

Food Safety and Traceability in Food Services Sector

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Abstract

There are several reasons for this belated recognition of the importance of supply chain management. First, the business model in the past was often based upon a philosophy of vertical integration whereby upstream and down-stream facilities and activities were owned and managed by one organization. Today the pendulum has swung the other way. Now we talk about outsourcing all activities other than our core business. The extent of this outsourcing in some instances is such that we should not talk of supply chains but rather supply 'networks'.

The food service sector is growing rapidly, so the supply chain challenges here are quite different. The sector is serviced by a small number of large players who operate restaurant and hotel chains and who service the 'cost sector' (e.g. schools, prisons and public services), and a very large number of small chains and independents.

One of the key differences between the food retail and food service sectors is the efficiency of their supply chains. Taking the sectors as a whole (whilst appreciating there will be wide variations between individual players), food service is characterized by a certain degree of supply chain inefficiency.

The Regulation 178/2002 on Food Safety defines traceability as: "the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution"

The Directive 2001/95/EC on General Product Safety: "Producers shall be obliged to place only safe products on the market". Within the limits of their respective activities, producers shall adopt measures commensurate with the characteristics of the products which they supply, enabling them to: a. be informed of risks which these products might pose; b. choose to take appropriate action including, if necessary to avoid these risks, withdrawal from the market, adequately and effectively warning consumers or recall from consumers.

Close collaboration between business partners along the supply chain is the best way to ensure consumer safety and product traceability and to limit incidents impacting consumers through shared and efficient crisis management systems.

Consumers drive the supply chain; 'demand chain' would therefore be a more accurate description when the primary driving force in terms of type, volume, quality and value of food supplied is considered. A development in the food supply chain that advocates this view is Efficient Consumer Response (ECR) where manufacturers, wholesalers and retailers work to meet consumer demands better and more efficiently.

This article continues the article "Food Supply Chain Management" from the previous issue (2014 Volume 5, Issue 2) and will continue in the next issue (2015 Volume 6, Issue 2) with case study of food safety and traceability of a product (beef) in a restaurant.

Key Words: *supply chain management, food service, restaurant and hotel chains, consumers, quality*

Introduction

At European level, the issue of food safety and traceability has

become a priority for institutions to ensure wholesomeness of food products and also their safety along

the food chain by measures taken since the establishment of the Community.

Increasing diversification of consumer needs and requirements urged food manufacturers to design and launch new food products that meet all requirements. Thus it grew monitoring of food from producer to final consumer according designed "from farm to fork".

1. Food security products

Consumers today are more educated about the food that they buy for their families and need more information about food quality. Increasing consumer demand for increased assurances of food safety moves downstream in the supply chain, verifiable soliciting suppliers to provide evidence that the control systems have been implemented effectively.

As a symbol of quality and food hygiene, food safety concerns reserved food quality conditions and practices in the prevention of contamination and illness. A safe food is falling in the EU food safety standards.

"Food safety concerns particularly the harmlessness of food, focusing on the reduction, elimination and avoid risks that food could represent for human and animal health". (Ene, 2009)

Law 150/2004 on food safety is the legal basis for ensuring a high level of health protection and consumer interests, consistent with diversity, traditional products related to the effective functioning of the internal market.

This law defines food as "any substance or product, whether processed fully, partially or not processed, intended for human consumption or intended to be used for human consumption". (Diaconescu, Ardelean, & Diaconescu, 2007)

Food security may be affected and influenced by a number of factors (Vijaykumar, Subramaniam & Rangarajan, 2005):

- Increased international movement of food;

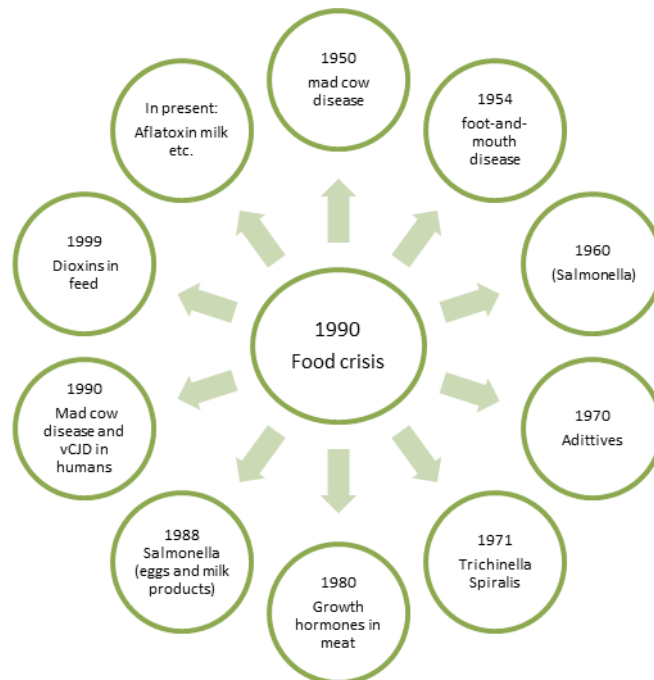
- Cultural differences regarding sanitation and preparing food;
- Increasing the number of people susceptible to food-borne diseases (youth, elderly, immune suppressed);
- Changes in lifestyle (food-term);
- The lack of basic food preparation;
- The emergence of pathogens;
- Strengthen the food industry.

Therefore, the safety and security of food supply is vital. The food security of the population should be regarded nationally and globally. According to the "Declaration of the World on Nutrition" FAO / WHO / ROMA 1992 and the "Declaration on World Food Security" FAO / WHO / 1996, "food security exists when all people, at all times, have physical and economic access to safe food or nutritious food that meet the needs of the body, to lead a healthy and active life. (Banu, 2007)

The Directive 2001/95/EC on General Product Safety: "Producers shall be obliged to place only safe products on the market". Within the limits of their respective activities, producers shall adopt measures commensurate with the characteristics of the products which they supply, enabling them to: a. be informed of risks which these products might pose; b. choose to take appropriate action including, if necessary to avoid these risks, withdrawal from the market, adequately and effectively warning consumers or recall from consumers.

Since the 90s it was the question of ensuring food security through rapid and effective problem solving food crisis and subsequent. Thus, the crisis means "a situation that deviates from the normal state, which can occur at any time, regardless of the preventive measures taken by the company or government agency, and that cannot be solved by normal operational and organizational structures." (Popa, 2012) The publication in 2007 of the European Commission and the Directorate General for Health and Consumer Protection has addressed the issue of food safety and food crisis that occurred during the 1990s (Figure 1). In Appendix 1 are shown in more detail food problems of those years.

Figure 1. Food crisis in the 1990s



Source : own elaboration

In 2013 several cases which led to a food crisis were identified, one of representing substituting beef with the horse from Romania.

The European Food Safety Report (European Food and Safety Authority EFSA-) contains information on trends and sources of zoonosis and zoonotic agents in Romania during 2010. This report was sent to the Commission in accordance with Article 9 of Directive 2003/99 / WHAT.

The information relates these diseases and agents in humans, animals, food and, in some cases, also in animal feed. In addition, the report includes data on antimicrobial resistance and bacterial zoonotic agents and information on the epidemiological investigation of outbreaks (Appendix 2).

Information provided covers both zoonotic diseases that are important to public health in the European Community and the whole situation zoonosis, which are relevant to the epidemiological situation nationally.

In the same report are also described the existing monitoring systems and prevention and control strategies implemented in the country.

According to the information from this report several Member States were affected by zoonotic diseases, including Romania. Appendix 3 shows the sources, the types of food, and animals in Romania category, in which were found instances of infection with Salmonella.

For effective management of food crisis is necessary to identify business risks, designing procedures, training members device (exercises and media-training) and updating of the system by monitoring the environment and feedback experience out of crisis episodes crossed.

Implementation of a fixation device crisis involves three key milestones for any organization: (Popa, 2005)

1. Locate and avoid four obstacles: the definition of crisis, the distinction between management and crisis communication, "crisis plan" as a technical dossier, throwing "stones / burdens" short term and prefabricated recipes;

2. To approve navigation / piloting easy and paradoxical effectiveness based on a lot of details, stabilizing the subject crisis management.

3. A grant primordially human factors - manning:

- People high level, but humble at the same time, who knows how to work in teams to invent solutions to a problem that apparently has no solution;

- People endowed with charisma that generates multiple resistance or avoidance behaviors;

- A mixed crew includes not only specialists of risk and crisis management, but also in the scientific, legal, informational, financial, administrative and economic intelligence, knowledge management and project management.

1.1. Good practices

- Good hygienic practices recommended practices to be observed general hygiene in the production, preparation, packaging, storage, transport, distribution and retail food for human consumption so to ensure a healthy and safe product.

- Good manufacturing practice: regulations GMP requires a manufacturing process based on quality, thereby insurance the minimizing or eliminating possible contamination errors and confusion in cataloging that are very important and huge risk accountant the specific products taken into consideration.

GMP addresses issues related to the company's record keeping, personnel qualifications, hygiene, cleanliness, equipment verification, validation and settlement reclamations processes.

In support food safety Food Safety Modernization Act FDA establishes responsibilities for food companies, food import controls, new or improved skills of application to the FDA, new taxes on food companies and importers. (Shadrack, 2011)

The new responsibilities of food companies refer to the Food Safety Plan / preventive controls, supply chain management, maintenance documents (maintenance) and Access Plans Food Protection.

Food safety HACCP Plan (Hazard Analysis Critical Control Points) means verification activities including

environmental testing and final product, and reconsidered every three years.

For importing food, new controls include procedures to verify the supply chain, the use of accredited labs for some testing.

