EDES

HANDBOOK

7.2

TOPIC 7

Traceability and Labelling

2

ESTABLISHMENT OF A TRACEABILITY SYSTEM

COLEACP

The handbooks are tools designed for civil servants in charge of restructuring the food safety system, and for all operators involved in drawing up the food safety policy and organising official controls (qualified civil servants, heads of laboratories, heads of departments in official organisations, those in charge of official controls, trainers, technicians, researchers, experts or company executives). They aim to provide an overview of the main points of a specific subject. All of the topics addressed by EDES during the training sessions are covered in separate handbooks.

The handbooks have been designed and drawn up by the EDES Training Unit in cooperation with the Consortium members.

EDES is a European cooperation programme managed by COLEACP. COLEACP is an international network promoting sustainable horticultural trade. It is funded by the European Union and was implemented at the request of the ACP (African, Caribbean and Pacific) Group of States. EDES aims to promote food safety in African, Caribbean and Pacific countries. EDES operates in all sectors in response to a request filed at national level by any public or private stakeholder involved in the food safety process.

TOPIC 7

Traceability
and Labelling

2

Establishment of a traceability system

Content

1. Implementing a traceability management system

> **Basic principle:** the implementation of traceability **must be adapted** to the objectives of the sector, to the company, to its environment and to its regulatory, contractual (client requests) and internal constraints.

1.1. Implementing a «traceability system»

A traceability system is a **technical tool** intended to help companies comply with **set objectives** and it is used, when necessary, to determine the history and/or location of a product and all of its components.

The **ISO 22005:2007 standard**[1] sets the principles and specifies the basic requirements applicable to the design and implementation of a traceability system in the food chain. It can be applied by any "organisation" operating at any level of the food chain. It must be designed to **flexible** enough to enable operators to meet the objectives they have identified as being **relevant for them**.

Traceability is usually initiated by an outside request that combines **regulatory obligations** with **client demands**. The latter may also be subject to a regulatory traceability obligation at their level or may be interested in having complete traceability without having to bear the cost alone.

> Since traceability requests **usually come from the outside with specific goals**, the challenge resides in implementing an **effective** traceability system in the company that will be **suited** to the size of the company, to its resources and to the qualified people available.

The implementation of a traceability system must be viewed as a "**project**" by the company. It requires a structured approach, that is, a methodology. Throughout the project, it will be important **never to lose track** of the fact that traceability is simply a tool for product **safety** and **quality** and not a goal in itself.

Implementation of a traceability system will be facilitated by:

- A degree of organisation in the company and of the project

- Known and stable processes and operational methods (a minimum number of operations that repeat over time must be identified)

- Well-documented processes and modes of operation

- The presence within the company of quality management systems (traceability provides visibility and understanding, not a way to solve problems or reduce risk). The temptation to link *traceability and quality* is great: this is, however, truer for "*tracing*" than for "*tracking*".[2]

- The availability of qualified staff informed about the project. The entire company is affected by its implementation. Although the actual use of traceability only involves a few players or services, it must take into account all operations and all employees. Everyone must answer the question: *"What can I do to enhance visibility of products and flows?"*

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1 ISO 22005:2007, *Traceability in the feed and food chain — General principles and basic requirements for system design and implementation* was developed by ISO/TC 34, Food Products. It is available from ISO.
2 *Tracing* and *tracking* are equally important and required within the framework of food safety.

Cutting the project up into "pieces" can lead to the implementation of several complementary, competing or incompatible traceability systems.

1.2. The basics of the methodology

A **four-step** methodology is usually used:

1. Environment definition and needs assessment (external and internal)

The company must identify the data to be traced, particularly those that:

- Meet regulatory requirements
- Meet market needs (clients)
- Meet the company's own requirements (organisation, reactiveness).

> *Who requests traceability, how and why?*
> *Is it really a basic need or just a fad?*
> *What do business professionals think about the trend and what are competitors doing?*

Even if the trigger is a request from a business partner, time must be taken to analyse the subject to understand its positive and negative effects on the company (business opportunities provided by better traceability) and the resources available (state of the art).

This analysis will be used to create a "**business vision**" of traceability for the company: *What are the purposes, formats, benefits for the company's operations and for the target markets*? Only a well-designed "business vision" will provide a return on investment.

