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## Traceability of food products in Morocco

M.Sobh<sup>1\*</sup>, H.Elgharbaoui<sup>1</sup>, A.Fadli<sup>2</sup>, R.Bengueddour<sup>3</sup>, A.Hammoumi<sup>4</sup>, H.Oudda<sup>5</sup>, M.Ouhssine<sup>1</sup>

<sup>1</sup>Laboratory of Biotechnology, Environment and Quality, Faculty of Science, IbnTofailUniversity, BP 133, 14000 Kenitra (MOROCCO)

<sup>2</sup>Laboratory of Botany, Biotechnology and Plant Protection, Faculty of Science, IbnTofailUniversity, BP 133 14000Kenitra (MOROCCO)

<sup>3</sup>Laboratory of health and nutrition, Faculty of Science, IbnTofailUniversity, BP 133 14000Kenitra (MOROCCO)

<sup>4</sup>Laboratory of microbiology, pharmacology, biotechnology and environmental Ainchok Faculty of Science, University Hassan II. BP: 5366 Maarif. Casablanca (MOROCCO)

<sup>5</sup>Laboratory Processes of Separation, Department of Chemistry, Faculty of Science, IbnTofail University, BP 133, 14000Kenitra, (MOROCCO)

E-mail: sobh72@yahoo.fr

### ABSTRACT

Traceability is a tool for production management and planning of the food chain that adapts to the rules of the market.

In this work we have shown how traceability has supported a system that can respond quickly to any health crisis throughout the food chain, we have been able to analyze the requirements of the implementation of traceability within eight business sectors with Moroccan vegetables and fruits, all showing the importance of this strategic approach for any business. E1 and E2 two companies have shown very satisfactory results 100% and 99% compliance in the system documentation at all stages of manufacturing. It has been shown the need for such an approach has to meet the requirements in terms of quality of products proposed, following generally the food crises in recent years. © 2014 Trade Science Inc. -

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### KEYWORDS

Food;  
Health crises;  
Consumer;  
Traceability;  
Food safety.

### INTRODUCTION

The various health crises experienced by repeated the world over the last few years (mad cow disease, foot and mouth disease, avian influenza) gave creating new demands of the consumer, including requirements: traceability allowing support a system that can respond quickly to any health crisis throughout the food chain and which supports food security, it is also a tool for production management and planning of the food chain,

which s adapts to the rules of the market.

therefore, the objective of this work is to analyze the requirements for the implementation of traceability within eight companies surveyed, while noting the importance of this strategic approach for any business, particularly those working in the 'food.

Traceability is defined by the ISO 8402 1994 standard as "the ability to trace the history, application or location of an entity by means of recorded identifications"<sup>[10]</sup> where "entity" includes different concepts and

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can be an activity, a process, a raw material, a machine or product.

The latest version of<sup>[9]</sup> ISO 9000:2000 traceability defined as: “The ability to trace the history, implementation or location of what is considered”<sup>[15]</sup>. It is noted that some particular aspects related to the period and the means to implement are not clearly specified.

Traceability thus defined has two complementary aspects: “tracking” which consists of a geographical monitoring and real-time product and “tracing” or archiving of information on the characteristics of the product in question.

Two main types are associated with a process of total traceability namely:

The ascending and descending on the one hand and the upstream, downstream and other internal traceability traceability.

It is rooted in the food sector with the objective of securing health<sup>[11,14]</sup>. And is applicable to various stages of manufacture from receipt of raw material till the delivery of finished product<sup>[2]</sup>.

Traceability is also a selling point for a provider that has a reliable system, and who wants to stand out from its competitors<sup>[3]</sup>. This is a concept that can be applied to all sectors: chemical, pharmaceutical, automotive, research and control laboratories and of course in the food industry

The various crises have accessed “imposed” product identification. Is to ensure “transparency”: it is simply to clarify and record the maximum information from different stages course the product, and the role of each stakeholder in the supply chain. It is therefore necessary to know who did what, when, where, and how it is:

- The supplier of the raw material.
- The origin of its components.
- The places where the product and its components were stored.
- The different stages of manufacture.
- Equipment used in the manufacturing or handling.
- The batch numbers.

