

TRACEABILITY IN AGRI-FOOD CHAIN

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Abstract

In the alimentary industry the traceability system is meant to document the itinerary of the food from raw material to finished product. The purpose of this system is not limited only to the detection of products that present risk for health, but also represents a basis for quality assurance processes and products. Implementing a traceability system will allow the generalization of application of concept on the entire food chain as well as the implementation of international standards for products encoding in perspective of a globalized market.

Key words: traceability, alimentary chain, product succession

INTRODUCTION

The first international definition of traceability was given in ISO 8402 standard in 1987 as the "ability to retrieve the history, use or locating of an entity by recorded identifications.

The entity can be: activity, a process, a product, a body or person.

When it is related to a product, the term "traceability" can refer to: the origin of materials and parts, process history applied to the product, distribution and location of the product after delivery.

Subsequently, the concept of traceability has been taken in the ISO 9000 series standards concerning the systems of quality assurance as a key element of any product quality management. In the recommendations of best European practice, is preferred the definition established by the General Food Law no. 178/2002 (taken also in Law no. 150/2004) as may be relevant to non-food producers.

Traceability is integrated into the quality system and allows tracking of a product running on its route from raw material to exposure for marketing, including to the consumer and therefore, the flow completion of a food by identifying and tracking using documents.

The term traceability can be used in four contexts (domains), each of them having a slightly different application:

 for product traceability is a link between raw materials, their origin, processing, distribution and their location after marketing;

 for data, traceability refers to calculations and data along the quality way and whereby it makes a connection with the requirements of inception quality;

 in calibration, traceability refers to equipment for measuring physical sizes quantities or properties or with reference on the materials included in national and international standards;

 in IT and programming, traceability refers to the design and implementation of the processes in accordance with the requirements of a system.

To adopt a global and integrated approach of the concept of traceability "from farm to fork" the Community legislation takes into account all aspects of alimentary production chain. At all stages of the chain, the legal responsibility to ensure food safety to the alimentary products falls upon the manufacturer.

For the agro-industrial sector in our country was elaborated a strategy that takes into account the market exigency, and also the potential risk factors because agriculture is not only a source of agricultural raw materials, but their capitalization with a view to ensure food and health to the population.

As a result, new concepts were required, as is the concept of agro alimentary economy comprising all activities that compete to the realization of an alimentary function of a country, or traceability, as a tool for quality assurance and consumer safety, contributing to the product management and to identify anything that affects his capacity both upstream and downstream.

In addressing this issue at EU level, member countries have decided to achieve a concerted traceability of products and to implement. It was decided mandatory labeling of foods with information useful for itinerary reconstruction from raw material supplier to final consumer. One such intercession involves taking responsibility of each intermediate in the chain of production, processing and distribution.

MATERIAL AND METHOD

Traceability is a simple concept intellectually, but is complex in terms of practical implementation.

Traceability is differenced in:

Internal traceability - represented by information that enable product tracking within an enterprise or company, internal traceability occurs when partners receive one or more materials and ingredients which are subject to internal processing. Internal processing involves movement, transformation, storage, destruction;

External traceability - represented by the information that company receives or provides to other members of the food chain, concerning a certain product;

Traceability of the food chain, respectively traceability between the chain links, attention being directed to the information accompanying the product from one point to another point thereof, so that traceability is extended to any product at all stages of production, processing and distribution.

For the information manager, implementing a traceability system in a chain of distribution, is to systematic associate a flow of information to a physical flow.

On the supply chain, traceability can be conducted in two distinct directions: forward

tracking or upward traceability and back tracking or downward traceability.

Downward traceability or back tracking of a product (tracking), is the ability to retrieve, locate products in any point of the supply chain, based on specific criterion.

Upward traceability or forward tracking of a product (tracing), is the capacity to retrieve the origin and characteristics of a product at any point in the supply chain, starting from one or more given criterion.

Product traceability indicates a qualitative tracking of products. It mainly depends on the proper registration and completeness of data related to product. A manufacturer uses it mainly to investigate causes of quality problems occurred upstream or downstream.

Traceability of product has as object especially the characteristics of the unit consumption. The term "data tracing" can be used to indicate a link between documentary information and product.

Upstream traceability means the procedures and tools put in work in order to retrieve what has occurred before the actor to become legal or physical responsible of the products.

