

Supply Chain of Agribusiness Products and Traceability Problem: Case of Moroccan Cooperatives

Elouazza Fatima¹, Souaqi Hayat²

Abstract

Objective: The purpose of this research is to understand how the obligation of traceability has influenced the performance of agribusiness supply chains of Moroccan cooperatives.

Theoretical framework: This research work allows to describe the general context of adoption of traceability in the supply chains of Moroccan agribusiness cooperatives after donation obligation by the public authorities.

Method: In this research, and in accordance with our methodological choice, we are first conducting an exploratory study of the literature review on traceability to identify the general context and clarify the research environment. Secondly, we will conduct a field study using the case study method. The latter is to be carried out using semi-directional individual interviews and observation as the main data collection techniques.

Results and conclusion: The findings suggest that traceability remains a value-creating force and a factor of differentiation and reliability for agribusiness cooperatives especially in the face of health, legal and economic challenges imposed by the global ecosystem. It must be seen as a rigid managerial approach which must not be reduced to a simple rudimentary system and which must mobilize the smartest technologies and international scientific advances to optimize the exploitation of this tool.

Implications of the research: This study highlights the importance and influence of the establishment of a traceability system on the good governance of all the supply chain links of Moroccan agribusiness cooperatives, particularly in an international context concerned with health security issues

Originality/value: The results of our research confirmed that the traceability system can be considered as a very powerful managerial innovation likely to create a real revolution in the sphere of Moroccan agribusiness cooperatives. This requires more efforts to generalize its location at the level of all Moroccan agribusiness entities.

Keywords: *Traceability; supply chains; agribusiness cooperatives; performance; traceability system; food safety.*

1. INTRODUCTION

With the health crises that have shaken the world, especially Europe and the United States of America, food safety has become a global demand. Currently, there is a concern on the part of consumers with aspects from the origin of the food consumed to the generation of tools that aim to ensure that these products are reliable and meet quality standards for purchases (ZHANG; MANKAD; ARIYAWARDANA, 2020),

¹ Faculty of Law, Economics and Social Sciences (Ain Chock), University Hassan II of Casablanca (Morocco). Mail: fatima.elouazzani1@gmail.com

² Faculty of Law, Economics and Social Sciences (Ain Sbaa), University Hassan II of Casablanca (Morocco). Mail: Hayat.saou@gmail.com

evidencing the need to improve communication between the different actors involved (BENITEZ et al., 2020; ROSSINI et al., 2021)³. In this context, traceability has emerged as a miracle solution for monitoring and controlling food flows. Also, it has become an essential tool of law at the global level after the implementation in 2005 of the European regulation CE N°178/2002 of 28 January 2002 on food safety. In this sense, traceability is a growing concern for consumers, producers and businesses, and has become a key element in the supply chain to ensure the quality, safety and sustainability of products.

In Morocco, it is currently a major issue for the agribusiness sector, with a strong demand for quality and safe food products. The country has strict regulations in place to ensure the transparency and reliability of the supply chain, while strengthening the quality management and traceability capacities of the sector's stakeholders. Moroccan agribusiness cooperatives, as an active player in the sector, are therefore directly affected by this problem, which constitutes a major challenge in terms of the quality of their products and compliance with international standards. However, they encounter several difficulties in setting up and managing a traceability system. Corroborating this reality, means asking a central question:

How does the traceability approach influence the performance of Moroccan agribusiness cooperatives?

2. THEORETICAL FRAMEWORK

According to quality standards, traceability is defined by ISO 8402 (published in 1987) as “the ability to retrieve the history, location or use of an item or activity, or similar activities, by means of a registered identification” (VIRUÉGA, 2005). In 2000, ISO 9000 (which replaced ISO 8402) summarized this definition as « the ability to track the history, implementation or location of what is being examined».

The standards have been precursors in the definition of traceability, but traceability has only become mandatory after its requirement by statutory instruments, and especially after the entry into force on 1 January 2005 of European Regulation EC 178/2002, which was a response of European law to food crises.

