HACCP in retail food stores

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The hazard analysis critical control point (HACCP) system is a management tool for a preventative food safety programme in systems that range from primary producer to final consumer. Ever since its origins with the NASA space programme, regulatory and industry groups have attempted to tailor this system to their specific operating environment. HACCP, as originally envisioned for the food industry by Dr Howard Baumann, is undergoing an evolution towards an acceptable 'generic' form that can be easily packaged, sold and implemented into whatever operating environment is necessary. The intent of HACCP in any form must assure safe food through hazard identification and control. This goal cannot be compromised, with attempts to have HACCP become 'all things to all concerned' with the result that its application towards assuring safe food becomes diluted and ineffective. This paper addresses how HACCP can be applied to the operating environment in a retail food store taking into consideration some of the complexities of that system. It is important to note that adoption of a HACCP system must be contiguous with a strong management focus on food safety and be strongly supported with the concept of continuous improvement through total quality management (TQM) systems.

Keywords: HACCP; retail

INTRODUCTION

The concept of food safety as practiced by the retail food store industry in the USA has been under increasing scrutiny by regulators, private interest groups and the general public. It has been conservatively estimated that there are between 6.5 to 33 million cases of foodborne illness each year in the USA resulting in approximately 9000 deaths[1]. This is at a cost estimated to range from US$5 to 8 billion. The retail food store becomes an easy target for association with these numbers due to its position as the last one having 'safe custody' for food that extends from harvest to consumer.

This concern is reflected in declining consumer confidence of the food they buy from retail food stores. In *Trends in the United States* published in 1993 by the Food Marketing Institute, 73% of shoppers were completely or mostly confident that the food they purchased was safe[2]. This is a decline of 9% over the 1991 survey that saw a peak of 82% express their confidence of the safety of their food. More than nine out of 10 shoppers rate safety as at least 'somewhat important' and more than seven in 10 regard it as 'very important'. Perhaps a key trend is that shoppers continue to assume responsibility for food safety (38%) whereas only 10% place responsibility for safety on the food store. This trend illustrates a potential competitive advantage to those stores that increase consumer confidence in safe food through a strong HACCP-based system.

Much of these survey results are the direct result of high visibility media coverage of food safety throughout the food chain. Government inspection is portrayed as inept and unable to protect the consumer from *pathogens such as Salmonella* and *Escherichia coli* 0157:H7 in the food they buy. Various major commodity industries such as meat, dairy and seafood have had high visibility negative reports that question the safety of the food being sold at local retail stores. In the autumn of 1992, on ABC 'Prime Time Live', a

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television report of a major supermarket's deceptive practices and apparent disregard of proper sanitation procedures brought all retail stores under suspicion by both regulators and consumers alike. The impact to sales from that report have significantly lowered the net income of the supermarket company concerned and demonstrates the value of a preventative food safety programme such as HACCP.

INTEGRATION OF HACCP INTO THE RETAIL ORGANIZATION

The modern supermarket in the USA has evolved into a mixture of integrated departments responsible for procurement, marketing, manufacturing, warehousing, transportation and sale of food. It is no longer viewed as mere shelf-stacking operations for packaged food, but competes directly with fast food outlets, restaurants and convenience stores. To do this successfully, management continually incorporates new systems, modifies old ones and attempts to find the best mix to maximize their return on investment. The complexity of this operating environment dictates the need for strong leadership and management within the company from top to bottom. As store operations expand and move further away from direct oversight, this becomes even more important in an attempt to reduce the cost of goods, increase volume and thereby increase company profit.

Sales are the lifeblood of the retail store. No company today with a public record of unsafe food can compete successfully with a company without one, all other things being equal. This makes commitment to safe food by top management a priority for a successful food safety programme and essential if HACCP-based systems are used as the vehicle to assure it. Like most large companies, retail departments are organized vertically and then horizontally. HACCP requires support horizontally across company departments due to its 'harvest to consumption' approach in hazard identification and elimination (*Figure 1*). This requires management to put into writing the company food safety policy for all employees to allow the supported integration of the HACCP approach in a retail environment.

Many integrated food processing plant HACCP programmes are successful today because management identified and committed the resources available through its organizational structure. Retail organizational structure of large retail food stores will vary with the company, its size, locations and complexity of operations. Successful HACCP implementation begins with identifying the organizational structure of the company and its relationship to HACCP-based systems in the retail environment. This is especially important in large chain supermarkets that plan to implement HACCP plans for similar processes or operations in multiple stores.