It generates loyalty and trust consumers<sup>[6]</sup>.

Countries, especially those that have trade relations with the countries of the European Union, have established standards for traceability to align with international standards in this area. Morocco, for example,

developed the standard Moroccan<sup>[12]</sup> NM 08.0.012 which is a document defining the objectives of traceability, which can be summarized in two distinct points:

Knowing the most complete history of a product as possible.

Permit the withdrawal and / or recall of products in the event of crisis.

These two points meet several other objectives such as transparency of information passing through the pipeline, determining responsibilities, corrective process level during product manufacturing activities... etc..

The standard similarly addresses the limitations that each company must set taking into account technical and economic factors.

Currently, traceability remains unenforceable by some Moroccan companies. To meet the requirements of internal and external markets do not cease to increase,

A study in this sector has enabled us to raise an overview of the issue of traceability.

## MATERIALS AND METHODS

In fact, our study was prepared eight questionnaires must be filled entirely by eight companies in the food sector.

Of the companies surveyed, there are two companies (E1 and E2) that have the global BRC certificate, three companies (E3, E4 and E5) have a system of traceability and non-certified, and three companies (E6, E7 and E8) are certificate or have a quality system or a documentary system. All these companies are home to a varied range of food, they have a network of dealers and resellers in all the Moroccan territory ensuring the supply of the local market and some participate in the external market foods.

The questionnaire is based on the GMP-Moroccan (Good Management Practices)<sup>[7]</sup> of compound feed manufacturers, it is a precise specifications built on ISO 9000 structure it also contains certain requirements<sup>[13]</sup>.

Comprising the steps of:

- Reception of raw material
- Weighing
- Wash
- Shelling
- Soaking in acidic solution

- Wash
- Rinse
- Drying
- Triage
- Cooling
- urchel Cup
- Dynamic Freezing
- Triage final
- Screening
- Weighing
- Weighing and packaging
- Metal Detector
- Palletizing and labeling
- Storage negative chamber
- Shipping

There are questions to make sure if there's presence of specific materials for each of the following steps:

### Reception

This is the step that allows the control and product discharge.

A delivery showing the product, the plot area, the quantity, the driver and the truck number.

A receipt showing the same information as the delivery

A sheet showing the processing of the product approved chemical used for the treatment of food, the dose used and the date of harvest and plot.

Sheets showing the results of physico-chemical and microbiological analyzes to the food, soil and irrigation water.

A checklist upon receipt showing as much information as: the date of receipt, lot number, product weight, the organoleptic, a sense of the scale of product according to customer requirements, product and regulatory, visa and the operator responsible.

Samples for microbiological and physicochemical analyzes Sampling plan.

### Weighing

This is the step to weigh the product after acceptance.

The weighed product keeps the same batch number, identical to other devices if they are in crates or on pallets filed.

A form for weighing.

A calibration certificate is valid for the instrument or equipment weighing 17,025 issued by a certified lab.

### Wash

This is the step that minimizes dirt if they exist.

A form control for the concentration of chlorine for washing and with the same lot number for the product in question.

A calibration certificate valid instrument for measuring the rate of the chlorine and chlorine metering pump.

A data sheet for tray washing.

Sheets showing the results of physico-chemical and microbiological analyzes to the wash water.

### Shelling

This is a step that eliminates the leaves that coat the fruit.

A medical record for personnel directly handling the product in question.

A control sheet of the product bearing the date, batch number,

Organoleptic and other criteria, name and signature of the agent control operation

A sheet showing the good hygiene practices and good manufacturing practice vis-à-vis staff.

A sheet showing the mastery of utensils used for shelling.

A data sheet or food contact for rolling strip that carries the product husked.

### Soaking in acid solution

This is a step of immersing the fruit in an acid solution.

Data sheet or food grade acids and the tray used for soaking the product.

Data showing the results of physico-chemical and microbiological analyzes to the soaking water.

Data control showing the date, batch number, acid and dose used, the soaking time, the organoleptic and other criteria, the name and signature of the agent control of the operation.