2. Assess internal capacities

All companies have a minimum amount of data recorded and stored for customer and production management, market studies, cost price calculations, marketing, accounting, tax returns, energy consumption, etc. They all provide implicit traceability systems. During the internal assessment, these existing internal capacities will have to be carefully identified and compared with external requirements.

> *What is already in place and what has already been recorded?*
> *What in-house experience does the company have with traceability?*
> *What are the weak and strong points of existing traceability compared to the specifications of the external request?*

Lastly, a traceability project should not be viewed solely as an "exercise" to be carried out internally since it also involves suppliers (direct) and service providers. The latter will have to be involved during traceability analysis and implementation.

3. Bringing internal and external together

The decision to implement traceability must bring together the "internal" and "external" aspects of the company. A traceability action plan and response strategy must be established given external requirements in order to sell the future system to clients, suppliers and, especially, to internal employees. Everyone in the company has to understand and accept the value of the project.

What can be gained from traceability within the organisation?
For example, what management benefits will it provide?
Will well-organised traceability help me complete my tasks more effectively?

These are important questions and the answers must clearly show the benefits for everyone at their own level.

4. **Putting together a real project**

Development of the traceability system must be **set up as a company project** with: a steering committee, a team, a working methodology, a schedule, a budget and validation of, and reporting on, each step.

It is important to follow the steps below when setting up the project to successfully implement a useful and effective traceability system:

- Define and plan the project. Keep employees informed

- Set up a suitable steering committee

- Define the parameters of traceability (context, existing elements, objectives) and the tools to be used

- Test on a process on site or on a «pilot» case and improve the system if need be

- Train employees on new requirements and obligations

- Extend the system to the entire organisation while communicating internally and externally about the traceability system

- Assess the robustness of the system: internal audits (based on previously defined indicators), test product withdraw/recall systems (simulate a crisis) and verify operator qualifications

- Periodically review the system (analyse changes in client, regulatory, process and product requirements).

Implementing a traceability system requires an action plan coordinated by a steering committee.

Once the system is set up, an **"administrator" must be designated**. They will be responsible for managing traceability in the company and will work with a set of indicators to evaluate the results, benefits, malfunctions and effectiveness of the system.
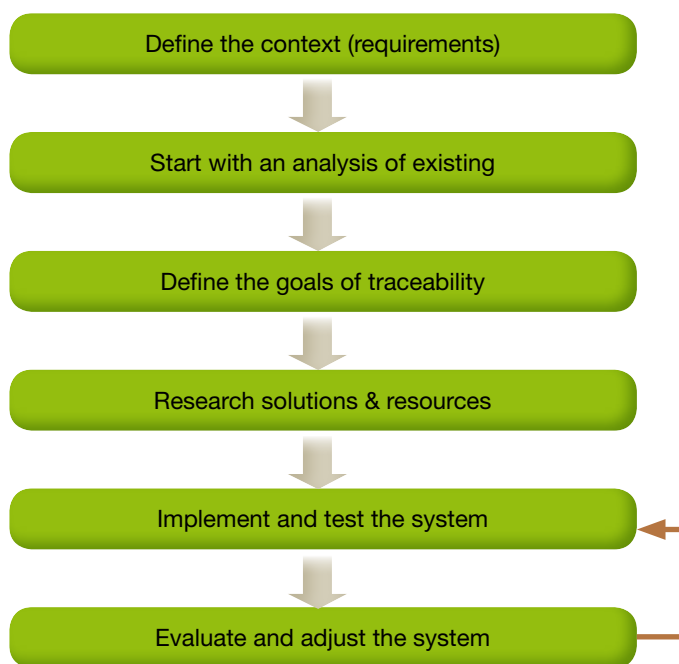
2. Creating an action plan

2.1. How to create an action plan

Implementing an organised traceability system in a company requires the creation of a coherent "Action Plan". It should include:

- A description of the project and an analysis of existing elements
- The definition of goals and a schedule of the steps to be completed (timing chart of tasks to be completed)
- The implementation of tools and a test phase of the system («pilot project»)
- An employee training programme and an information programme (that includes customers)
- A follow-up programme/evaluation of the system that makes any required adjustments.