This regulation, also known as the “Food Law”, is considered a reference text and a cornerstone of international legislation in terms of traceability. It states «that traceability is the ability to trace, through all stages of production, processing and distribution, the path of a food, feed, an animal producing food or a substance intended to be incorporated or likely to be incorporated into a food or feed». (European Parliament and Council of the European Union, 2002).

In order to comply with international standards and regulations, Moroccan law, in turn, adopts traceability in its regulatory system, and it has provided a definition of this in Article n°12 of LAW n°28-07⁴, on the health safety of food products, based on the European Reference Regulation EC 178/2005: «traceability is the ability to trace through the food chain, the path of a primary product, a food product, an animal feed, an animal producing primary products or food products, or that of a substance intended to be incorporated or likely to be incorporated into a primary product, food product or feed». (Kingdom of Morocco, 2010).

³ (Nyland, Badejo, & Corrêa, 2023)

⁴ The law n°28.07 on food safety food products promulgated by dahir n°1-10-08 of 26 Safar 1431 (11 February 2010) and published in B.O. no. 5822 of 18 March 2010, page 214 « has enabled Morocco to have a legal basis based on international principles and concepts enabling the control services to carry out the tasks entrusted to them in accordance with international recommendations and standards. This Act is a working tool that introduces the general principles and requirements for ensuring the safety of food products and the obligation to inform the consumer through clear and complete labelling ». This framework law establishes the basic principles and concepts of food safety and imposes on all stakeholders in the food chain full compliance with the standards ensuring food safety, from the range to the range ».

Many other definitions are given by specialists and writers and others are present in statutory instruments of other countries, but for our research we refrain from these definitions which summarize the others, since global benchmarks have been cited. Our conclusion is that there is no unanimity on the definition of traceability.

2.1 The implementation of traceability in the agribusiness Supply Chain

Traceability in place in agribusiness Supply Chain is about recording the history of a product in detail from its manufacture to its distribution in a careful system called a "traceability system". According to Lecomte, et al., (2006), the establishment of such a system is in a way to build a search engine that will work on the basis of predetermined criteria, in a previously defined field of investigation.

For agribusiness, the traceability system must ensure knowledge of the suppliers of ingredients, of the batches of ingredients present in each batch of finished products, the transformations and the locations that impact the batches of ingredients and the batches of finished products. Depending on the size and resources of the company, depending on the nature of the products and their degree of development, depending on the size of the batches and safety issues, there are different types of traceability systems, the most rudimentary (paper and pencil) the most advanced system based on an ad-hoc computerized system (Vergote, et al., 2009).

Thus, in small structures, paper documents may be sufficient for product traceability. They can be attached to the products, in the form of labels or packaging, or physically accompany the product (a delivery note, an invoice, etc.). However, by moving towards the gigantic structure of the supply chain, paper devices are no longer enough. As a result, there is the use of the Global System of Standards 1 (GS1)⁵ identification and automatic coding standards, specifically the Radio Frequency Identification (RFID)⁶ bar codes and labels, which are of great importance in the supply chain management and IT traceability literature.

It is important to know that the implementation of a traceability approach within a company must be considered as a major new project that requires a skillful implementation methodology. By consulting the literature review on this issue, we found that there is no exact and standardized methodology or methodology specific to a given sector, because it is still a business-dependent choice and is not standardized by a regulation or standard. According to VIRUÉGA (2005), the existing methods are strongly inspired by quality management and ISO type approaches.

For agribusiness, most of the academic and professional work that we have consulted⁷, address a methodology almost the same if it is not a small differentiation concerning the classification or the gathering of its stages which are as follows:

- ⇒ Define the context;
- ⇒ Determine the objectives ;
- ⇒ Identify the existing;
- ⇒ Search for solutions ;
- ⇒ Seek the means;
- ⇒ Implement the solutions selected;
- ⇒ Evaluate the system.

Ultimately, we can say that the process of implementing such a system is not easy enough. It is, by the way, a real challenge for all types of companies whose challenges and constraints that must be faced to give birth to this system are certainly multiple.