### Wash

This is the step that minimizes dirt if they exist.

Record of the transaction, including the date, time, product, lot number, details of the critical operations of

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the transaction (the concentration of chlorine intended for washing), the name and signature of the officer responsible for the operation.

Valid certificate for the measuring rate for the chlorine and chlorine metering pump.

Datasheet for tank washing.

Sheets showing the results of physico-chemical and microbiological analyzes to the wash water.

### Rinsing and drying

This is a step to remove traces of chemicals and drying the product.

Record of the transaction, including the date, time, product, lot number, details of the critical operations of the transaction, the name and signature of the officer in charge of the operation.

A calibration certificate valid instrument for measuring the rate of chlorine for rinsing.

Sheets showing the results of physico-chemical and microbiological analyzes to the rinse water.

Record of the transaction, including the date, time, product, lot number, details of the critical operations of the transaction, the name and signature of the officer in charge of the operation.

### Triage

This is the step that allows the elimination of non-conforming products.

Data sheet or for food contact utensils, equipment or system that come into contact with the product.

Medical record for staff.

Record of the transaction, including the date, the time, the same batch number, the organoleptic and other criteria, the name and signature of the officer in charge of the operation.

### Cooling

This is a step that can bring the product to a positive chamber so that it keeps a temperature between 2 and 7 ° C.

Calibration sheet for cold room equipment such as motor, sensor, the alarm system.

Data sheet or food grade products for cleaning the room.

Data control of cleaning and disinfecting the room indicating the date, time, dose products used, method

validation, name and signature of the responsible operator.

Presence of a cleanup plan.

### Cup urchel

This is the stage at which the cutting is done by the product urchel machine.

Data sheet or food grade for the machine.

Calibration certificate.

Control sheet good hygiene practices

Control sheet good manufacturing practices.

### Dynamic freezing

Step to lower the product temperature to -18 ° C in the negative chamber.

Calibration record for the negative chamber, and the alarm system.

Data sheet or food grade products for cleaning the room.

Data control of cleaning and disinfecting the room indicating the date, time, dose products used, method validation, name and signature of the responsible operator.

Presence of a cleanup plan,

### Final sorting

This is the step that allows the elimination of non-conforming products.

Data sheet or for food contact utensils, equipment or system that come into contact with the product.

Medical record for staff.

Control plug good hygiene practice

Control good manufacturing practice sheet.

Record of the transaction, including the date, the time, the same batch number, the organoleptic and other criteria, the name and signature of the officer in charge of the operation.

### Sieving

This is an operation that is to pass through sieves for separating particles in different sizes.

Data Sheet for food contact or sifter.

File for medical staff

Control plug good hygiene practice

Control good manufacturing practice sheet.

Record of the transaction, including the date, the time, the same batch number, the organoleptic and other

criteria, the name and signature of the officer in charge of the operation.

**Weighing and packaging**

- Operation is to weigh the product to ensure weight.
- Calibration certificate for the balance
- Data sheet or the balance for food contact.
- Control sheet good manufacturing practice.
- Control sheet good hygiene practice

Record of the transaction, including the date, time, product, lot number, details of critical operations, the name and signature of the officer responsible for the operation

**Metal detector**

Step eliminates the solid metal detector machine foreign body.

- Calibration certificate for the machine.
- Control sheet good manufacturing practice.
- Data monitoring good hygiene practice.

Record of the transaction, including the date, time, product, lot number, details of critical operations (test standards), the name and signature of the officer in charge of the operation.

**Palletizing and labeling**

This is the step to set labels on the product packaging and place the product on a pallet.

Record of the transaction, including the date, time, product, lot number, details of critical operations (list of ingredients), the name and signature of the officer in charge of the operation.

Treatment Certificate wooden pallets or food grade though they are plastic.

Food grade packaging that come into contact with food certificate.

**Negative storage room**

Step of storing the product at -18°C in the negative chamber.

Calibration record for the negative chamber, and the alarm system.

Data sheet or food grade products for cleaning and disinfection of the room.

