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Quality Control And Product Tracing In ERP Systems

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Abstract. Food safety and quality are keys to companies' business survival and great efforts and resources are devoted to them. This is an on-going challenge, demanding the best control systems and day-to-day vigilance on farms, in processing plants and throughout the distribution system. The product quality of the Hungarian meet industry meets the high level international standards, because the Hungarian meet industry is an export oriented sector. However, the application of computers and information systems still haven't got enough emphasis in the food sector, although the majority of companies use ERP systems. IT budgets of Hungarian companies are smaller than of the ones in industrialized countries. They spend 0.49% of their return from sales on IT operation and development. We find different rates among Hungarian owners and foreign owners. The Hungarian ones spend less (0.36%), but foreigners spend twice this amount (0.61) on informatics. Quality control is conducted at several stages of the production flow. The most important targets are basic materials coming from partners, purchased and processed products and foods. We have to be able to identify and determine what ingredients there are in the end-products and what the production and distribution processes were. Sometimes this refers to a process backwards that we have to conduct when we discover a mistake in the production flow or in the quality of the end-product. Back-tracing is a six stage flow in the system. Our paper and lecture describes how the ERP system is built-in food tracing functions and experiences in Hungary.

Keywords. Product tracing, food safety, ERP systems

Introduction

By January 1, 2005, traceability systems are mandatory for all businesses operating within the European Union's food supply chains, based upon a one-up-one down principle. This means that a business must be able to identify all suppliers and the food, feed or food ingredients they supply to the business. A similar requirement was introduced within the United States, over the period June 2004 to June 2005, as a result of a proposal contained within the Bioterrorism Act.

In the food chain, traceability means the ability to trace and follow a food, feed, food-producing animal or substance through all stages of production and distribution. Stages of production and distribution means any stage including import, from and including the primary production of food, up to and including its sale or supply to the final consumer and, where relevant to food safety, the production, manufacture and distribution of feed. (Definitions at Article 3, EU General Food Law Regulation)

In primary production, traceability has been defined as the ability to trace the history of the product through the supply chain to or from the place and time of production, including the identification of the inputs used and production operations undertaken (British Standards Institute PAS 85:2000). Legislation has been introduced recently to ensure livestock identification and the tracking of livestock movements. Many of the farm assurance schemes require some level of traceability to be in place within primary production.

Market incentives give food suppliers three primary motives for establishing traceability:

1. Improve supply-side management;
2. Differentiate and market foods with subtle or undetectable quality attributes;
3. Facilitate trace back for food safety and quality.

Product tracing in ERP systems

Only an integrated ERP system can meet these objectives efficiently. Its integration into business processes guarantees:

- Online capture of data right at the source without the need for additional resources
- Online processing of data, eliminating the need for isolated, stand-alone solutions
- Seamless proof of origin throughout and beyond the industry-specific ERP software

An ERP system in the food industry (like the CSB-System) is specialized in transparent proof of origin and safeguarded traceability for all segments of the food industry and in accordance with all prevailing international standards (including Reg. (EC) No 178/2002, 1830/2003, EUREP-GAP, IFS, HACCP, ISO9000, BRC, GLP, GMP, GHP).

Modern traceability and communication between ERP systems

One of the answers of the modern traceability and communication between ERP systems is the realization of EDI and/or XML techniques. Electronic Data Interchange, the transfer of data between different companies using networks, such as VANs or the Internet. As more and more companies are getting connected to the Internet, EDI and XML are becoming increasingly important as an easy mechanism for companies to buy, sell, and trade in information.

With this data interchange techniques, paper transactions can be replaced by electronic transmissions, thus time is saved, and the potential for error is minimized. Data can be exchanged at any time. Related business expenses, such as postage, printing, phone calls, and handling, can also be significantly reduced. EDI can aid in the support of manufacturing efforts, such as Just-in-Time and Third Party Warehousing, and financial efforts, such as Electronic Payments.

These translation and communication software is available for most computers, whether PCs, minicomputers or mainframes. Basically all EDI software packages do the same thing. Translation software translates business documents into a standardized format that complies with ANSI X12 or EDIFACT, and communication software sends and receives documents or standardized data groups.

Technologies of identification

Traceability can not be solved without high level identification. The identification of food items is based essentially upon two categories of identifier:

Primary identification (based on the use of biological markers and feature extraction based upon anatomical, physiological, biochemical or molecular, including DNA, methods of identification).

Secondary or data carrier-based identification techniques in which a number or alphanumeric string is used for identification purposes and may be accompanied by other data or information for traceability or process support purposes.

A secondary identifier may also be linked to a primary identifier, particularly where the primary identifier is held as a data template in a data carrier or database. Meta-data may be used to distinguish data types and assist in automatic identification and handling of source data concerning the item or items being processed or handled.

Data Carrier and Capture Capabilities

In recognizing the need for flexibility in defining traceability systems to satisfy different supply chain needs it is necessary to identify a range of technologies and associated products to meet these needs. The technologies may be conveniently grouped as follows:

- Item-attendant data carrier technologies – including linear bar codes, two dimensional (multi-row bar code and matrix codes) and composite codes, contact and non-contact magnetic data carriers, contact memory and radio frequency identification (RFID) data carriers.
- Item-attendant feature identification technologies – including static and dynamic feature-based systems, identification based upon physical and chemical properties, including DNA profiling.
- Item-attendant location and locating technologies –including RFID and GPS locating technologies.
- Item-attendant communication technologies – including wireless local area network (WLAN) technologies.
- Item-attendant sensory – exploiting at the item level developments in sensory and telemetry technologies.
- Item-attendant security technologies – embracing a range of technologies for fraud prevention and security at packaging level.
- Data storage and communications technologies – including large volume relational data base technologies and both local and wide area communication technologies.
- Software support technologies – embracing the wide range of information management systems software and the needs for interfacing item-attendant technologies to appropriate management systems.