Downstream traceability means the procedures and tools put in work in order to find what occurred after the transfer of ownership or after physical transfer of products from one actor to another person.

Logistical traceability means quantitative tracking of products. It depends on the proper registration of links between successive products on the succession. She allows products locating, determining the destinations and origins.

Close traceability. The concept of "close traceability" is applied to continue manufacturing processes, where traceability is performed by tracking on hours / minutes of the events that links between successive batches.

Traceability components are:

Supplier traceability - represented by all records and documents on which it may prove the origin of all raw materials, ingredients, additives.

Process traceability - represented by recordings made during the technological process, providing the possibility to identify all raw materials, ingredients, additives, etc. from which was obtained a certain product and operations that they have suffered in the technological flow.

Client traceability, whereby shall ensure the identification of all product customers.

The structure of the traceability system depends on the characteristics of the technological process, the objectives and is characterized by:

✚ width - describes the amount of information collected;

✚ depth – it refers to the distance the system will cover and which, in terms of safety in consumption depends on the time / stage of the food chain where contamination risks may occur;

✚ precision - reflects the degree to which the traceability system can highlight a specific point in the trajectory of the product and its features.

Traceability is not only necessary for health reasons but also to regain consumer confidence from Romania and the EU in foods. Thus, traceability answers to the trends of a more demanding market, where the consumers demand products that are not only safe, but can be identified and differentiated from other alternatives. As consumers, we want to know where it came from the food we eat and what is its nutritional value. Traceability is also required to certify products with designation of controlled origin.

The development of an advanced internal traceability system can be stimulated by elaborating and implementing an effective system of data storage, production process control and quality assurance. This concept can also be viewed as a stand-alone system, whose development must be approached systematically.

By the traceability system should be possible to detect the raw material or product,

by identifying forward and backward in the chain of production and information supply on identity, regardless of time and place in the technological flow.

An integrated quality management (Simca) and food safety must provide the ability to accurately identify and document the materials and actions involved in primary production, processing, handling, distribution and marketing.

At the basis traceability stand four principles: identifying, managing links, data recording and communication. If one is not applied, the company is located outside the perimeter of traceability or is responsible for the information chain rupture.

A traceability system is based on four fundamental pillars: product identification, data / information, itinerary product and identification tools (Figure 1):

Phase identification of the product is fundamental, physical characteristics as volume, weight, dimension, packing, etc., having a direct impact on product traceability. Other information refers to a series of mechanical properties and life cycle. Material structure condition the traceability system.

The second fundamental pillar refers to data/information necessary for identifying and tracing products, taking into account that in the last period was developed a number of recognition systems and automatic identification.

The third pillar requires the knowledge of the itinerary that the product makes, which means that the traceability system must record each of the stages of technological process, including handling, storage, etc. clearly during the technological process, the degree of automation, technical level, inventory management, etc. will have a direct impact on the efficiency of traceability system.

The last pillar, respectively the identification can be made directly by marking on the package or on the records.