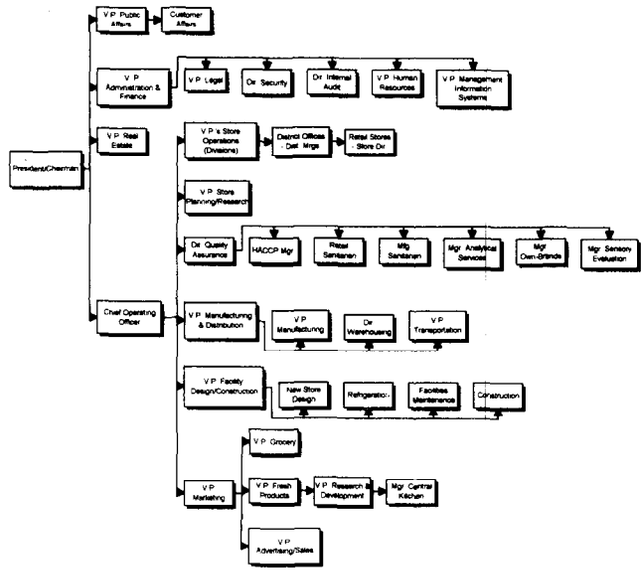

Figure 1 Retail grocery organization (manufacturing and retail operations). V.P., Vice-president; Mgr, Manager; Mfg, Manufacturing; Dir, Director

It would be helpful to review some of these relationships, using a retail operation that includes manufacturing operations as depicted in *Figure 1*. The listings are not all inclusive and will vary with the size and complexity of the retail organization.

Facility design construction departments can play a key role in assuring that facility hazards identified through HACCP are designed by the new store design team and constructed out of new stores or modified by the facilities maintenance department in existing stores. facilities maintenance department in existing stores. Likewise, refrigeration and fixture buying offices can assure that refrigeration and fixtures within the store are designed and purchased to remove potential identified hazards (e.g. insufficient cooling capacity or inadequate handwashing sinks). Real estate departments can play a part in HACCP by selecting site locations that reduce environmental hazard impact to the store.

Marketing involvement in retail HACCP will include using the procurement team to find approved suppliers that will provide hazard control on incoming goods. The marketing team will be responsible for the introduction of new products that may introduce new hazards. They will need to work with quality assurance (QA) or quality control (QC) departments within manufacturing operations before products are approved. This may involve analytical services, supplier audits or sensory evaluation in development of purchasing specifications. QA/QC departments are also best suited to act as facilitators of the development and implementation of a retail store's HACCP plan.

Internal audit departments can monitor systems to assure that policies and procedures necessary throughout the HACCP system are in place, as well as identify potential hazards within existing systems. Store operations together with planning and research departments down through divisional level must coordinate with corporate offices to assure that new processes intro-

duced into the system at store level are 'HACCP engineered' prior to introduction[3].

Associated with most new systems is the advertising, customer relations and public affairs departments that can provide customer feedback for inclusion with risk assessment. The companies legal department should be available for consulting on legal issues relating to the HACCP programme as regards outside agencies. Human relations and corporate communications departments can be involved with training and providing training development aids that support HACCP programmes. Management information systems are essential in linking the communications between departments electronically and attempt to reduce the paperwork problems associated with the verification function of a HACCP programme.

Some companies may have centralized kichens/ commissaries or manufacturing plants with accompanying support to include transportation departments. Fully integrated retail grocery companies will find a HACCP benefit when these organizational elements are built into their control system. Normally each of these operations will develop their own *independent* HACCP plans. This allows control of variables such as processing, storage and transportation of food that smaller retail companies cannot control, as these companies maintain control through ownership of the process or product. Critical control points can be passed both forward to the store or backwards to the plants best suited to control the identified hazards.

Companies without manufacturing capability will have to depend on supplier certification of their HACCP programme. QA and buyers from the corporate level could assist suppliers in the development of a programme or monitor existing ones that serve the best interest of the company. The HACCP principles could be used to establish this programme outside the company structure.

HACCP IN THE RETAIL STORE

HACCP implementation within the retail store can be implemented in several ways. Each retail store will usually have various departments that essentially perform the same operations from store to store. In most larger retail food companies, specialty departments may be found in specific 'marketplace-type' departments that focus on fresh, perishable food. These may include such departments as separate pizza shops, Chinese kitchens, soup and salad bars, smoked meats shop, or seafood shops. Some of these may not only provide take-out food for immediate consumption, but there is a current trend towards full service sit-down restaurants. These operations lend themselves to department-specific HACCP programmes using the principles of HACCP for that particular operation. An example might be a vacuum-packaged meat HACCP plan within a smokehouse or delicatessen operation.

