personalized messages.⁵⁸

Samsung used a novel approach to increase recall responsiveness. In December 2016, Samsung discovered that over 100,000 Samsung Galaxy Note7 phone users had neglected to return their recalled phones despite multiple recall warnings and notices. These phones were prone to having battery-related fires due to excess heat. To increase its completion rate, Samsung developed a software update that "bricked" the unreturned phones. This update made the unreturned phones useless as there were unable to accept a charge and to connect to a network.⁵⁹

Recapturing Recall-Related Expenses Via Insurance and Supplier Hold-Harmless Agreements

An additional responsibility of the product recall team is to document every product recall expenditure and to attempt to recover these costs from the firm's product recall insurance or from suppliers via hold-harmless agreements.⁶⁰

A study sponsored by the Grocery Manufacturers Association (GMA) found that 78 percent of respondents managed product recall risk by purchasing insurance. The largest product recall costs were business-interruption and product-disposal related, and the highest recoveries came from insurance proceeds.⁶¹ Product recall insurance provides coverage for first-and third-party product recall-related expenses.⁶² First-party or direct-expense coverage includes notification of customers, shipping costs, warehouse and storage expense, product disposal costs, and expenses involved with use of extra personnel to conduct the recall. Third-party expense coverage involves reimbursing recall expenses to a firm that used the recalled product. These include repairing or replacing a product, business interruption of third parties, costs to repair the third party's reputation, and costs to purchase substitute products to replace the recalled products.

In addition to insurance coverage, a firm can seek to recapture recall-related expenses via hold-harmless agreements with its key suppliers. These agreements require suppliers to indemnify customers for product recall-related expenses. Hold-harmless agreements typically require a supplier to

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carry product recall insurance and to name its downstream customers as an “additional insured.” The additional insured stipulation enables downstream customers to implement a claim directly with the manufacturer’s insurer.⁶³

Summary and Conclusion

Firms should develop separate recall plans based on the risk level associated with each product category. The discovery-to-recall timing interval can be greater with low versus moderate to high risk perils. In contrast, high risk levels should require super effort, short discovery-to-recall times and full restitution.

Common errors in planning and implementing recalls include assuming that the firm is immune to a recall based on prior experience, underestimating the difficulty and expenses involved in a recall (such as minimizing the costs associated with notifying downstream channel customers and underestimating long-term lost sales), using a common completion rate metric across all product categories, and neglecting to recapture recall-related expenses via insurance and hold-harmless agreements.

Table 3. Product Recall Readiness Audit Checklist

Has your firm...
✓ Established a multifunctional team to organize for a potential recall?
✓ Developed a comprehensive product recall manual?
✓ Evaluated offshore and captive offshore suppliers to assess safety risk?
✓ Monitored potential sources of safety perils?
✓ Differentiated recall planning and implementing strategies based on the risk level of the product?
✓ Estimated the potential costs of a recall (including lost sales, loss in brand equity and reduction in stock market value)?
✓ Evaluated discovery-to-recall intervals to trigger a recall announcement?
✓ Reduced the time interval from discovery to product recall?
✓ Developed a plan to notify upstream suppliers, downstream customers and appropriate government agencies?
✓ Examined overall recall response alternatives: denial, forced compliance, voluntary recall and super effort?
✓ Calculated an appropriate completion rate goal for each product and channel?
✓ Studied means of improving recall responsiveness?
✓ Evaluated its overall product recall plan via a mock recall?
✓ Examined the use of insurance and hold-harmless agreements to recover product recall costs?

A useful tool to plan and review a firm's recall strategy is the product recall readiness audit. This review process can be implemented by the leader of the product recall team or by an independent consultant. An important aspect of this checklist involves assessing a firm's recall strategy via a mock recall. The mock recall should be able to identify a safety-related issue, to assess the quality of a firm's recall communications, and to evaluate a firm's ability to repair and ship new or reengineered replacement products in a timely manner. The product recall readiness audit checklist is shown in Table 3.

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