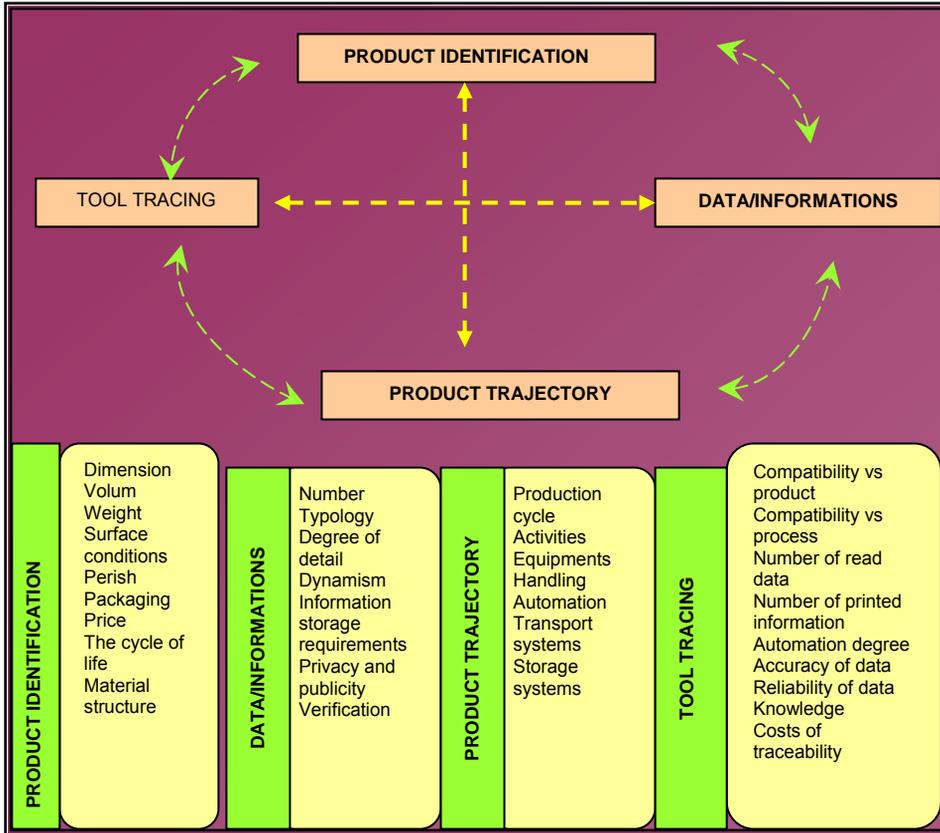


Figure 1. The general framework of a traceability system

Developing an efficient traceability system which includes all descriptors and subdescriptors concerning the quality and product safety presents a series of advantages (Sava et al., 2007).

- ✦ establish effective procedures for receiving raw materials which lead to obtaining defective products, with minimum losses;

- ✦ information with reference to raw materials can be used to enhance quality level of products and process control;

- ✦ elimination of quality assessment tests in two or more successive stages of technological process;

- ✦ stimulation for maintaining a high quality and constant level for raw materials;

- ✦ the possibility to market raw materials and prepared with special character;

- ✦ accomplishment of legal quality requirements.

Table 1
Description of a traceability system

R E Q U I R E M E N T S	The cadre These elements are relatively stable. A first analysis can be made on succession	The context The objects
	Traced elements They may evolve over time, depending on the objectives. A common minimum may be decided on sector, but the choice of traced elements results, usually, from the enterprise risk assessment.	Perimeter Products Links Recorded data Archiving data
M E A S U R E M E N T S	Standards GS1 standards are the common language for traceability. Their use determine mostly the system performances	Identification of products and enterprises Automatically tracking the physical flows Computerized data exchange
	Organization Organization is its own individual enterprise. It is directly related to the information system.	Responsibilities Procedure Information Exchange Scenarios
	Informational system System configuration information is unique to each enterprise. Instruments may be more or less computerized pursuant to the volume and frequencies of informational exchanges	Information acquisition Information transmission Information management
E V A L U A T I O N	Performances There are key indicators of the traceability system integration. They should be analyzed for each product	Reliability Rapidly Precision Coherence

Source: internet [7]

Implementation of a intern traceability system is performed using codes, documents and records, data management procedures and the procedure of products recall.

In order to implement a traceability system will scroll through several phases that will include (Figure 2):

 *Establishing an administrative team.* It is essential that the implementation of a documented traceability system to represent a team effort and it is desirable that any person who has knowledge and experience required to be included in the project. This is necessary because of different nature of operations of a company.

 *Realization of flow diagram.* Flow diagram will include all operations that take

place in a company, from raw material acquisition to final product delivery.

 *Identification of existing procedures.* Based on the flow diagram will identify all documented procedures that can collect useful information about the product. These may include acquisition procedures, quality monitoring mode, batch coding procedures, etc.

 *Identifying existing counting.* It is necessary to identify which records are kept and how those records are associated with certain products and operations. This information should collation and written to provide documentation for the traceability system. Procedures and records should include not only the name of the document,

but a reference to its location in the company documents.

found in some records/documents, which are kept in manufacture department or office.