Traceability: Start with existing elements and develop an action plan

```
Define the context (requirements)
            ↓
Start with an analysis of existing
            ↓
Define the goals of traceability
            ↓
Research solutions & resources
            ↓
Implement and test the system
            ↓
Evaluate and adjust the system
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This implementation scheme is the most logical approach to setting up an **effective and relevant traceability system** (meeting identified external and internal needs).
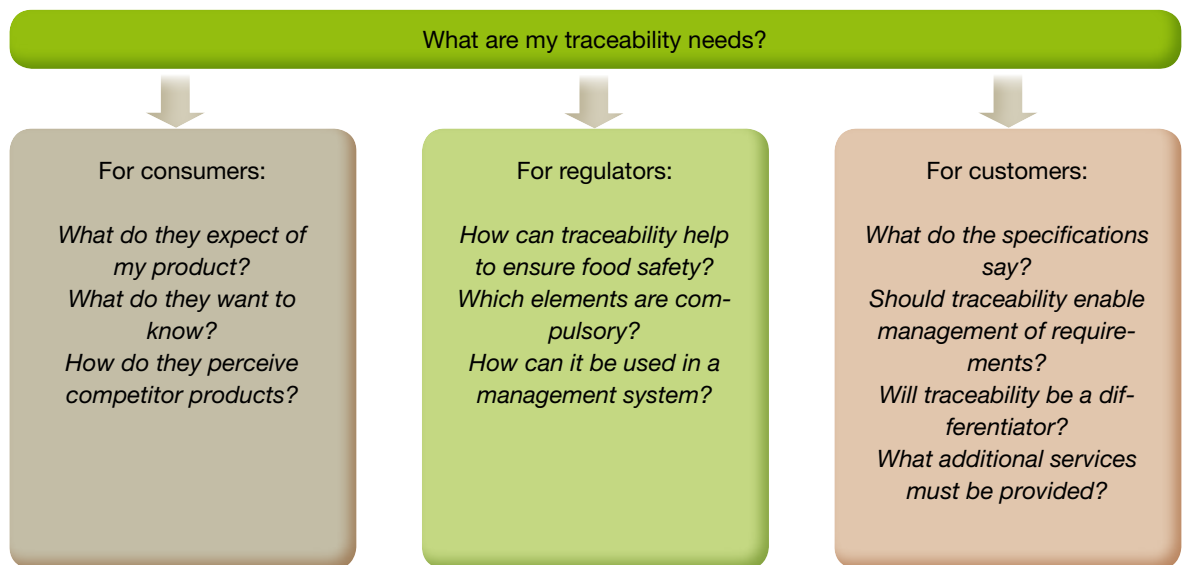
2.2. Important steps for consideration

A series of steps is required to effectively implement a traceability system:

Step No. 1 - Define the project

Implementation will be difficult if objectives and expectations are not defined, or change constantly. The following must be defined to enable study of what is expected from the traceability system:

- **The "entities" to be tracked:** To trace effectively, **products** must first be clearly **defined** (type, composition, properties, commercial specifications, regulatory specifications, etc.). It is much easier to trace a defined product than a product that is either not defined or ill-defined. Likewise, tracing a product with few components is easier than tracing a product with many ingredients. This is the case for many of ready-to-eat food products (e.g. frozen meals, complete meals, etc.).[3]

- **The issues that must be addressed or dealt with:** and the information to be provided. If the purpose of traceability is **product health safety**, **risks must be correctly evaluated ahead of time**: they must be known and measured and solutions must be found to reduce them. Implementation of traceability will be difficult if there are many risk factors and/or they are difficult to control.

Traceability: Define the context

What are my traceability needs?		
For consumers: *What do they expect of my product?* *What do they want to know?* *How do they perceive competitor products?*	**For regulators:** *How can traceability help to ensure food safety?* *Which elements are compulsory?* *How can it be used in a management system?*	**For customers:** *What do the specifications say?* *Should traceability enable management of requirements?* *Will traceability be a differentiator?* *What additional services must be provided?*

- **The boundaries of traceability** (where it starts, what it covers and where it ends). That is: questions about what really needs to be done in practical terms must be answered:

  - Track and/or trace?

  - Which entity and why?

  - What level of detail is required?

  - To take what decisions?

  - To answer which questions (e.g.: audit, inspection) or handle which situations (e.g. crises)?

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3 Note that it is also easier to implement traceability on lots and product units than on "continuous" products, especially if continuity leads to chaining of batches that will be mixed in the end-product (pallets consisting of products from several sources, products stored in silos, fruit jams, etc.)

- **Required information** Generally speaking, it's better to have too much information that not enough. But it's also better to have some reliable information rather than too much unusable information. The ideal is to have a lot of useful information... It's always too late to find the missing information after the fact. Creating a list of required information is a **key step** that will condition the rest of the implementation. Note that it's impossible to *trace* using a system set up solely for *tracking*.

Step No. 2 – Project coordination

A steering committee must set up to coordinate actions. It must be a reflection of the entire company and not of a particular sector (e.g.: suppliers, processors, commercial packaging, distribution). It must bring together all of the potential **users** of the traceability system (e.g.: commercial services) and all **producers** of traceability elements (e.g.: all operators in the field, control laboratory analysts). It shouldn't only involve people who handle systems (whether computerised or not). It should be headed by a "Project Leader" who knows the subject and the company well!