1.2. ISO 22000 International Standard

Because many of today's food repeatedly crossing national borders, international standards are necessary to ensure the safety of global food supply chain.

International standards ISO 22000 families addresses food safety management and contains a number of standards focused on various aspects of food safety management:

ISO 22000:2005 contains the overall guidelines for food safety management.

ISO 22004:2014 provides generic advice on the application of ISO 22000

ISO 22005:2007 focuses on traceability in the feed and food chain

ISO/TS 22002-1:2009 contains specific prerequisites for food manufacturing

ISO/TS 22002-2:2013 contains specific prerequisites for catering

ISO/TS 22002-3:2011 contains specific prerequisites for farming

ISO/TS 22002-4:2013 contains specific prerequisites for food packaging manufacturing

ISO/TS 22003:2013 provides guidelines for audit and certification bodies

ISO 22000 Standard (Food safety management systems - Requirements for organizations in the food chain) specific requirements of the food safety management system and combines five key elements to ensure food safety generally recognized along the food chain available until the final point of consumption:

1. Interactive communication;
2. Management System;
3. Process Control;
4. HACCP principles;
5. Prerequisite programs.

In the food safety system, ISO 22000 brings news about additional requirements relating to documentation,

planning management system of food safety, preparedness and response in case of emergency programs preliminary determination draft programs operating, updating information and documents on preliminary programs and HACCP plan, verification planning, verification, validation and improvement (Appendix 4).

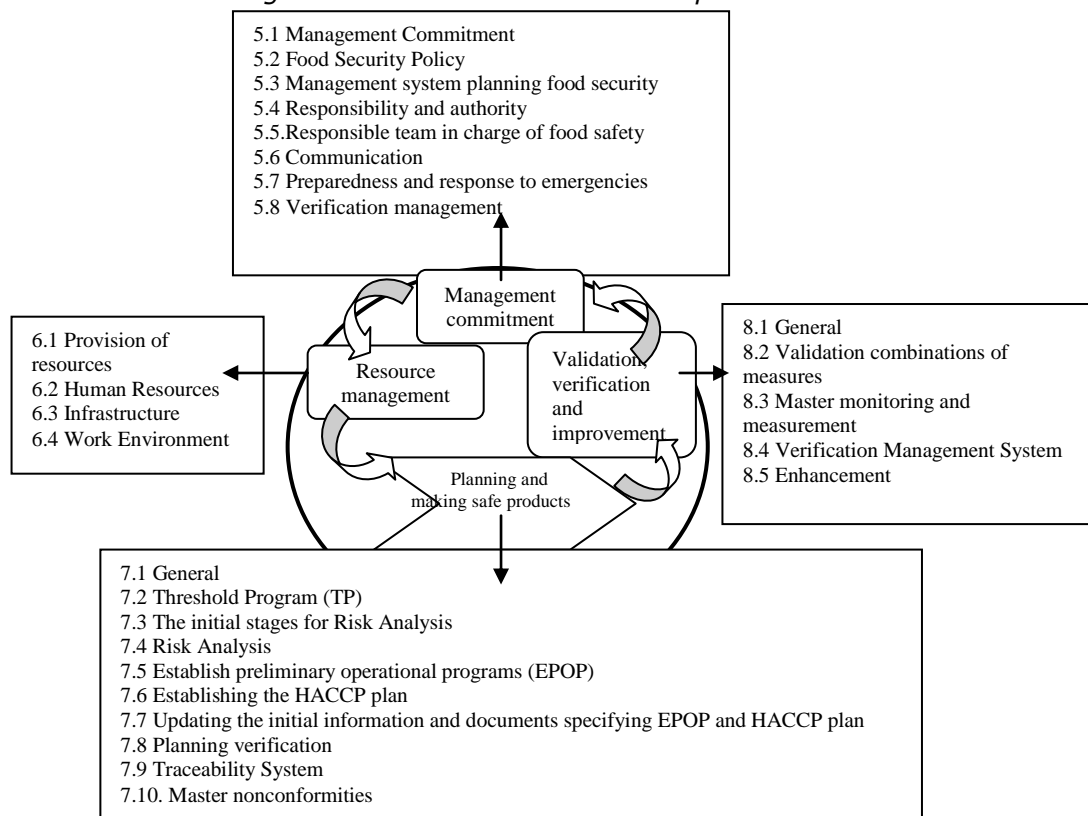
The main elements of each structure of ISO 22000 and ISO 9001 standards are essentially common but have separate fields of application.

Moreover, ISO 22000 provides additional paragraphs compared to ISO 9001 (Figure 2).

The requirements of ISO 22000 General requirements specifically how to build management system, namely: (Boutou, 2006)

- Setting the scope of the management system;
- Identification, evaluation and resolve hazards;
- Communicating appropriate information at all levels;
- Internal communication of information on the system;
- Regular assessment and management system upgrade;
- Outsourced processes affecting resolving.

Figure 2. Details of ISO 22000 requirements



Source : Boutou, 2006

Relative documentation requirements - the organization must use internal and external documents on food safety in various activities to meet the requirements. The type and extent of the documentation will probably be different from one organization to another due to the size and complexity of the activity and competence of staff ISO 22000 standard and requirements established in the preliminary program, namely: (Blanc, 2006)

- The organization must establish implement and maintain one / several programs preliminary to help resolve: the likelihood of introducing changes relating to food safety into the product through the work environment, contamination and cross contamination between products, levels risk related to food safety in product and product processing environment.

- Preliminary adapting programs to the needs of the organization in terms of food safety products;
 - Adapting the size and type of operation and thus the nature of the products manufactured and / or handled;
 - Preliminary programmes implementing at all levels of the production system, either as programs of general application, either as programs applicable to a product or a production line;
 - Preliminary programs must be approved by the team responsible for food safety.
- Implementation of a food safety management system based on HACCP principles has the following advantages:
- Reduce food available until extinction risks;
 - Leading the organization's commitment to improving the image;
 - Reduce the need and cost of final testing of the product;
 - Increased consumer confidence in the product;
 - Drastically reduces the likelihood of accidents that can lead to contamination of the products;

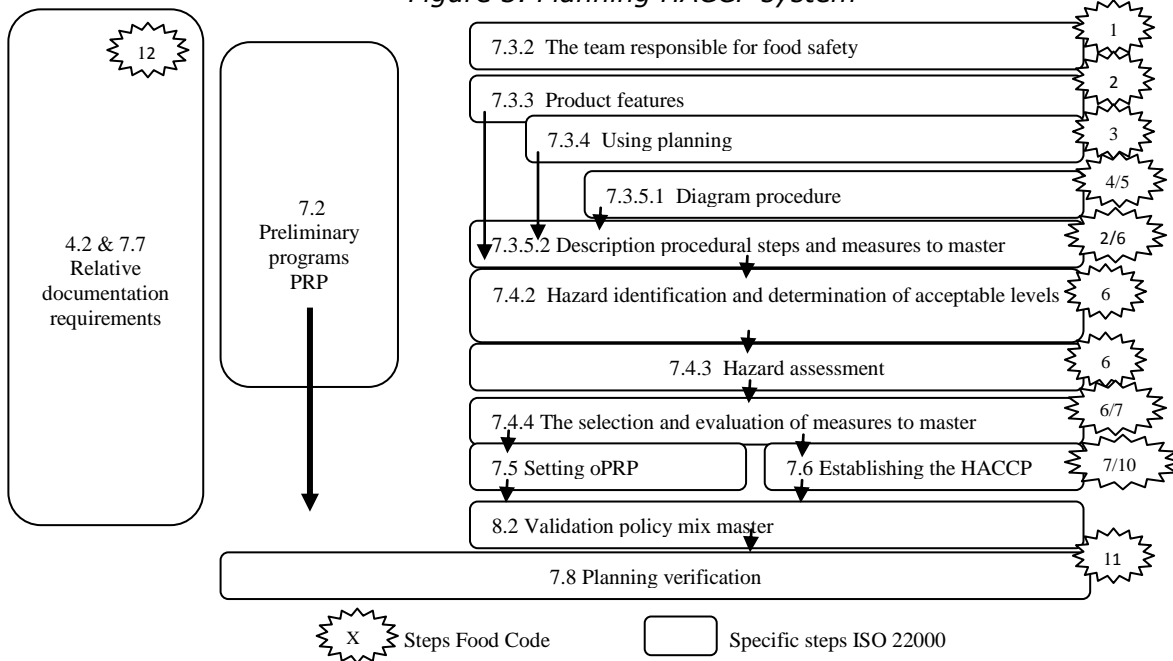
- Long-term lowering costs of raw material losses and recall products from the market.

Communication and ISO 22000

Introducing ISO 22000 Communication stresses the importance of communication in the food chain, communication, without which the reactivity of awareness and mastery of dangers cannot be optimal. In Appendix 5 is an example of communication in the food chain; Communication at all levels of the food chain is essential to ensure the identification and resolve almost all relevant food safety hazards in each stage. This implies communication between organizations in the food chain, from upstream to downstream, between customers and suppliers, based on identified hazards and the measures resolve order to help address stakeholder requirements.

Planning and realization of safe products International Standard ISO 22000 requires the organization to employ a dynamic and systematic development of the management of food safety. This method is based on defining preliminary programs, method HACCP, traceability and resolve nonconformities (Figure 3). (Boutou, 2006)

Figure 3. Planning HACCP system



Source: Boutou, 2006

Validation, verification and improvement of the management system of food safety

It involves activities needed to develop the system of food safety management so designed to be reliable

and able to provide the expected level of operations and verification by validating resolve (Appendix 6).