Data control of cleaning and disinfecting the room indicating the date, time, dose products used, method validation, name and signature of the responsible op-

erator.

**Presence of a cleaning.**

Record of the transaction, including the date, time, product, lot number, details of critical operations (compliance FIFO: first in first out, temperature, time), the name and signature of the agent responsible for the operation.

**Expedition**

Step of outputting the product to the customer by means of a refrigerated truck by setting the temperature at -18 ° C.

Record of the transaction, including the date, time, product, lot number, details of critical operations (compliance FIFO, the temperature of the negative chamber and truck, pallet number, destination, the client, the number of the truck and its hygienic status, names of operators responsible for loading), the name and signature of the officer in charge of the operation.

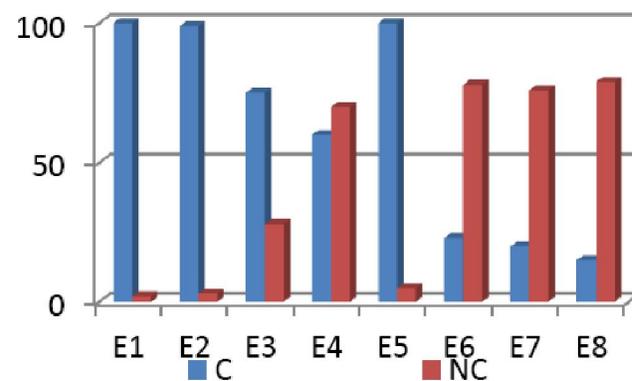
Certificate of release of the product given by EACCE: autonomous institution of control and coordination of exports.

**RESULTS**

Our results are presented in graph form, and we will discuss and interpret given collected from steps that appear most critical along the production line.

**Reception**

To assess the documentation system at the reception, you will interpret this graph.



**Graph 1 : Percentage of compliance and non-compliance to the documentary reception system at the eight companies**

Companies E1 and E2 that are already certified and having a management system for the safety of food-

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stuffs, show a high percentage of compliance and, reaching respectively (100% and 99%), and vice versa for non-compliance, there is a almost low percentage declines respectively to (2% and 3%). proof that there's this one that a full traceability system which takes into account the 5M (material, method, environment, labor and the material).

For E3, E4 and E5 with traceability and companies are not certified by a management system for the safety of foodstuffs, are experiencing a high rate of compliance that reaches respectively (75% and 60%), but not not coincide with that of E1 and E2,

Condos now E5 which has a very high percentage of compliance (100%) and is almost equal to that of E1 and E2 and with a percentage of non-compliance very low (= 5%), this is due to the requirements of clients who require a product without pesticide, and in this case, the company begins to install measures to meet these stringent controlled customer keeping safe records as well:

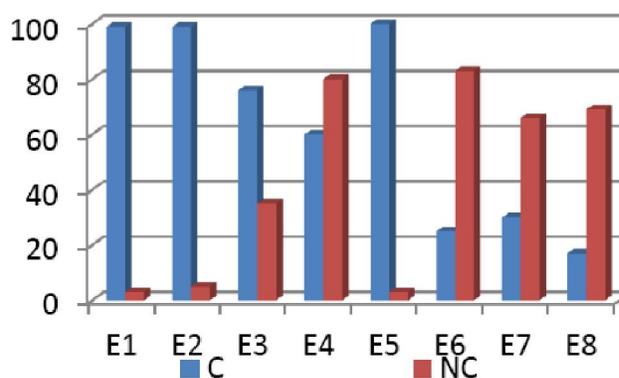
- At the level of supplier
  - The realization of customer audits to verify compliance of the chemicals used and the doses.
  - The certainly respect the DAR (date of harvest) definitely.
  - Checking the results of physicochemical and microbiological analyzes on irrigation water, soil and the product.
  - Certainly the training for operators.
- At the enterprise level
  - Ask for and keep records of treatment of the product.
  - Ask for and keep the delivery
  - Development of a checklist of product receipt.
  - Taking a sample for microbiological and physicochemical analyzes.