All actions must be planned and coordinated by the **steering committee** The traceability system will have to become part of a managerial, business, regulatory, technical, IT, cultural and human environment. An overall understanding of all contextual elements, including the workings of the **food safety management system (FSMS),** is required to build an effective system based on objectives useful for the company and accepted by those involved on a daily basis.

Step No. 3 – Define the elements of the traceability system

The following is required, at a minimum, to build a traceability system suited to the objectives defined in the company project:

- Describe the product life cycle (process details)
- Describe information flows and the documentary base of the traceability system
- Define the human, technical, IT and financial resources needed

➤ **Describe the product life cycle and the ascending and descending traceability schemes**
Traceability presupposes the existence of a circuit followed by the entity: this is the product's "life cycle". The goal is to recover all of the information and data required for traceability management throughout the entire life cycle. Traceability therefore requires full knowledge of the **logical sequence** of operations.

The more complex the circuit, the more variations or degrees of variation it will have, the more unstable and changing it will be and the more difficult establishing traceability will be because the links to be built will themselves be multiple, changing and complex. A continuous flow is also difficult to track: only its beginning and end are known! Steps, sequences and markers must be defined to structure traceability.

Therefore, the following must be done:

- Create a **life cycle for products**, link by link, and describe the existing links between each step and everyone involved in the chain
- Define the **markers** of the life cycle within which traceability will be implemented: from where until where; what level of precision is required; what are the key steps, etc.?
- Develop **ascending and descending traceability schemes.**

Analyse the product life cycle: create a diagram of operations[4] based on a logical sequence.

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4 Identify essential operations moving from raw materials to finished products.
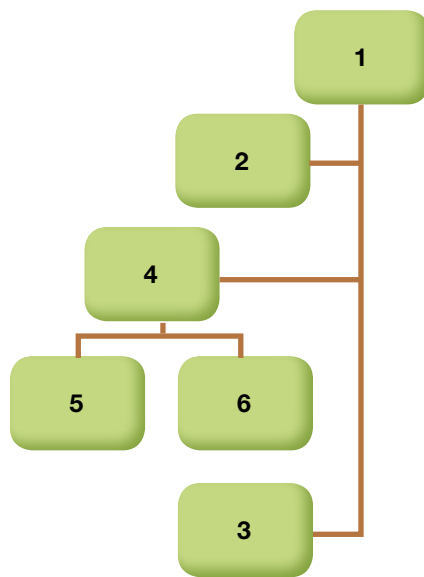
Analysis of physical flows and processes

Analyse the **flow of items** to identify their key points:

- Operations carried out
- All changes of state or packaging
- Transport, movements, warehousing or removal from inventory
- Assemblies (components brought in at a certain point of the process) and mixes

It is important to identify how continuity of information will be guaranteed throughout the process steps.

The data recorded, the basis of the company's traceability system, **will not be the result of chance.** A good understanding of flows and processes (of the operations carried out) will enable identification of which data should be captured and where and how it should be recorded.

Establish **"traceability procedures"** for the company's employees. This will ensure that the data considered to be indispensable will be recorded at the right place, at the right time and in the right format and that they will be kept and communicated under the required conditions.

➤ **Establish information flows and the documentary base for the traceability system**

Traceability is a matter of information. Its implementation is tied to the company's information flows and to the systems implemented. It feeds off of them and feeds them. Knowing these flows and systems will ensure that they are used as effectively as possible.

System documentation and the resources to be used are part of the documentary basis of the food safety management system:

- Starting with the life cycle, **inventory all data** and information to be recorded, step-by-step
- Create a list of the different **records used** as traceability media (**analysis of existing elements**!) and their normal retention periods (the life expectancy of products and regulations must be taken into account to determine the retention period)
- Write out the **procedures** to define the steps to be taken for each link. The procedures implemented must provide control over the traceability continuum at the critical points identified