It is up to the organization's management to ensure that the system

1.3. ISO 22000 and continuous improvement

ISO 22000 introduced continuous improvement as a new requirement. The aim is to master the sequence of links with different data input and output from them: quality policy, objectives, implementation of HACCP, performance evaluation, correction, corrective action and review the direction (Figure 4).

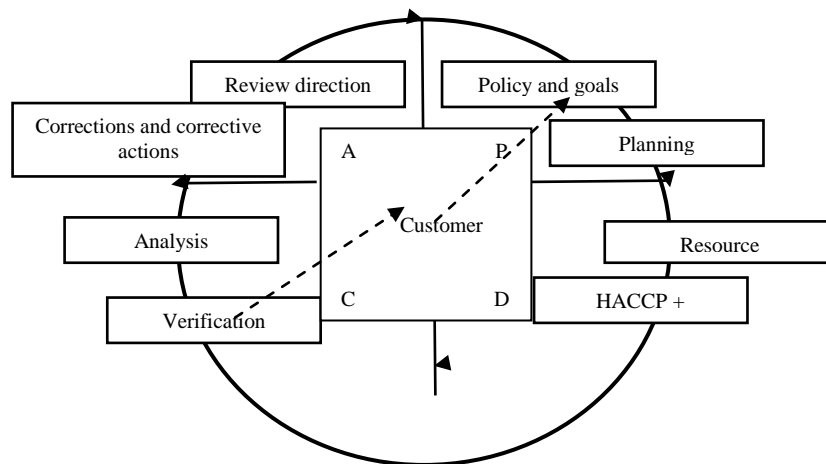
1.4. Benefits of ISO 22000 international standard

In an organization, implementing a quality management system not only gives consumers confidence that the food is safe to eat, but also:

of food safety management is designed to produce the desired effects, it works as expected and is updated based on the information provided.

- An improvement in tangible and demonstrable performance in terms of food safety;
- Identify current risks for the company and for consumers;
- Creating a highly efficient tool for performance improvement in terms of food safety and the ability to effectively monitor and measure performance;
- Much better compliance with legal requirements;
- Recognition of quality and safety in the global food chain;
- Ease to integrate ISO 22000 with other management standards ISO 9001 and ISO 14001;
- Saves time and money;

Figure 4. ISO 22000 and continuous improvement



Source: Boutou, 2006

Currently, many organizations need different food safety standards but by implementing ISO 22000 which is the tool that harmonizes all standards based on HACCP method can save time and money.

2. The traceability of food

Initially, the concept of traceability has been correlated with specific origin / regions which supply products such as: bread, meat, oil, etc. Subsequently, the concept has spread to food safety and bioterrorism needs the right information to the consumer. A concrete example, is to monitor cows to

reduce the risk of mad cow disease, and traceability systems that offer consumers information about products, such as country of origin, growth, specifically information about each step of providing a product.

The Regulation 178/2002 on Food Safety defines traceability as: "the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution"

Another definition of traceability is given by the International Standard ISO 9000: 2000 'ability to track (detect) the history, application or location of an entity by means records on the identification data ".

Food traceability features can be considered the following: (*Diaconescu, Ardelean, Diaconescu, 2007*)

- It may be regarded currently as a fundamental component of any quality management system in the food industry;
- Is part of a legislative effort to trace and follow agri-food commodity and food by using records from obtaining available until the final consumer;
- It was launched as part of initiatives for public safety in order to rein consumer confidence in foodstuffs and to establish that the main responsibility for food safety and quality rests specialized unit, which they market;
- Assume responsibility of all participants who have a role in food route, as it covers the entire chain of production - distribution - consumption available until the end consumers; or uncovered a weak link in this system may compromise the entire system and affect the safety of food consumption.

Traceability objectives involve ensuring effective coordination between actors and services along the chain, pooling resources and ensure product placement and information whenever and wherever it is useful.

Creating a traceability functions in an organization implies. (*Faraggi 2002*)

- Precise definition of functions: customer, supplier, logistician, supplier etc.
- Precise definition of the places and routes: reception, central storage, backup proximity, consumption etc.
- Precise definition of operational processes: determining the points of consumption, ordering, etc.
- Formalize precise procedures: safety stock levels, replenishment methods, thresholds ordering, quality control mechanisms in receipt etc.
- The exact configuration management information systems: data acquisition, structure product descriptions, shared database, integrating budget monitoring.

2.1. The need to implement traceability systems

The need for organizations to design, implement and maintain a traceability system due to:

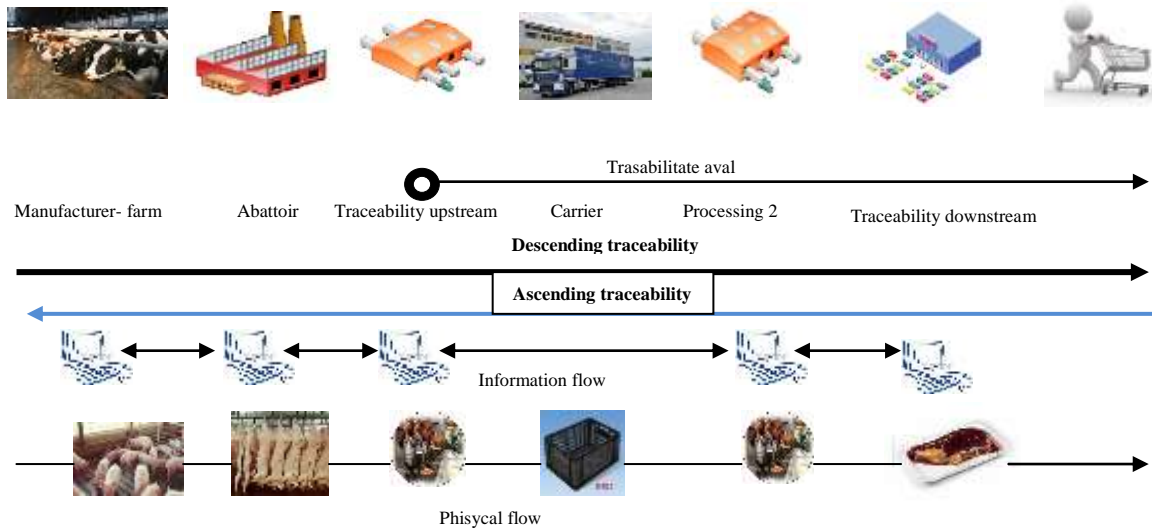
- organizations need to comply with the requirements of European and national legislation;
- organizations need to comply with the necessary requirements for establishing and maintaining a quality standard;
- organizations need to control spending and optimize resources;
- organizations need to be able to legally prove that the product / service realization is in compliance with certain requirements;
- organizations need to ensure consumer product / service compliance of the performance of certain activities.

To implement a traceability system is required following the steps in Appendix 7.

2.2. Types of traceability

For effective management of information is required Implementation of a traceability system within a supply chain, which means systematic association of a flow of information in a physical flow (Figure 5).

Figure 5. Types of supply chain management traceability



Source : own elaboration

Total Traceability aims control of processes and products upstream (origin-tracing raw materials supplier) and downstream (supply of the product to the consumer). It identifies all stages of manufacture and delivery of a product on the market and also should allow, if necessary, return to the origin of a malfunction / Pause (internal / external company) in terms of installing a food crisis or dissatisfaction consumer (Appendix 8).

For the success of total traceability approach it is necessary to fulfill certain prerequisites: (Ta 2002)

- 1) Identification of products during the processing cycle for marketing materials:
 - Ensure a better knowledge of the origin, manufacture, quality of raw materials, packaging materials;
 - Control / master stages and instruments of production, and control of compliance;
 - Ensuring preservation, transport and distribution of finished products.
- 2) Data collection and management of the data;
- 3) management interfaces and connections that require:

- Rapid and reliable means to enable a load of links between excessive expeditions lots and units;
- Combination with other existing enterprise means: request for certification / accreditation, GMPs, HACCP etc.

4) The supply chain quality management to ensure a flow of information and communication between stakeholders, harmonization of information systems and collective accountability for quality and food safety.

Traceability and traceability upward downward. Supply chain traceability can be directed in two distinct directions:

- Forward or upward traceability (Traking) - is the ability to find the location of products at any point in the supply chain, based on specific criteria;
- Backward or downward traceability (Tracing) - is the ability to find the origin and characteristics of a product at any point in the supply chain, plecând from one / several criteria.

Traceability international reception begins and ends after sending materials finished products through all stages of manufacture.

Traceability outsourced is the information received by the company or those provided by other members of the food chain company, regarding a particular product.

Traceability chain that food traceability of the chain links, attention is directed to the information accompanying the product from one point to another point in the chain thereof, such as traceability is extended for any product at all stages of production, processing and distribution. (Banu, 2007)

Logistics and traceability traceability:

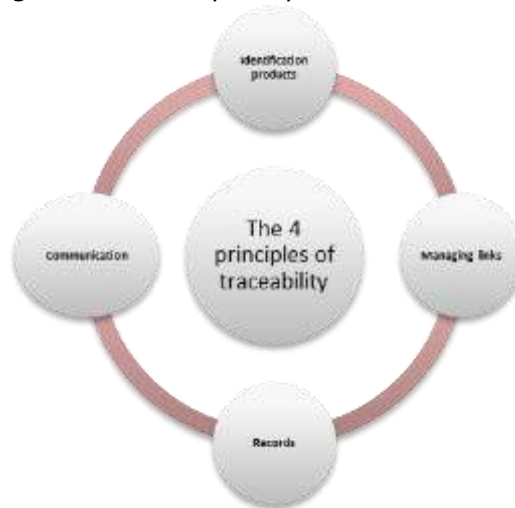
- Traceability - indicates traceability and quality of products depends on a good recording and completeness of the data related to the product.
- Traceability Logistics - indicates a quantitative tracking of products and recording depends on good links

between successive products sector. This allows local product traceability, setting destinations and origins.