For E6, E7 and E8 companies not having a traceability system have a low rate of compliance and a high rate of non-compliance, and this will of course due to the lack of a safety management system for food food that will install and manage the traceability system considered among these requirements effectively by assessments and daily updates.

### Wash

The evaluation of the documentation system at the

wash, requires the interpretation of the graph.



**Graph 2 : Percentage of compliance and non-compliance to the documentary washing system at the eight companies**

For now E1 and E2, in the same way they attentent a high percentage of compliance (99%), and a percentage of non-compliance which declines very low respectively to (3% and 5%), it is of course due to the commitment of the leadership that encourage the implementation of the management system for the safety of food products, which manages an effective and rigorous traceability system.

For E3 and E4 companies know a percentage of average compliance that reaches 76% and 60% for E3 E4, and a percentage of non-compliance which reached a low 35% to 80% for E3 and E4, it is of course due to the existence of an effective traceability system not because it is not managed by a management system for the safety of food products.

By cons, for the enterprise E5, we note that the rate of compliance is high and reaches 100%, a very low rate of non-compliance which declines to 3%, this is due to clients who require and demand have a clean well washed product.

And it is in this sense that the company installs, documents and records a traceability system with measurements of mastery are:

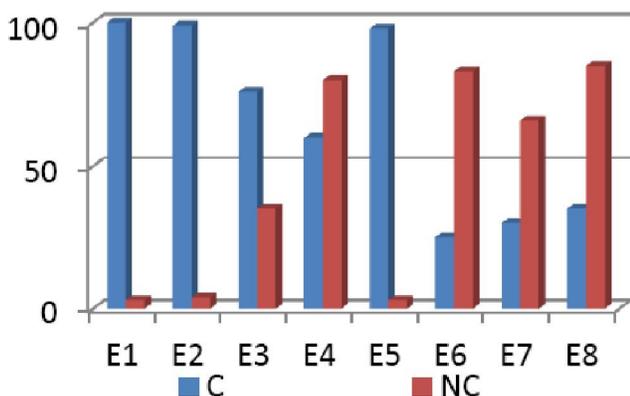
- Implementation of physicochemical and microbiological analyzes for water.
- Certificate valid calibration of the metering pump chlorine.
- Data Control monitors the rate of chlorine in the wash.
- Datasheet chlorine.

For E6, E7 and E8 companies show a low rate of compliance that reaches respectively (25%, 30% and

17%) and a high rate of non-compliance happens respectively (83%, 66% and 69%) This is due to the lack of a management system for the safety of food products that accurately manages all systems with the objective of security and safety of the finished product and are closely related to the document management system.

**Rinse**

To assess the documentation system at the rinsing, will interpret this graph



**Graph 3 : Percentage of compliance and non-compliance to the documentary flushing system at the eight companies**

We particularize the rate of compliance for the E1 and E2 companies are still high (100% and 99%) and vice versa for the rate of non-compliance are still low (3% and 2%). This latter course is due to the good functioning of the safety management of food, which rigorously manages the retrieval system.

For companies E3 and E4 with a solitary retrieval system not managed by a management system for the safety of foodstuffs, are still experiencing problems with non-conformities that delay production and come up 35% E3 and 80 % for E4, with a rate of compliance by arriving at 76% and 60% for E3 to E4, this is of course due to the lack of a system that will manage the documentation.

The E5 company, knows a high level of compliance that reaches 98%, and vice versa for the rate of non-compliance, it is so small and reaches 3%.

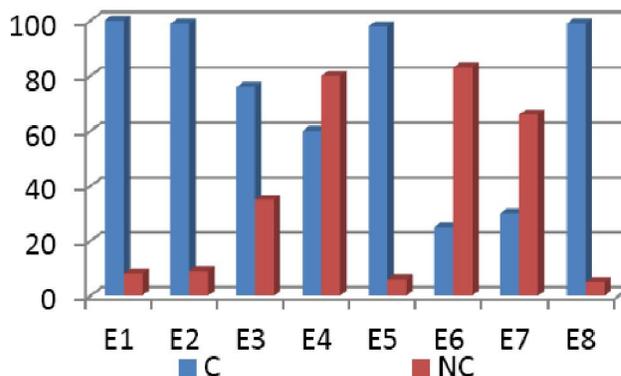
This is always due to the demands of their customers who like to have a product thoroughly rinsed, and to do this so, she must master this process by implementing measures mastery and record keeping and documentation as:

- Implementation of physicochemical and microbiological analyzes for water.
- Certificate valid calibration of the metering pump chlorine.
- Data Control monitors the rate of chlorine in the wash.
- Datasheet chlorine.