⁵ GS1 comes from the «Global System of Standards 1», is a global non-governmental and non-profit organization, specialized in the international codification of products (we will detail its definition in the second section).

⁶ RFID (Radio Frequency Identification) is a technology that allows the automatic identification of products.

⁷ ACTIA and ACTA. 2007. Traceability. 2nd edition, Traceability, practical guide for agriculture and the food industry. ACTA-ACTIA, 2007.

2.2 Issues in implementing traceability

The performance of a traceability system in an agribusiness supply chain depends closely on a set of issues, namely:

a) Quality and health security issues

Ensuring that consumers have safe, healthy and high-quality food is a major and crucial issue for a FCS traceability system. Such a system is thus regarded as a quality management tool which must have the following qualities in order to satisfy this challenge:

⇒ The ability to control the origin, authenticity and integrity⁸ of products by allowing maximum detection of situations of food counterfeiting and fraud⁹;

⇒ The ability to provide maximum guarantee and assurance to consumers, by giving credibility to the claims¹⁰ provided by the company (origin of products, ethics, list of ingredients, GMOs, environmental footprint...);

⇒ The speed with which safety issues and quality gaps can be traced back to facilitate targeted removals and recalls of hazardous products in the event of non-compliance.

⇒ Meeting safety requirements in the context of system and product certifications (quality labels, etc.);

b) Legal issue

Having integrated traceability into the regulatory and legal texts that govern food safety at the global level, the actors of the SCA find themselves in the obligation to set up a reliable and global traceability system that traces all the links, with an obligation of results. This means that, regardless of the means used to implement a traceability system within FCC member companies, the legal challenge of this system will be to prove the results, by showing that each actor literally complies with the regulations in force to avoid criminal convictions. The system should thus make it possible to trace all the flows and processes to provide answers on the sharing of responsibility in the event of a proven problem and help the authorities to fight against fraud and parallel channels for “identify the problem and reduce its impact” (Wanscoor, 2008)

c) Logistical challenge

The logistical challenge of a traceability system for each production entity is to optimize the monitoring and control of flows, based essentially on the degree of perishable food that differs from one product to another. This involves controlling the continuity of the traceability chain or the overall traceability of the life cycle of a given PAA throughout its SC. This requires the achievement of a number of crucial objectives, such as better inventory management, a perfect identification of products located in the company’s warehouse, and an accurate location of products stored using RFID, optimization of replenishment processes, etc...

d) Economic challenge

The economic challenge of a traceability system is to minimize the costs of the business. According to KARAA (2010), traceability ensures that orders are monitored on an ongoing basis, allowing the company to control costs related to inventory management and just-in-time supply. Thus, there are several critical costs that the traceability system

⁸ “Condition of a food product when the expected characteristics, including health safety, quality and nutritional characteristics, are genuine, unaltered or altered.” Ditto.

⁹ “Any deliberate action by any company or individual to mislead others about the integrity of a food for the purpose of obtaining an unjustified advantage. The types of food fraud include adulteration, substitution, dilution, tampering, simulation, counterfeiting and falsification.” Ditto.

¹⁰ The claim is synonymous with the company’s statement of the qualities of the proposed product or service, and more broadly the benefits and benefits that it is intended to provide. It appears on the product packaging. For example, a nutrition claim claims or suggests that a food has specific beneficial nutritional properties.” For example, it says “low fat”, “source of omega-3 fatty acids” or “high in fibre”, etc. <https://www.e-marketing.fr>

must reduce as much as possible (costs related to potential incidents; costs related to recall or withdrawal alerts, repair or destruction, assets, penalties imposed by partners, potential lawsuits, etc.).

e) Marketing challenge

The guarantee of origin, quality and composition of PAA are increasingly demanded by the consumer to ensure their safety. In practice, the intermediary of trust between the consumer and the company is nothing other than the information label affixed to the product as proof of traceability. With the help of the data marked on this label, “consumers can choose their basket of goods as best they can, taking into account their own education, preferences and budgetary constraints” (Lazzeri, 2014). For this reason, the traceability system must prove the credibility and transparency of the company’s product claims regarding product origin, ethics, GMOs, nutritional value, allergens, etc.