The four principles are based traceability (Figure 6):

- 1) Identification of products - in order to track products throughout their processing, information is attached batch manufacturing or shipping units that have undergone the same transformation; and each grouping of products is marked with a unique identifier.
- 2) Management of connections - between batches, between them and logistic units and shipment of units, should be recorded throughout the supply chain. If an actor does not manage these links chain with upstream and / or downstream, then it can rupture traceability (loss).

Figure 6. The 4 principles of traceability



Source: own elaboration

3) Records - within the transformation process are outlined certain predetermined dates, which are elements of the process variables (varies by season, production line, production time) which may influence product quality.

4) Communication - to ensure continuity of information flow, each supply chain actor must communicate to the next actor, identifying the batch or regrouping of products. For traceability management necessary to associate a flow of

information in a physical flow of products.

2.3. Contributions to the consumer traceability

In 1996 it was reported early food crisis caused by BSE (bovine spongiform encephalopathy) and a journalist spoke about traceability as a means of certifying the capacity to identify the origin of meat. Thus, in February 2004, following a survey, Louis Harris published Search noting that traceability has

become the third criterion for evaluating the quality of food to consumers (22% of responses), after health safety and taste (ie 27 and 23% responses).

In October 1996, a notice from the CNA (National Council for Food, a consultative body composed of representatives of government, consumer associations and professional federations), considers acronym but want a general improvement of the rules for identifying and promoting traceability as 'information reliable and controllable'. (Lecomte, Ta & Vergote, 2006)

In short, as regards consumers, traceability is necessary as a tool to use for transparency in the sector, thanks to information provided by the product as a tool reactivity of economic operators to accelerate withdrawals and reminders that would be needed.

2.4. Traceability systems

ISO 9001: 2008, a traceability system records and tracks the way production beginning with taking over from suppliers of products, parts and materials through their processing and

distribution passing their finished products (Appendix 9).

2.4.1. The principles of traceability, supporting technologies and standards GS1 (Global Standards 1)

Implementing a traceability system within a supply chain requires ing parties to systematically associating the physical flow of raw materials, intermediate and finished products with their associated information flow.

To support raw material suppliers, manufacturers and retailers, EAN International has defined key traceability principles and produced an implementation grid (Table 1) which connects with supporting technologies EAN-UCC standards and relevant. (EAN-UCC, 2006)

The four key principles of traceability are:

- 1) Unique identification of products, logistic units and locations;
- 2) Collecting and recording data on traceability;
- 3) Management of traceability links and data mining;
- 4) Communication of data traceability.

Table 1. Grid deployment EAN UCC traceability

The principles of traceability	Support Technologies	Specific instruments EAN UCC
The unique identification	Automatic Identification	GTIN, SSCC, GLN, Application Identifiers
Collecting and recording data	Automatic data collection	EAN/UPC, UCC/EAN - 128
Management links	Electronic data processing	Software
Data communication	Electronic Data Interchange	EANCOM® / XML

Source: Blue Book – ECR Europe, 2004

The unique identification - any article and / or location to be located or tracked, must have a unique identity. EAN-UCC globally unique identifier allows access to all available data on the history, application or location.

Identifying locations - EAN-UCC Global Location Number (GLN) enables the unique identification of entities and unambiguous physical, functional or legal, such as warehouses, loading

vehicles, company departments, etc. (Appendix 10).

Identification of products - GTIN (Global Trade Item Number) can use bar codes with EAN / UPC (on any item crossing point prior sale of the retailer) under the symbol UCC / EAN 128 (on any item not crossing the point of Retail's retailers) and / or can be used in EANCOM® and EAN UCC XML messages.

2.4.2. Procedures of identification and traceability of products

The purpose of this section is to describe product traceability processes based on the following elements:

- Unique identification of the companies involved;
- Unique identification of products (consumer units);
- Unique identification of logistic units (pallets, containers, etc.);
- Information flows and data exchange.

It is recommended a collaborative approach that includes dialogue between partners in the supply chain and use of a common business language.

The use of standards GS1 (formerly EAN-UCC) to identify trading partners (GLN - Global Location Number), products (Global Trade Item Number) and logistic units (SSCC - Serial Shipping Container Code) together with use of standards for electronic messages EDI (Electronic Data Interchange) for the communication of information (EANCOM®) is the recommended solution.

2.5. Information technology in traceability

2.5.1. GS1 logistics label description

The system GS1 barcodes are used to carry data relating to a product or service at each stage of the supply chain. The data can be encoded GS1 product identification number (GTIN) or any additional data for that product. The main GS1 standard barcodes are: EAN-8, EAN-13, ITF-14, GS1-128.

GS1 logistics label is a voluntary standard developed by GS1 along with representatives of manufacturers, distributors, transporters and GS1 Member Organizations. This label groups information into three logical sections: supplier, customer and carrier (Appendix 11); these sections can be designed, printed and applied at different times.

Section provider generally contains information known to the manufacturer at the time of packaging. SSCC is applied here as the unit identifier with GTIN.

The section contains information allowing the client to retrieve references consignee order. Information appearing

with order and its processing by the supplier: order number, transport to location, route information handling, etc.

Transport section contains information known at the time the expedition and refers usually to transport. Typical information for this section are carrying the postcode, consignment number, route information handling, etc.

Any section of the label GS1 logistics information is grouped into three parts: (GS1, 2007)

- Superior containing text information in free format;
- Middle containing plain text interpretation of data represented in the barcode;
- Lower containing barcodes.

Benefits of using logistic label:

- Time payout obtained by automating data collection and control of shipments;
- Gathering information more accurate, reliable and quick to read the label issuer of orders by the reception of the goods;
- Obtained by eliminating time payout of successive labels applied by each actor in the chain;
- High reliability by suppressing information retranscribed and multiple collection of the same information;
- Confrontation with standardized EDI messages;
- Better traceability in the supply chain by using the ISO standard unique identifier for transport units (SSCC).

2.5.2. Use of RFID for traceability

Technologies using radio frequency identification (RFID - Radio Frequency Identification) can provide traceability and real-time control to meet regulatory requirements and the customer and while improving efficiency and profitability. Figure 7 describes the structure of the RFID tag.

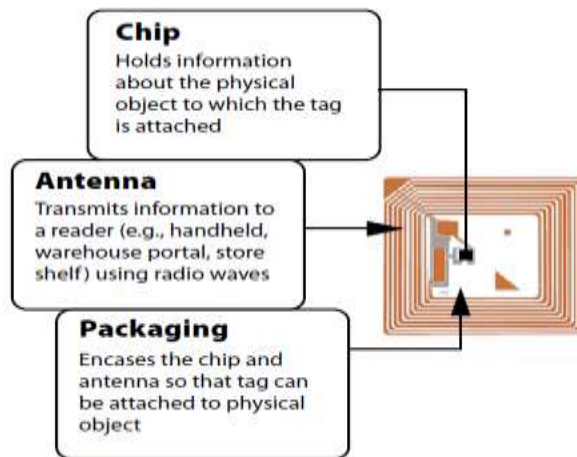
When the number of lots from vendor associated with a unique ID (RFID) product is received and that the ID is scanned as it is placed in the manufacturing process, product information and batch can be easily traced if necessary (Figure 8).

Also capturing the batch number of bulk receipt and use helps quickly identify lots that may have gone into

finished products. The race against the clock in a recall or if a request for information from the Food and Drug

Administration (FDA), automated systems print a spreadsheet every time.

Figure 7. Structure of label RFID



Source: Popa, 2012

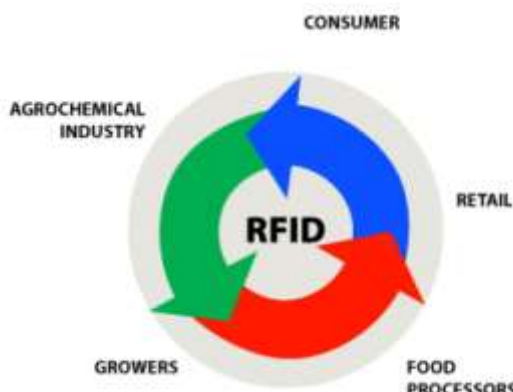
RFID is a proven technology promises to improve efficiency and traceability. The main advantages of RFID include:

- Tags can be read from a distance without being aligned;
- Reduced need for human intervention;
- Longer tags and improving access to information;

- The tags will help you locate and eliminate dangerous products quickly and efficiently in case of a recall;
- The tags will eliminate the need to recall the entire production line.

RFID tags are much more likely to be placed on larger units, such as containers and pallets, rather than the ultimate consumer items.

Figure 8. RFID cycle



Sursa: Vijaykumar, Subramaniam, & Rangarajan, 2005

- For reasons of safety and reliability, traceability in the supply chain has gained considerable importance in recent years. The new ISO standard 17367: 2009 will help manufacturers and

distributors to track products and manage their traceability thanks to standardized radio frequency identification tags (RFID).

ISO 17367: 2009 Application of RFID in the supply chain. Product labeling, defines the characteristics of RFID, which is used in the supply chain and is applied to the product label. The standard contains recommendations concerning:

- Coded identification of the product;
- Additional product information for inclusion in the RFID tag;
- Semantics and syntax of the data;
- Protocol data to be used to interface between office and RFID applications;
- Standards of Hertzian interface between the reader and the RFID tag RFID.

- Craig K. Harmon, who chairs TC 122 / GT 10, said: "ISO 17367: 2009 provides increased security products worldwide using RFID technology. He will facilitate and make more effective the exchange of goods in international trade and logistics".