For now E6, E7 and E8, not having a retrieval system, are still experiencing problems with non-compliance amounting to respective rates (83%, 66% and 85%),

**Metal detector**

To assess the documentation system at the metal detector, you will interpret these graphs



**Graph 4 : Percentage of compliance and non-compliance to the documentation system of the metal detector at the eight companies**

In this step we raise the compliance rate remains high (100% and 99%) and vice versa for non-compliance still arrive at low (8% and 9%), similarly, it is caused by the right managing their documentation system that DEPOND management system safety of foodstuffs already installed in the track.

Similarly for businesses E3 and E4 are still experiencing problems with the rate of non-conformities that remain high at 35% to 80% for E3 and E4, and vice versa for the rate of compliance that never reaches that of E1 and E2.

E5 for business, with a single retrieval system, continues to meet the requirements of their clients, among which is the mastering stage metal detector, and for all get rid of this problem, it installed measures mastery of keeping the documentation system as well:

- Certificate valid calibration machine metal detector.

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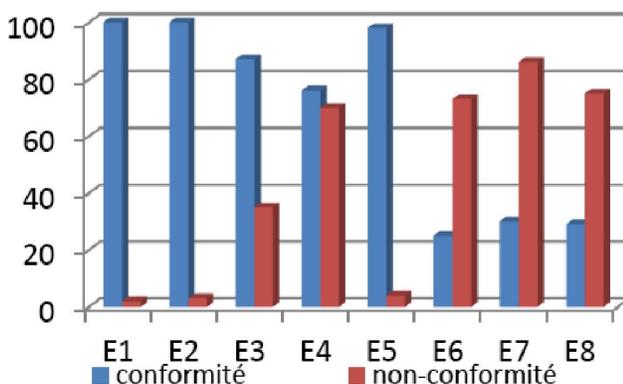
- Data tracking control of the machine by means of specific verification standards.
- Checking samples of the product at the output of the machine.

For E6 and E7 companies are still experiencing problems that are particularized by high rates of non-compliance (83% and 66%) and low rates of compliance (25% and 30%), this is of course due to the absence of a management system for the safety of food products.

For now E8 shows a high rate of compliance (99%) and a low rate of non-compliance (5%), this is due to the requirements of their customers requesting a finished product without physical hazards.

### Negative storage room

The evaluation of the documentation system at the negative storage room requires an interpretation of this graph



**Graph 5 : The percentage of compliance and non-compliance to the documentary of the negative chamber at eight companies system**

We notice the same thing in the other steps, E1 and E2 for companies already having a management system for the safety of food products operating efficiently and manages the documentary a rigorous system to avoid any problem. And this is the reason why so, there is still a high rate for the compliance and low for non-compliance.

For companies E3 and E4, with a single retrieval system, showing the average rate for compliance, and higher rates for non-compliance, it is of course due to the lack of a management system for the safety of food products which will manage the documentation system.

The company E5, knows a low rate of non-compliance (3%) and high (98%) still on compliance re-

quirements continue their customers who demand a healthy and safe finished product, one that reflects the implementation of measures adequate mastery.