Examined ERP systems in Hungary

More than ever, companies from the food industry require enterprise-wide business software that fully supports industry-specific challenges as well as all legal and individual requirements. Food industry has special business needs, with traceability. We examined the ERP System applications in different enterprises according to the following main objectives:

- Centralized management

- Covering the entire vertical production system
- System support for HACCP, ISO, IFS, BRC
- Increasing efficiency
- Cost reducing
- Marketing orientation

The first system was the CSB-Systems which is widely used in Europe. It has a food industry specific solution and we examined it at Meat Combine of Gyula Plc. The Meat Combine of Gyula Plc is one of the biggest meat industrial companies in Hungary. 1868 is regarded as its year of establishment, when the first slaughterhouse in Gyula was handed over. During the 131 years past since then it has undergone various stages of development and modernization. Its technical and hygienic standard meets both the national (Veterinary and Food Control Stations, Food law) and the very strict EU, USDA and NATO requirements. The quality assurance system corresponding to the ISO 9001 standard was introduced on 1st March 1998, which is a guarantee for their partners that their products are of excellent quality all the time. The second system was the FÓKUSZ ERP system which was developed for poultry industry.

The CSB-System

The CSB-System is specialized in transparent proof of origin and safeguarded traceability for all segments of the food industry and in accordance with all prevailing international standards. On the basis of the cross-industry standard EANCOM the CSB-System has developed a solution that allows for flexible interchange of origin data between companies and organizations. With the help of this data interchange mechanism, user companies can guarantee seamless farm-to-fork proof of origin for each and every batch that has entered the production process. The integrated laboratory information and management system QLS/LIMS extends the CSB-System to become a comprehensive ERP-System.

The CSB-System encompasses all functions of a future-oriented Enterprise Resource Planning system. The enterprise-wide materials resource planning forms the basis for integrated information processing throughout the following functional processes: Resource Management, Procurement, Inventory, Production, Sales, Quality Management Paperless HACCP Concept, Laboratory Information and Management System (QLS/LIMS)

In their Special Solutions for Meat & Fish we can highlight the following main functions:

- General:
    - Management of multiple item units
    - REUS management
    - EDI procedures
    - Scanner and scales connection throughout all areas
    - Proof of origin throughout all areas
    - Batch traceability
    - Integrated laboratory information and management system QLS/LIMS
- Livestock Management:
    - Slaughter planning with delivery planning
    - ADC of slaughter lines (cattle and small livestock)
    - Slaughter statement (QA statement, piece work slaughter, service statements)
    - Slaughter evaluations
    - Grading (CSB-Image Meater)
    - Proof of origin (origin database with HIT integration)
- Procurement:
    - Purchase planning
    - Proof of origin for raw materials
    - Quality management through in-process control
    - Primal grading
    - Automatic putaway (track control, high bay storage, etc.)

Fókusz ERP system

The Fókusz ERP System (one of the leading ERP systems in Hungary), which was developed for Hajdú Bét Ltd by IFSZ (Informatics Developer and Service Provider Ltd). The preferable main objectives were as follows:

- **Centralised management.** The production flows are manageable by computer based systems in the headquarters. Interventions can be made and information may be obtained via the computer based system.

- **Covering the entire vertical production system.** Attention was paid to covering every step in the vertical chain and there aren't any gaps in the production chain which would be processed by other systems or manually.
- **System support for HACCP, ISO, IFS, BRC.** Nowadays there is a basic demand for using quality control systems in food industry. The system is not only compulsory but supports the quality standards introduction in the future.
- **Increasing efficiency.** Management will be clear and transparent (official functions, duties, tasks, responsibilities) because of the correct administration. So problems will easily and quickly be discovered and solved.
- **Determinable costs**
- **Reduced cost level.** With the introduction of the system the faulty products and the rate of low quality products, which can't be sold on the market, are decreasing, so the return from sale is growing. Moreover the company has to pay less compensation for demands and buyers, penalties of authorities
- **Marketing orientation.** Companies can react more easily and quickly to the changing demands of the market and commerce, which gives them an obvious comparative advantage with a flexible system.

Deployment a system like Fókusz for farmers and the agri-food industry means new market opportunities – and continual changes. Food safety is an on-going challenge, demanding the best control systems and day-to-day vigilance on farms, in processing plants and throughout the distribution system.

Conclusion

At the beginning of the 21st century the matter of food safety plays an accentuated role in the food industry. Important issues in this topic are the risk of bioterrorism, impurities in the food chain and the ascendancy of customer needs. The solutions of these problems are the introduction of modern quality assurance systems, traceability and identification of products. These solutions can only be realized by using modern ERP systems, which may be able to solve today's quality food industry problems. These food industry specific systems offer the following advantages:

- Users profit from the following essential benefits:
- Maximized growth potential through completely integrated information processing
- Variable weight items and equalized units
- Flexible planning of materials and capacity resources
- Reduction of inventory costs through paperless order processing, picking, and delivery
- Transparent quality management (paperless HACCP) and seamless traceability
- Solid integration of numerous locations via Internet and Intranet

The food industry requires sophisticated ERP system with quality control and tracking solution (forward and backward) possibilities on very high level.

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