ISO 17367: 2009 can be applied in many industries. He was drafted to ensure compatibility (at the physical level, but also at the level of orders and data) with four other international standards classified under the generic title of RFID in supply chain applications. International standards in this series are interoperable and do not interfere with each other. These are:

- ISO 17363:2007, Supply chain applications of RFID – Freight containers
- ISO 17364:2009, Supply chain applications of RFID – Returnable transport items
- ISO 17365:2009, Supply chain applications of RFID – Transport units
- ISO 17366:2009, Supply chain applications of RFID – Product packaging
- ISO 17367:2009, Supply chain applications of RFID – Product tagging.

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Appendix 1. During the 1990s Food Shortages

- 1950 Mad cow disease - was spread in Europe lack the strict and uniform application of animal health; spread disease rapidly due to isolation cows in poorly ventilated barns and cattle lack of standard checks. Also this year has seen an infection with the leaved *Trichinella* extended *Spiralis* in pork because of the way the animals were raised and slaughtered without suitable controls or inspections.

- Foot and mouth in 1954 (Foot and mouth disease) - In 1952, there was a worldwide epidemic of FMD, which had a huge economic impact; 340 000 were affected farms in France. Later during the 1950s and 1960s, was introduced compulsory vaccination of cattle against foot-mouth, reducing number of outbreaks of almost one million between 1951 and 1955 in some 30000 between 1966 and 1970.

- 1960 zoonotic diseases (*Salmonella*) - The EU has established rules to protect the animals against a wide range of diseases and to ensure that animal products will meet safety standards. At the same time special attention was given to monitoring and reduction of zoonotic diseases transmissible to humans.

- 1970 adverse- additives and potential effects due to large quantities of food produced from plants and not directly from farms or from small producers, were added to a growing number of chemicals designed to preserve and enhance flavor. In this regard we have been conducted tests to ensure the safety of the additives used and to determine any potential side effect.

- 1971 *Spiralis- Trichinella* EU established harmonized hygiene for the treatment of poultry meat in slaughterhouses, storage and transport. It also established health rules for imports of cattle, pigs and fresh meat and meat inspection mandatory *Trichinella spiralis* for. As a backup measure in case of any problem, in 1979 the EU set up a Rapid Alert System for Food and Feed, by notifying a risk direct / indirect human health.

This network associate Member States, EFSA (European Food Safety Authority) that manage the Commission, candidate countries, third countries and international organizations.

- 1980 growth hormone carne- Italian media debated cases related to premature sexual development and aging in infants by eating baby food that contained a veal extract with high concentrations of a particular growth hormone. In response, Italy and three Member States subsequently banned the use of this hormone in beef production. An EU ban followed in 1981 and, four years later, was completely banned the import of meat treated with hormones.

Also in 1980 there were reported cases of botulism in canned mushrooms and soup in Italy, shrimps in France and hazelnut yoghurt in the UK; and in 1982 it was recognized as a threat to food security *E. coli* bacteria for the first time (O157: H7).

- 1988 *Salmonella*- appeared a large number of cases of *Salmonella* in UK eggs and dairy products linked consumed at public gatherings and institutions. UK Department of Health issued a warning to British consumers against eating raw eggs as a public safety measure.

- Mad cow disease and CJD in 1990 (Creutzfeldt-Jakob disease, dementia) to man- BSE or mad cow disease was first identified in cattle in Europe just a few years earlier. However, the problem has worsened and became very obvious cases of disease; They were reported in 9 Member States for the first time this decade, and other cases in the UK and Ireland. The link between BSE and the feed given to cattle, and subsequently between infected meat and the fatal Creutzfeldt Jakobs Disease (vCJD) in humans, has caused great concern to the public on how manufacturing food.

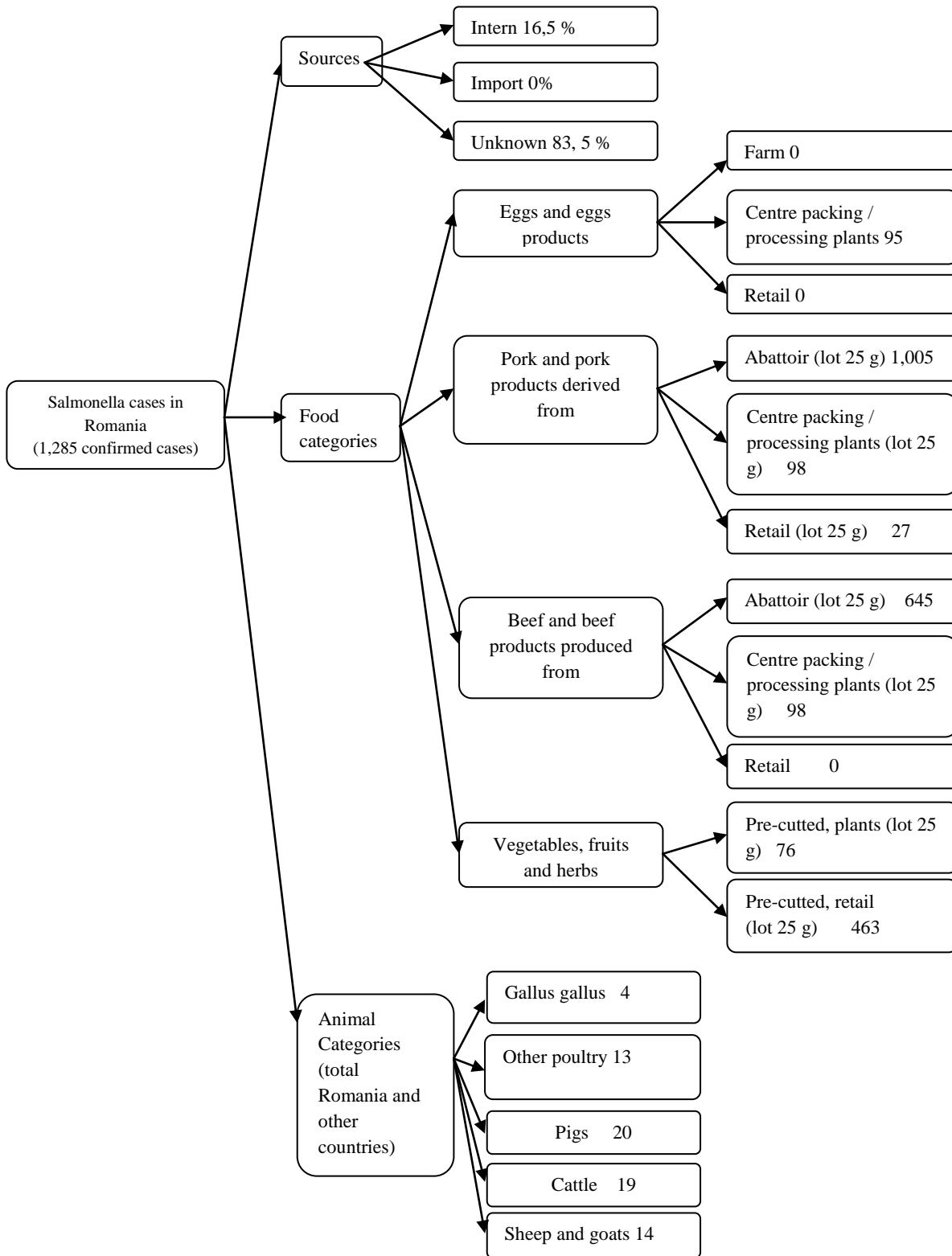
- Dioxins in feed- 1999 found dioxins (carcinogenic) in feed in Belgium. The problem was then spread Belgium, food produced from animals which have consumed contaminated feed. Many animals were affected and food had to be withheld or withdrawn from the market and destroyed, while temporary restrictions were imposed trade in meat and dairy products.