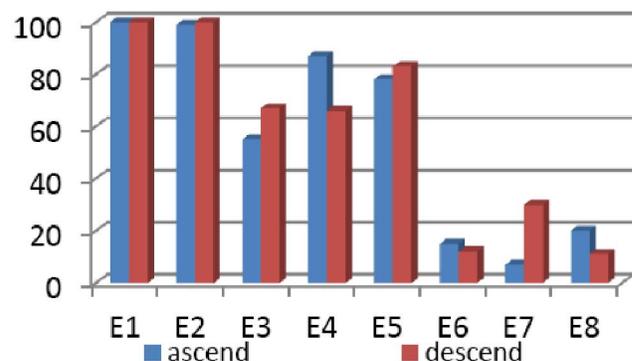
At this stage and keep the documentation system such as:

- Certificate valid calibration of the negative chamber and these accessories.
- Control of monitoring product storage in the room sheet (specifying the time, temperature, the batch number, the number of palette, respect for the FIFO rule, the name and signature of the officer responsible for the activity,...).
- Data recording the alarm in case of power failure system.
- Record control of the generator.

For companies E6, E7 and E8, show the highest rate seen in non-compliance, and low level of compliance, this is due to the absence of a management system of food safety food that will manage the traceability system.

### Traceability test

To assess the documentation system at the test traceability, we will interpret these graphs



**Graph 6 : Percentage of successful test tracking and tracing at the eight companies**

The success rate of the test traceability for E1 and E2 companies is at its peak on the rising test, it reaches 100% to 99% for E1 and E2 on the test down, it gets to 100% for E1 and E2 This is of course always due to the commitment of management that provides the human, technical and financial management system for the safety of food products that requires the company to install a system of effective communication<sup>[1,4]</sup> and to the evaluation of ascending or descending traceability tests for each product. And maintain traceability are

generally in two forms, media and computer paper<sup>[15]</sup> as a form to be completed by the operator and carrying a maximum of information, previously drafted and approved by the various department heads for a long time (at least during the lifetime of the product).

This allows the company to act more quickly in case of detection of non-compliance. Indeed, depending on the precision of the localization of products, processes recall or withdrawal can vary considerably. Thus, if the destinations productions are known and recorded accurately, it can save time for the company. And like that the company can: Reduce food risks<sup>[8]</sup> related to a failed system traceability; Enhance the sense of openness and closeness that feels the consumer; Identify potential areas of contamination.

Better inventory management<sup>[16]</sup> by accounting for inputs and outputs of raw materials and output of finished products;

Better quality management system for recording checks throughout the production, and the rapid identification of effective corrective actions;

Better management of production through the exploitation of data traceability.

The success rate of the test tracking and tracing for E3, E4 and E5 is inefficient enterprises, so he knows the problems are probably due to the lack of a management system for the safety of foodstuffs, which manages the communication system and traceability.

The success rate of the test tracking and tracing for E6, E7 and E8 companies is too low because there's no system of safety management of food products which can result in:

- A weakness in the communication system.
- Lack of organization.

## DISCUSS

Both companies E1 and E2 are certified and apply the documentary system in a rigorous manner that facilitates there, good organization of work, a reduction in the number of non-conformities, to react quickly to a food safety problem or contamination show no problems in testing ascending or descending traceability.

Companies E3, E4 and E5 have a documentation system is not reliable because they are not yet certified, which sometimes shows the presence of non-compli-

ance with high rates sometimes exceed 50% as the case for E5, and problems in testing tracking for the three companies.

For E6, E7 and E8 companies that are not certified and not having a retrieval system still show high rates at all stages of production and problems in testing Traceability either upward or downward.

## CONCLUSION

Food traceability has very important issues for any organization or for any nation. The study here from channels "fruits" and Moroccan "vegetables" still shows gaps in its implementation. However, despite the difficulties and obstacles attached to traceability, each firm, each supply chain must provide the human, technical and financial success of its implementation.

It seems ultimately that traceability should be considered as a real strategic approach pointing to increased productivity and competitiveness of any business and this, ensuring real-time monitoring and continuous products, thanks particularly to a set of technology. It has been noted as well, the need for such an approach to meet the requirements in terms of quality of products, generally following food crises in recent years. In fact, traceability can be seen as an additional tool for safety and quality of food products such as methods of risk analysis HACCP types.

However, it should be noted that traceability alone does not guarantee food safety.

But it is a business asset for a provider that has a reliable system, and who wants to stand out from its competitors.

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