QA departments, with trained and experienced food technologists, are best suited to identify those hazardous operations within the store environment. Top management should empower them to assemble a HACCP team based on the relative risk of each identified operation. As retail stores basically operate as independent departments, the composition of the HACCP team would be department-oriented for each particular plan developed. Store management should be represented and experts all the way to corporate level could input into their particular specialties. By designing the store HACCP system as separate plans for specific operations and within specific departments, HACCP implementation can be limited or expanded as the risk is assessed. This also has the benefit of establishing 'ownership' at the operating level which is essential to retail HACCP success.

Smaller retail stores without in-house QA can use outside HACCP consultants. The drawback would be that they would have to become totally familiar with the organization and operations to assure that risk assessment includes elements that may not be readily apparent during limited evaluation time. The more centralized the organization, the easier it is to overcome this drawback. An important step in assuring successful HACCP acceptance is to get the operators involved with the design; either as direct members of the HACCP team or brought in for specialized input. This not only helps transfer ownership from QA, but increases HACCP awareness in the training of the operators during implementation of the programme[4].

APPLICATION OF THE HACCP PRINCIPLES

Once the particular operation requiring a HACCP plan is identified, the team can apply the seven principles of HACCP identified by the National Advisory Committee on Microbiological Criteria for Foods[5] and slightly revised by the Codex Alimentarius Committee on Food Hygiene[6]. These principles are basically sound and can be broadened as the specific food or process dictates.

Risk assessment under Principle 1 will vary with the experience of the HACCP team. Some processes may lend themselves to simple flow charts which readily allow the hazards to be identified. As the complexity of a process or product increases, accurate flow charting of the operational steps for each input to the process or product is essential to properly assign risks from biological, chemical or physical hazards. In a retail environment, the HACCP team must depend on the ability of the organization to provide the necessary data to assess risks. For example, raw ingredient formulation of an outside supplier's product can be obtained through the procurement and marketing departments who deal directly with that supplier. In situations where engineering data may be necessary, the systems engineering department or the planning and design department can be required to supply such data.

Once the data or information is obtained through the

various organizational elements, the HACCP team can properly assess risks. Use of the critical control point (CCP) decision tree recommened by the Codex Alimentarius Committee can aid the HACCP team in establishing the CCPs of each step in the operation where an unacceptable risk from a potential hazard has been identified. Excessive or unneeded CCPs can burden the HACCP plan by reducing the 'user-friendliness' which is needed for effective understanding.

A problem occurs with retail operations when regulatory health inspectors attempt to incorporate their limited concept of HACCP without knowledge of the overall process. In some cases, such as in the voluntary NOAA/USDC (National Oceanic and Atmosphere Administration/US Department of Commerce) seafood retail HACCP programme, CCPs include hazards such as economic fraud or 'quality' factors as part of the conditions for entering the programme[7]. These CCPs are better in programmes outside the HACCP programme and not as CCPs within the HACCP programme as they do not affect unacceptable health risks. It is also paramount that retail HACCP plans focus on the *minimum number* of CCPs necessary to control only those hazards identified during the risk assessment process. The high personnel turnover and labour manhour controls at the retail store dictate that this process should be kept as simple as possible for effective implementation.

The use of the CCP decision tree by the HACCP team under Principle 2 will, in some instances, result in identifying modifications needed to a process or product beyond the scope of the HACCP team. Knowing which element in the organization has that responsibility will reduce the downtime in getting those changes made. This illustrates the importance of access across horizontal elements of the organization to determine necessary HACCP actions. The quicker these are resolved, the easier it will be for the HACCP team to complete the plan.

Critical limits established for each CCP under Principle 3 must reduce the hazard to acceptable levels and be achievable within the retail environment. Monitoring procedures under Principle 4 for these critical limits must likewise be effective and, if possible, built into the system. An example of an excellent monitoring procedure for a critical time and temperature requirement for cold holding might be a recording chart or datalogger with a built-in alarm system. This would eliminate the element of human error associated with the high employee turnover expected in a retail environment. Properly calibrated equipment and sensors would reduce equipment-associated errors. The more time spent on designing these monitoring and control devices into new store design or modifying existing stores, the easier it will be to assure implementation of the HACCP plan. In some cases, new HACCP plans will find that critical steps are already in control from these changes to the system.

Corrective action plans required under Principle 5 also present a challenge in a constantly changing retail environment. Retail stores in many cases operate 24 hours a day, representing three shift changes. Passing contol of the operations from one shift to the other in a high demand period when the system is taxed can be expected. Many food-service departments with processes requiring HACCP plans are not conducive for keeping paper records for reference. Properly placed laminated decision charts or flow diagrams at CCP locations could help assure corrective actions are initiated when out-of-control situations are encountered.