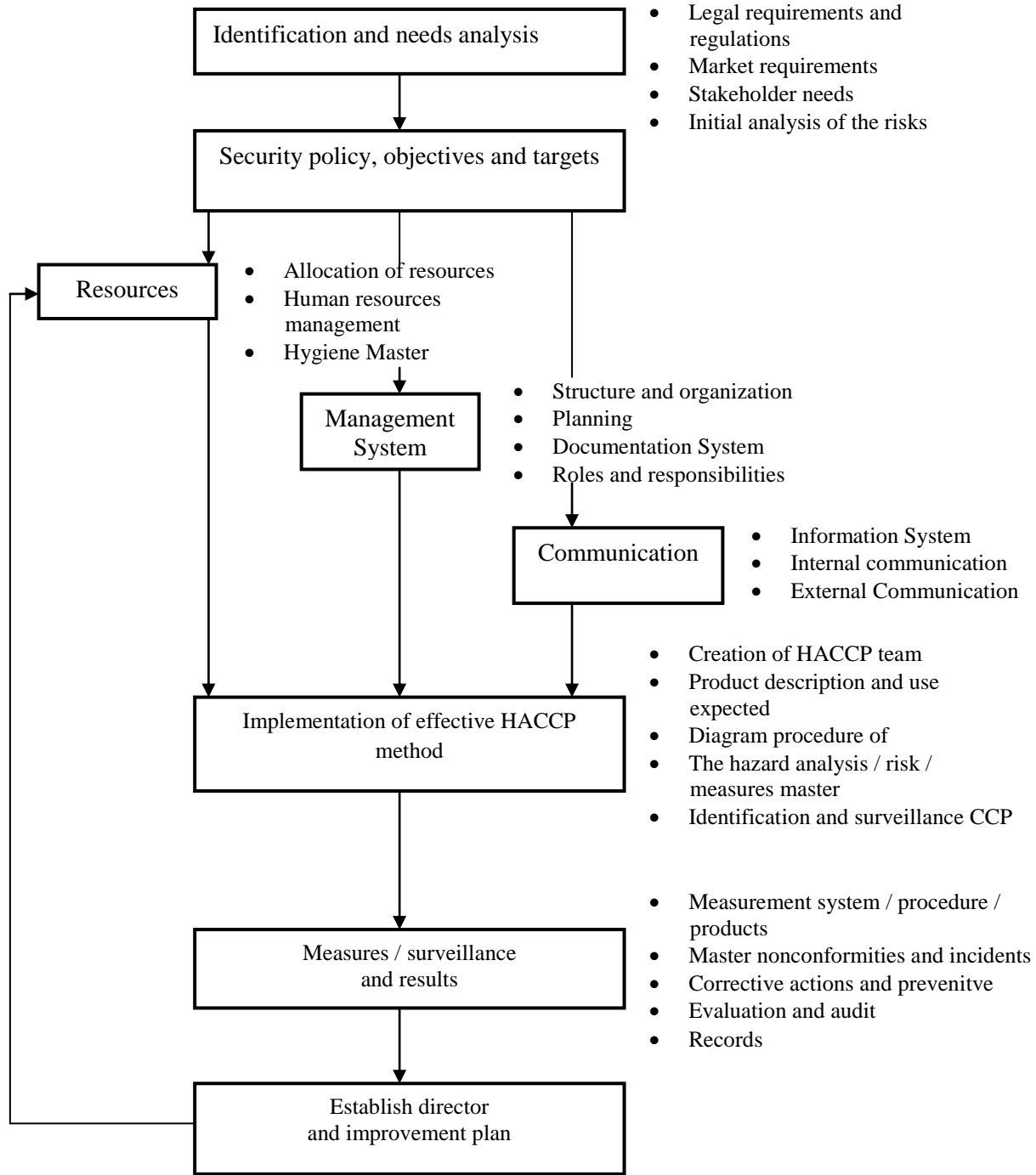
Name virus / mixed outbreaks	Outbreak	Number of human cases	Situation		Food sources	The origin of the problem	Original source food	Factors that contributed	Instalation point
			Hospitalization	Deaths					
C. Botulinum	1	4	4	0	Pork products derived therefrom	Household / domestic kitchen	Internal market	Storage time / temperature increased	Household / domestic kitchen
Enterobacter spp.	1	5	5	0	Dairy products (other than cheese)	Not known	Internal market	Not known	Not known
E. Coli și proteus	2	8	6	0	Cheese	Not known	Internal market	Ingredients Contaminated and processed	Not known
Trichinella	1	138	-	-	Pork products derived therefrom	Not known	Internal market	Ingredients Contaminated and processed	Not known
	1	4	-	-	Pork products derived therefrom	Not known	Internal market	Ingredients Contaminated and processed	Not known
	1	3	3	0	Pork products derived therefrom	Household / domestic kitchen	Internal market	Heat treatments inadequate	Household / domestic kitchen
Staphylococcus aureus	1	39	9	0	Cheese	Not known	Internal market	Storage time / temperature increased	Schools, kindergarden
S. Choleraesuis	1	15	15	0	Pork products derived therefrom	Household / domestic kitchen	Internal market	Ingredients Contaminated and processed	Household / domestic kitchen
Salmonella spp.	1	6	6	0	Milk	Household / domestic kitchen	Internal market	Ingredients Contaminated and processed	Household / domestic kitchen
	2	14	12	1	Sweets and chocolate	Household / domestic kitchen	Internal market	Not known	Household / domestic kitchen
Enterotoxine Staphylococcal	1	16	3	0	Cheese	Household / domestic kitchen	Internal market	Not known	Household / domestic kitchen
					Sweets and	Household /	Internal	Ingredients	Restaurant,

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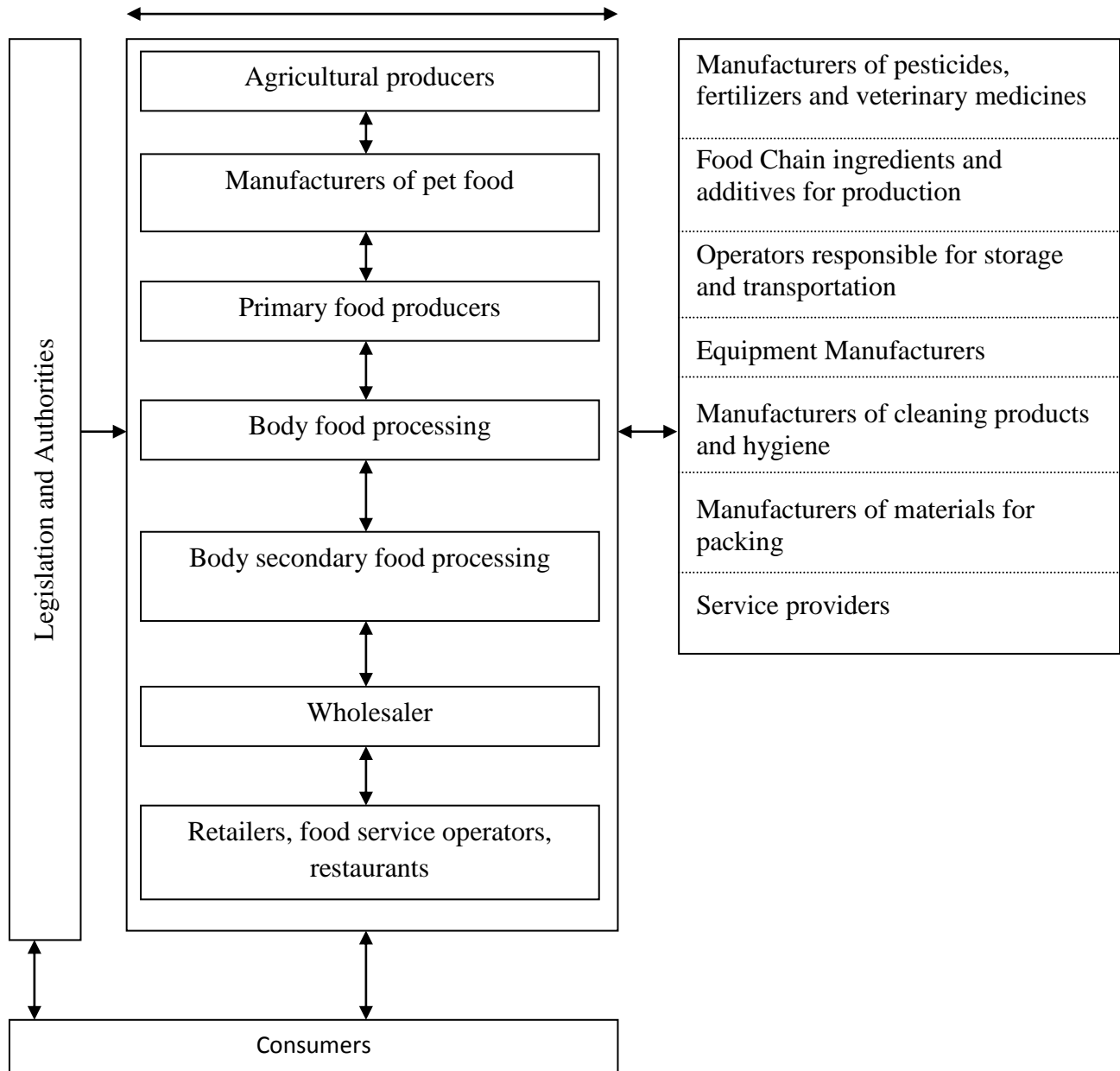
	1	5	5	0	chocolate	domestic kitchen	market	Contaminated and processed	cafe, pub, bar, hotel
Enterotoxine, nespecificat/e.coli	1	14	0	0	Cheese	Household / domestic kitchen	Internal market	Handling infected food	Temporary catering (festivals)
Enterotoxine, unspecified	1	28	0	0	Cheese	Not known	Internal market	Ingredients Contaminated and processed	Hospital
	1	23	20	0	Cheese	Company (primary production)	Internal market	Ingredients Contaminated and processed	Temporary catering (festivals)
	1	4	4	0	Cheese	Household / domestic kitchen	Internal market	Handling infected food	Household / domestic kitchen