- If computer program development is required, write out the **functional specifications** and infer the **appropriate tools and management resources** required. Tools already in place aren't usually suitable for traceability. Adjustments will be necessary and their complexity will reflect that of the information system.

➤ **Define the human, technical, IT and financial resources required**

For each step and for each recording media, it will be necessary to define the **responsibilities of each person** doing the recording, the frequency of data collection and the processing required for the data.

The tools and data management resources must ensure:

- Identification of the object traced. **"Lots" must be defined** to accomplish this and it must be determined whether or not their definition complies with customer, regulatory and company requirements

- Information collection, transport and reproduction

- Guaranteed **data integrity**

- That **information and product become inseparable** (**labelling** that guarantees a **consistent link between information and the product traced**).

In order to select data tools and transmission methods, it is necessary to **first** evaluate the data collection and transmission systems that already exist in the company: can they simply be adapted?

The implementation of a traceability system is not limited to selecting markers, identifiers and authenticators. Although these choices are important for the project, it is imperative to have a global, organisational and technical approach.

Step No. 4 - Training

The company must implement a training program.

It must be suitable and designed to inform all operators in the chain about the approach and to train them to use the tools.

Step No. 5 - Internal and external communication

This is proposed by the steering committee to company management and is intended to explain and promote the approach implemented internally and to the company's customers.

Feedback must be provided (impact measurement) to improve system effectiveness.

Step No. 6 - System assessment

Assessing the system will enable verification of its relevance compared to the goals set beforehand. The traceability system must be assessed periodically during internal audits of the food safety management system.

The data input to this review can be:

- Results (tests, audits, etc.)
- Modifications to the process
- Changes in regulations
- Corrective actions
- New expectations in the chain.

3. Developing traceability procedures

3.1. Sample approach

To develop traceability procedures: understand the context, carry out needs analysis as explained above and create a list of instructions to be followed based on the operations diagram.

We will use the concrete example below to facilitate understanding of the procedures used to illustrate the approach.

Description of the company environment:

The family company GIANT GREEN grows vegetables and fruits that it sells to supermarkets throughout the country. Part of its production is also sold to small local processors for canning. After attending a trade fair, Mensah Kyra, the owner of GIANT GREEN, understood the benefits of exporting certain products to Europe. However, he also understood that his future customers would ask for a great deal of information on his production and packaging practices. He therefore decided to implement a traceability system in his company right away. He felt that implementing traceability would also help with inventory control, to improve his practices and to increase his profit margins.

Crops are planted to meet expected market needs, but during the season, GIANT GREEN also buys products from small producers nearby. GIANT GREEN buys its seed and seedlings from a few local suppliers. Mensah or his assistant spray pesticides and fertiliser themselves. They hire labour for some fieldwork and for packaging. GIANT GREEN also sometimes takes care of packaging for several other producers.

Harvested products are brought directly from the fields to the station and placed in one of the chillers. In general, pickers put the products in plastic containers and transport them to the station in GIANT GREEN trailers. The produce brought in from the fields or taken from the chiller is emptied into a wash basin at the start of the packing line. Each product is then sorted according to its appearance, calibre and colour then packaged in printed boxes. Packaged products are placed on a pallet and, if not shipped immediately, returned to the chiller until shipping time.