The training of employees responsible for HACCP implementation represents a major problem to retailers due to the long hours and high staff turnover. This may require essential food safety training be centralized and *prior* to working in operations that require HACCP knowledge. In large chain stores that implement HACCP through the chain, this will represent significant training and investment of time and money up-front.

Record-keeping requirements of a HACCP plan under Principle 6 present a major challenge within a retail environment where sales floor space is maximized compared with non-sale areas. As such, many of the records associated with the specific steps of a process are retained forward of the department and may not be accessible during limited verification times by outside agencies. Advanced planning to streamline checklists for the HACCP plan that meet verification auditing requirements of the HACCP system will help to reduce this problem. Limiting paper records to the minimum essential to provide an audit trail will improve the chances for success in a retail environment. The use of electronic mail or other management information systems within the store should be considered over paper record-keeping of HACCP plan requirements.

The drawback to this HACCP principle is that many of the records recommended or mandated by regulatory HACCP plans are not 'user-friendly' and are viewed as unnecessary paperwork that only satisfy the auditor during verification of the HACCP system. It tends to focus away from the actual safety of the product and in the eyes of the operators becomes nothing more than a record chase. As such, this could result in concentrating on record-keeping rather than carrying out the preventative measures necessary to assure CCPs are routinely performed. Records can easily be fabricated when the productivity demands of the operation force the operators to catch up after the fact and are therefore of little value if not used within the intent of this principle.

The successful verification under Principle 7 is truly dependent on top management support of HACCP as part of its food safety programme. Retail store management structure has its own system to assure that defined policies and procedures are fully carried out. As long as the HACCP system of food safety is fully resourced and prioritized, it will have little difficulty in becoming institutionalized in day-to-day operations. Support at

the top level is necessary to assure that various departments across the company support the programme so that the proper verification activities can be carried out. These systems can be evaluated by the HACCP team itself or by a number of other departments such as internal audit, retail support, or corporate level offices. Outside evaluation can be obtained with progressive regulatory activities that want to support HACCP within the scope of their operations. Agreements can be reached in advance on what will be included on both sides.

HACCP AS PART OF TOTAL QUALITY MANAGEMENT

There are a number of optional methods of applying the HACCP principles to develop HACCP-based systems within retail operating environments. The goal of each should be aimed at improving customer service through increased food safety, a basic tenet of TQM[8]. Improved food safety, from the customer's point of view, can also meet their expectations on quality and value and help to improve sales for the company.

One method is aimed at specific 'programmes' within food service departments. Examples of this include a sandwich programme, in-store vacuum packing of delicatessen meats, in-store smoked meats, etc. Flow charting these operations allows common hazards to be identified in advance and 'generic' CCP procedures with related critical limits written into operating manuals/instructions. This is commonly referred to by some HACCP consultants as 'recipe HACCP'. This becomes part of a 'HACCP-based' system without development of a formal HACCP plan. Policy and procedures can then take the place of the formal corrective actions, monitoring and record-keeping requirements normally associated with a HACCP plan.

Another method that improves the food-safety aspects of retail operating departments is a department-specific 'self-inspection programme' that uses HACCP-based principles. Many of the food safety and sanitation aspects of retail regulatory food codes can be assessed for risk, based on the hazards identified under the code. These can be grouped under critical control areas that associate with known hazards in the retail operating environment. Critical control areas such as time and temperature, personal hygiene, food protection/cross contamination, cleaning and sanitizing, chemical usage or pest control can help operators to focus on the key hazards that affect food safety. Non-critical areas can be added to the self-inspection checklist to assure that the control points that are non-critical, but important from a compliance perspective, are covered. The checklist itself can cover specific HACCP plans within the department and become the document necessary for record-keeping under that specific plan. Each of these methods minimizes the training requirements specific to a HACCP system, but still uses HACCP principles that can be trained under routine operating requirements.

CONCLUSION

There are many variations and combinations within a retail environment that allow the principles of HACCP to be moulded into a total system that will ensure food safety. From supplier HACCP plans to specific food service HACCP plans, HACCP can be applied in many situations in a retail food system. The complexity of a fully integrated retail support system has to be fully understood for ease of HACCP implementation. The principles of HACCP can be applied formally to develop HACCP plans or can be used to etablish HACCP-based programmes that accomplish similar results. Regardless of what systems are used, HACCP itself should focus only on the critical areas that present unacceptable health risks to the customer for successful implementation in a retail operation.

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