Source: EFSA, Zoonoses Monitoring, 2010

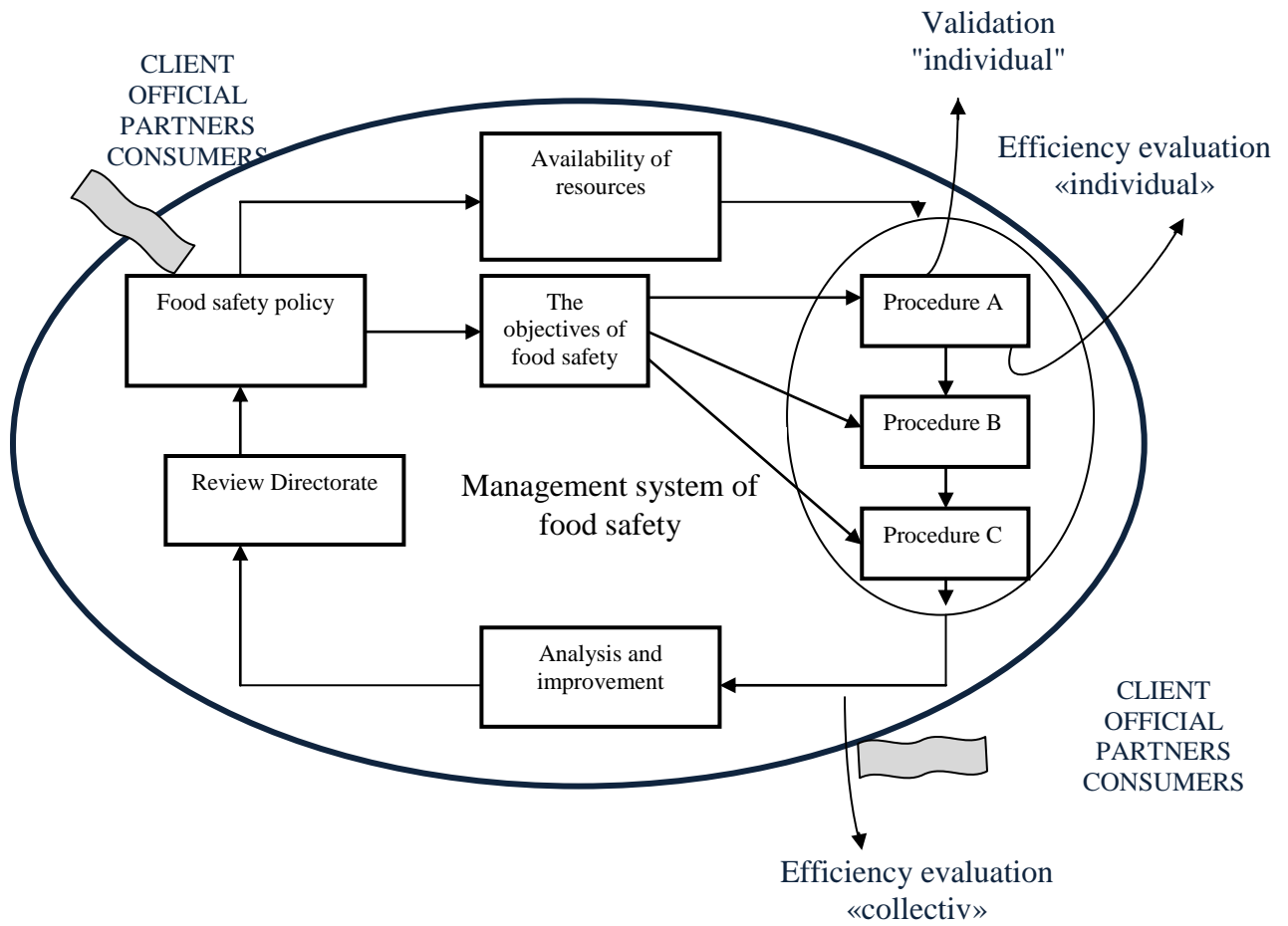




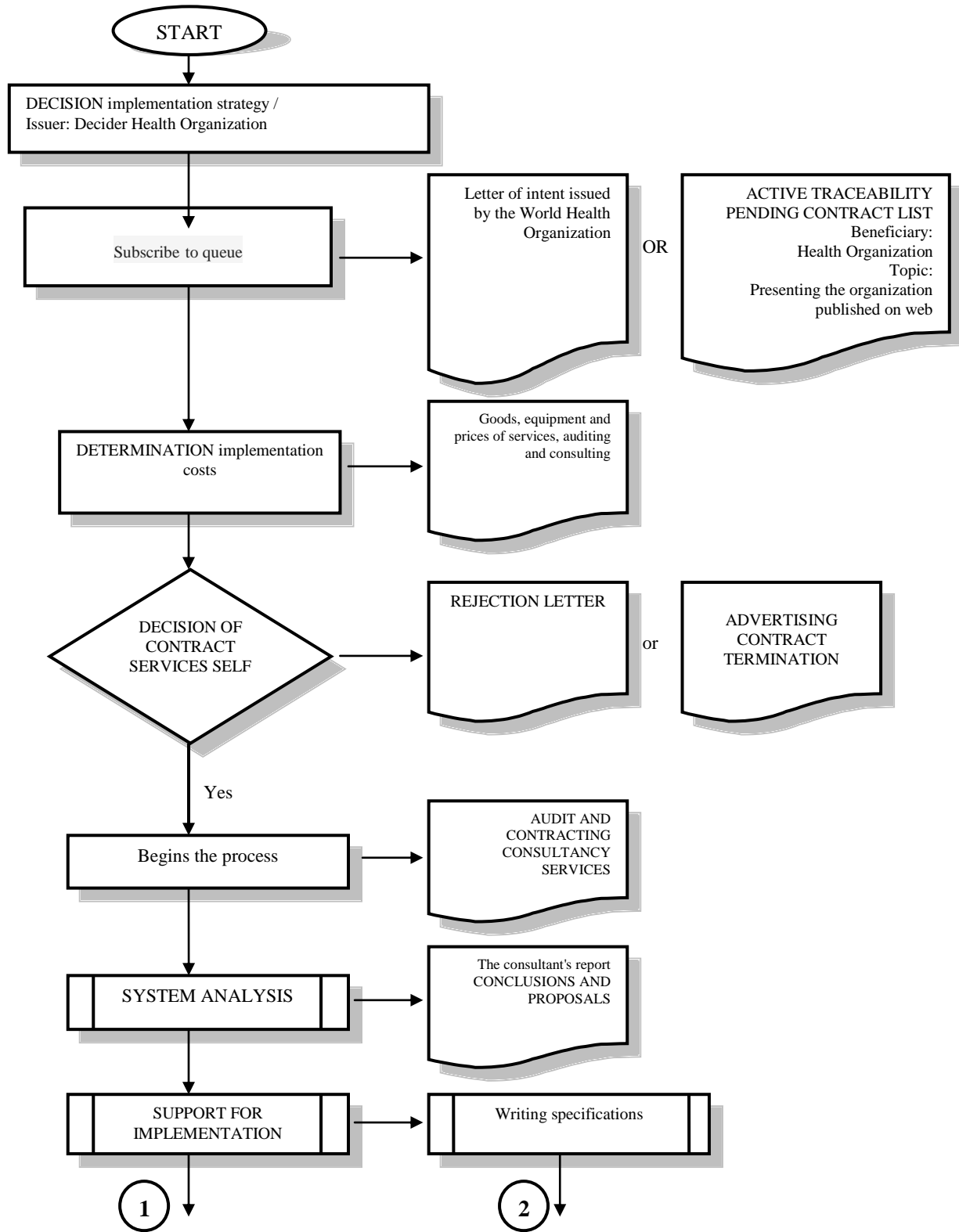
Source: Boutou, 2006

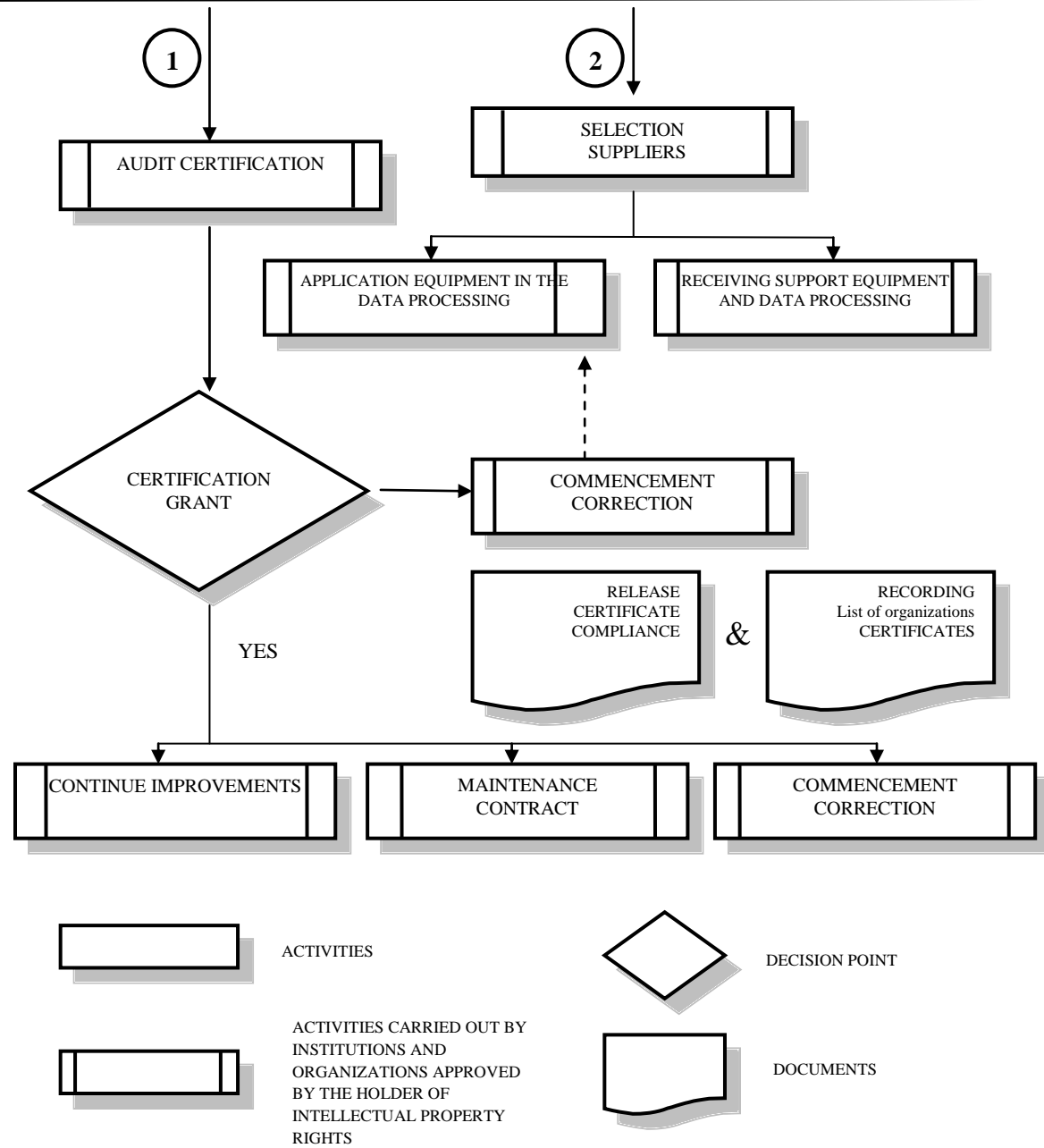


Source: Blanc, 2006

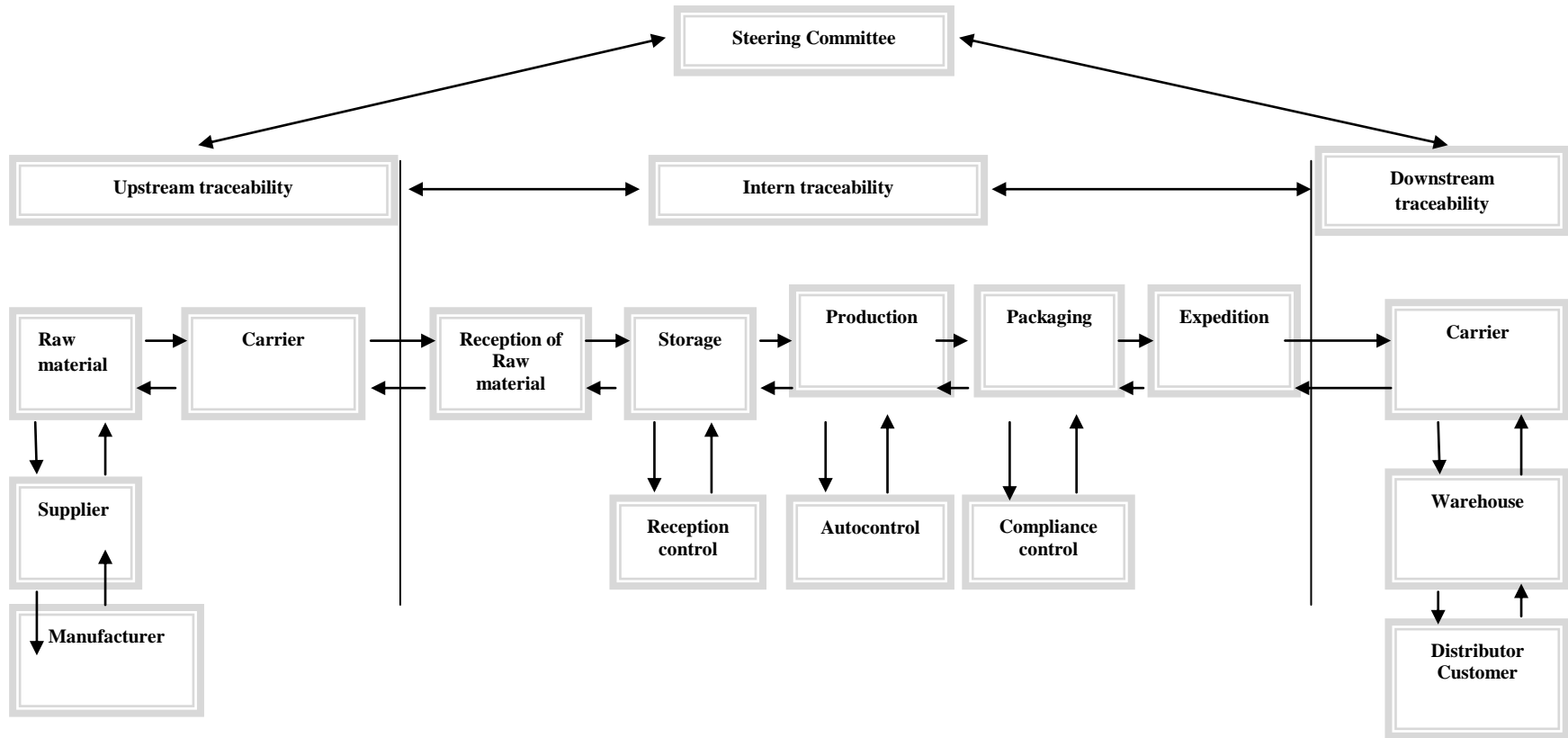


Source: Boutou, 2006



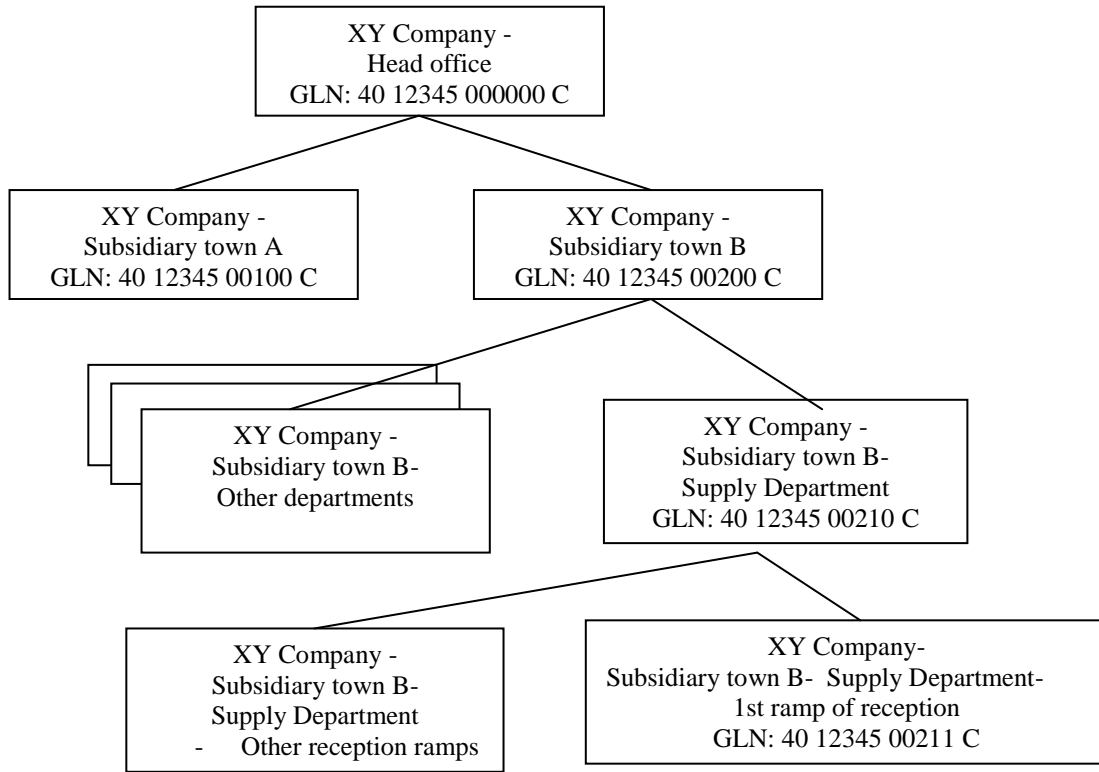


Source: www.trasabilitateactiva.ro



R E Q U I R E M E N T S	<p>Framework</p> <p>These elements are relatively stable. A first analysis may be conducted on subsidiary.</p> <p>Elements traced</p> <p>They can evolve over time, depending on the objectives. A common minimum may be decided sectoral, but the choosing elements drawn results, usually, from risk enterprises evaluation.</p> <p>Standards</p> <p>GS1 Standards are common language for traceability. Using their largely determine the system performances.</p>	<p>1. Background</p> <p>2. Goals</p> <p>1. Perimeter</p> <p>2. Products</p> <p>3. Links</p> <p>4. Data registration</p> <p>5. The archival</p> <p>1. Products and companies identifyin</p> <p>2. Automatic follow of physical flows</p> <p>3. Data interchange</p>