While preparing to implement his traceability system, Mensah Kyra realised that he had to be able to track all of inputs, in the field, and from harvest through shipping, including products packed for other growers. This means that he has to collect data on the fields, varieties, quantities, harvest dates, packaging and shipping. What's more, he has to keep logs of all fertiliser and pesticide spraying. He needs to know what information has to recorded when inputs are received, what information has to be archived and what information has to be shared with his customers when products are shipped. Since GIANT GREEN produces several types of vegetables and fruits that require fairly different processing and handling, Mensah Kyra realised that he would have to create different recording systems for each operation when harvesting, storage and data sharing processes are very different.

3.2. Step 1 - Creating an operations diagram

The first step consists in creating a **diagram** to show the logical sequence of the company's operations.

It will provide a clear guide to sources of information useful to traceability for all operations carried out during the production and packaging process.

- **Identify the main activities** carried out by the company.
  There are several activities taking place in a food factory (reception of inputs, processing, packaging, warehousing and shipping)

- **Create a list** of all of the company's different activities and put them in a *flow chart*. For example, for this case study:

1 Reception and warehousing	2 Processing	3 Packing	4 Interim storage	5 Shipping

➤ **Number every activity to help you identify them and to be able to refer to them in traceability protocols.**
  Every activity can also produce and use several types of inputs and outputs. There can, therefore, be several ways to collect different types of data. It may be necessary to identify and separate these different types of activities in order to create clear protocols.
  For example, the reception of inputs includes all of the products, consumable items and materials required to carry out the company's activities.
  Although these inputs are all received within the framework of the same activity, different employees may manage each input and the data may be collected and stored differently.
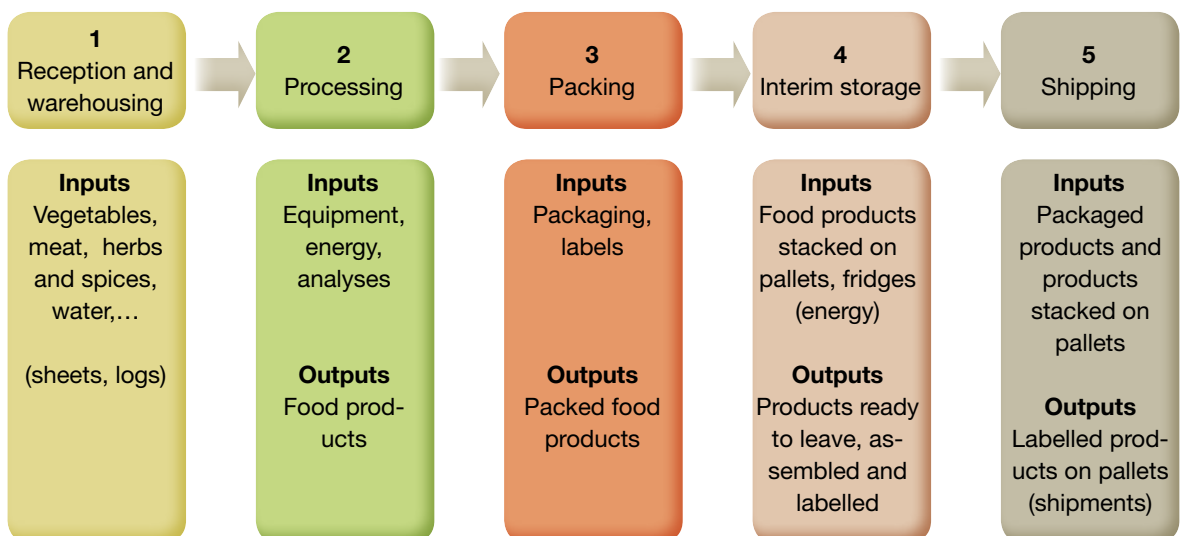 *The decision about whether or not to create different procedures for each type of activity must be decided by management.*

- **List all inputs and outputs used for each activity**
  Inputs are all products, consumable items and equipment needed to carry out activities within the framework of each operation.
  Outputs are the works in progress, finished products and sub-products of each operation.
  Generally speaking, the outputs of one activity are the inputs of another one.

1 Reception and warehousing	2 Processing	3 Packing	4 Interim storage	5 Shipping
Inputs Vegetables, meat, herbs and spices, water,… (sheets, logs)	**Inputs** Equipment, energy, analyses **Outputs** Food products	**Inputs** Packaging, labels **Outputs** Packed food products	**Inputs** Food products stacked on pallets, fridges (energy) **Outputs** Products ready to leave, assembled and labelled	**Inputs** Packaged products and products stacked on pallets **Outputs** Labelled products on pallets (shipments)

3.3. Step 2 – Write-up the instructions to be followed as procedures

At each step of the process, a **series of "procedures"** (instructions to be followed) will explain to company employees how to capture and document traceability information.

These procedures can change and will need to be updated as the company changes...like all other company procedures.

For each activity in the operations diagram:

- Identify the type of activity by name (and number);
- Briefly describe the activity carried out;
- **Identify the person responsible for the activity, the data to be captured and the traceability data documentation to be kept;**
- **Explain how to capture traceability data;**
- **Indicate where the data must be saved**.

This approach will help you ensure that you are collecting, saving and sharing all of the traceability data needed in your company. It's often helpful to include samples of forms to be filled out and documents to be collected (invoices, product use logs, production sheets, receiving and shipping logs, etc.)