 *Confirmation in situ.* It is essential to confirm that all information above can be

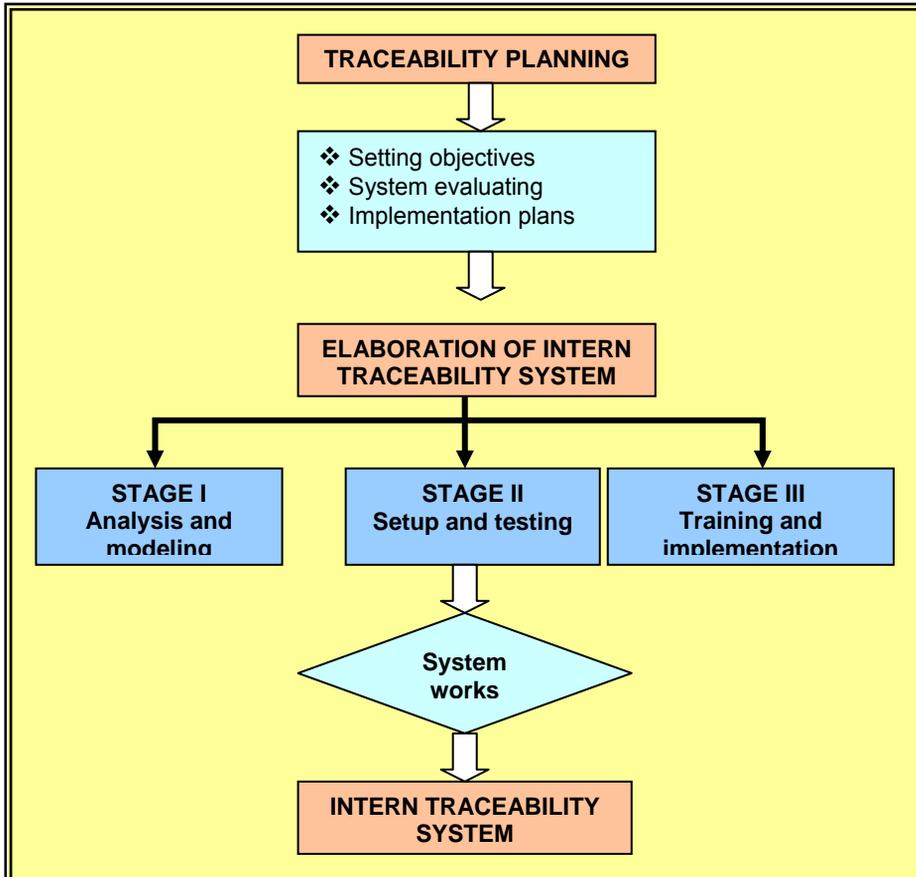


Figure 2. Schematic representation of the process of elaborating and implementing an intern system of traceability [5]

Managing traceability involves assigning a flow of information in a physical flow of products. The link between information flow and physical flow is assured through reference to the identifiers of the two types of flow:

- expedition note number;
- sequential package number(SCC);
- delivery note number.

Risks in a traceability system are of type:

1. traceability rupture;

2. loss of information without traceability rupture;
3. wrong information;
4. loss of precision;
5. performance level below the critical threshold for the system to be operational.

Critical points are generally caused by any change of actors and actions, according to the typology of actions. Every action presents a risk of traceability rupture, real

risk if was not registered the link between consignments or successive expedition units.

Ability to retrieve traceability data in a quick and accurate way throughout the distribution chain is a critical issue. This requires management of successive links between what was received, produced, packaged, stored and sent throughout the entire chain. If one partner in the distribution chain fails to manage these links will result cutoffs in informational chain and loss of traceability. It is impossible to obtain a complete traceability of products without a proper identification of them in all their configurations at each point of production and distribution chain.

CONCLUSIONS

In a agro-food chain are dangers and risks to be identified and characterized. Responsibility for quality assurance lies with all parts involved in its composition.

The security approach of a product in the chain allows obtaining an efficient traceability and identification of a weak link in the chain which may favor the emergence of risk.

Traceability system is meant to document the trajectory of food from raw material to finished product. The purpose of this system is not limited to detection products that presents health risk, but is also a basis for quality assurance of processes and products.

Traceability should allow to retrieve the delivered quantities to each client by identifying the date of delivery of product from the same batch. Traceability should not be viewed as an action that is done only for the sake of making it but be seen as a means for cost effectiveness.

On traceability are based the actions and measures taken to achieve quality and safety of products in accordance with the requirements of retailers, distributors and end customers. Production costs must be balanced with risk analysis, which requires analysis of known risks, identifying of future risks. Traceability should therefore be seen as a means to monitor product safety in terms of regulations and risks to consumer health.

Expression of responsibilities in the chain must be made by approaching and adopting good practice on each segment of it.

Public health and individual health through food can be improved at a chain by implementing a complete traceability system, to make common stem with data entry and risk analysis at each link in the food chain.

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