R E S O U R C E S	<p>Organization</p> <p>Organization is proper to every enterprise. It is directly linked to data system.</p> <p>Information system</p> <p>System configuration information is unique to each company. Tools may be more/less computerised volumes and frequencies as a result of information interchange.</p>	<p>1. Responsabilities</p> <p>2. Procedures</p> <p>3. Interchange information</p> <p>1. Information acquisition</p> <p>2. Information transmission</p> <p>3. Managing information</p>
E V A L U A T I O N	<p>Performances</p> <p>Are keys indicators of integration to traceability system.</p> <p>They must be analyzed for each product.</p>	<p>1. Reliability</p> <p>2. Speed</p> <p>3. Accuracy</p> <p>4. Coherence</p>

Source: <http://www.etrasabilitate.ro>



Source: Blue Book – ECR Europe, 2004

FROM (EXPEDITOR) SC ALIMENTE SRL Str.Frumoasei, nr.3 1231 Afumați	TO (DESTINATAR) SC MAGAZINUL SRL Str.Viilor, nr. 100 71234 București	transportator
CARRIER (Transportator): TransRo SRL		
Data de livrare : 31.01.2008 ROUTE (Cod ruta): 12345678912 SHIPMENT No. (Nr. Expediție): 59412345678912345		
 (402)59412345678912345(403)12345678912		
ORDER No: 2356789	 (400)2356789	client
SSCC: 359410738000001051 GTIN: 05941073800152 BATCH/LOT: 1120		furnizor
 (02)05941073800152(10)1120  (00)359410738000001051		

Source: <http://www.etrasabilitate.ro/informatii/exemplu-eticheta.html>