Use these procedures to train employees and to explain to them their role and responsibilities in the traceability system.

3.4. Sample data recording procedures

➤ **Example 1: "Harvesting, Transport and Warehousing" procedure**

Activity: Harvesting, transporting and warehousing products

Description: Harvest products, transport them to the station and warehouse them.

Persons in charge: Production Manager, Transporter and Station Manager

1. Before harvesting, pick up clean containers in the clean container warehousing area (see the **Buildings Diagram**), load them onto a trailer and take them to the right fields (Transporter).

2. While harvesting, manually fill out the **product harvest form** (form "X"), with the product harvested, the variety, the harvest date, the amount harvested, the field or block, the name of the person responsible and the amount harvested (Production Manager).

3. Form «X» is kept in the office of the Production Manager. When form «X» has been filled out, sign and date the bottom of the form and file it (also kept in the office of the Production Manager).

4. Transport the harvested product to the harvested products cooler (Transporter).

5. At the station, write down the field number and the harvest date on stickers and place on each container. This will be the batch number of the harvested produce. The field number and harvest date should be written as: *xx-mm-dd* (field number-month-day) (Station Manager).

Keep the field data through to the station!

➤ **Example 2: Processing and packaging**

Activity: Process the basic ingredients into finished, packaged food products and store the products temporarily

Description: Use the processing tools to produce food products.

Persons in charge: Head of production, processors, line supervisor, laboratory analyst, quality engineer.

1. Before processing, check for the availability of ingredients making up the finished product, the availability of packages and the sampling plan for the quality and safety analysis.

2. During processing, the line inspector fills in the **product processing form** by hand, indicating the product processed, the weights, samplings, analyses conducted on the line (pH, temperature, etc.) and the processing date and quantity.

3. The form is kept in the office of the head of production. When the form «X» is filled in, sign and date it at the bottom and file it in a folder (also kept in the office of the head of production).

4. Move the processed product to the cold room set aside for processed products.

5. When the product arrives in the cold room, write the batch number and processing date on a sticker and attach it to the batch. This becomes the batch number for the processed product.
   Keep the field data until consumption!

➤ **Example 3: "Warehousing and Shipping" procedure**

Activity: Product warehousing and shipping

Description: Load the product onto the lorry and ship

Persons in charge: Station Manager

1. Fill out the **pick-up list** for each order.

2. Find the produce corresponding to the order in the chiller. Make sure the packaging identifier and label are on each crate. Take the packaged produce out of the cooler and to the loading dock.

3. A lorry is assigned when the produce is ready for shipping. Inspect the lorry to ensure that it is clean.

4. Load the product onto the lorry.

5. Check the contents of the lorry by comparing it with the order sheet.

6. Write out the shipment information on a new form: product, packaging, quantity, destination, lorry number, shipping date and packaging identifier. Fill out a Transport sheet. Give the Transport sheet to the lorry driver.

Data collected	What should be recorded?
Input lot number	Packaging identification
Product identification	Product code
Product description	Product description
Shipping date	Order preparation and ship date
Identification of origin	Company name and address
Shipment identification	Customer order number
Shipper identification	Company name and address
Identification of destination	Customer name and address (destination)
Receiver identification	Customer number
Quantity	Number of pallets shipped
Units (box)	Number

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SAFE FOOD IN ACP
A PROGRAMME FUNDED BY THE EU

Handbook Topics