2.3 Constraints related to agribusiness traceability

Despite its advantages and effectiveness in the management of agribusiness supply chain (ASC), a traceability system (TS) faces a number of constraints and obstacles related mainly to the specific characteristics of the supply chain (SC) structure and the influence of its external environment (pressure from organizations and public authorities, the demands of associations interested in food security, consumer expectations, climate change, fluctuations in fuel prices, etc.). The main constraints for a production entity operating in an ASC are either technical or economic.

In fact, to set up a ST there are a lot of computer and technological means available to the actors. This may seem beneficial to ensure the implementation of a TS among all players despite their size, performance, capacity, etc. In reality, this causes a serious problem of compatibility and interoperability (Azevedo and Carvalho, 2011), due to the use of several computer systems that differ from one actor to another

From an economic point of view, traceability has a difficult cost to evaluate, since it includes various heterogeneous loads corresponding to the equipment, the operation, the personnel, the certification, etc... These charges must cover the costs of setting up a TS, as well as the costs of the permanent evolution of technological innovations in this field. These include costs related to the purchase of equipment, costs arising from changes in the operation of the company following the adoption of new hardware or software, personnel training costs, cost of certification, etc.

3. METHODOLOGY

Following the creation of the National Food Safety Board (ONSSA) in 2009 and the entry into force of Law No. 28-07 in 2011, traceability became mandatory for all actors operating in the agribusiness sector. Cooperatives as a major player in the Moroccan economic fabric are led to take these regulatory requirements into account to address food and product safety concerns, to ensure public health and to develop the capacity of their production units to adapt to international standards and market requirements. Thus, agribusiness cooperatives seeking to enter the formal market in order to benefit from the many advantages offered by local foods such as the freshness of products, support for the local economy, traceability and origin of food (Pandey, Rajeswari, & R.Magesh, 2023) and also to be able to distribute products on the national and/ or international territory are required to obtain the health authorization of the ONSA, which leads to the implementation of a traceability approach from product design to consumption. To this end, all cooperatives which do not follow the regulations in force at the level of its production, processing, packaging, storage and labelling links of any type of food product, are not in compliance with the provisions of law no. 28-07, relating to health security.

As mentioned above, traceability allows the improvement of the performance of the agribusiness entity through better visibility on information flows, optimization of technical and logistical operations, and help in making managerial decisions, the challenges of establishing a traceability approach within the cooperative are varied and multifaceted.

From a legal and criminal point of view, the responsibility of the cooperative is engaged through its products just like any other production unit. The deficiency and consequences of the products will be at his expense, in addition to the legal warranty (Wanscoor; 2008). According to the latter, the costs of destruction, assets, penalties, possible lawsuits and insurance costs are then influenced by the lack of control over traceability. This leads to the misallocation of risks and unclear legal responsibilities between the actors in the supply chain of the product marketed.

From an economic point of view, low traceability increases management costs and risks at all levels. In fact, Fabbe-Costes and Lemaire (2010) found that a traceability system, in particular the computerized one, strongly contributes to the optimization of the company's activity in terms of productivity and cost control.

From a managerial and marketing point of view, Wanscoor (2008) explains that the implementation of a traceability system increases the possibility of tracking or tracing items and thus the competitiveness of the cooperative to the market. It improves and facilitates communication between the links of the supply chain, promotes the reputation of the cooperative and the brand image of the product regarding the commitments made by the cooperative on the products. This secures the customer and promotes the good positioning of the entity and its products in terms of ethics, certification (organic, origin, etc.)

Some recent studies on cooperatives from Bouhazzama and Mssasi (2021), Souaqui and Bennani (2020) show that the marketing difficulties of cooperative products are recurring both nationally and internationally. According to a study carried out by Ailli (2017) in the Fez-Meknes region, cooperatives do not control and practice little relevant and effective marketing canvassing, which in our opinion leads to inconsistency in the marketing plan or even in product policies, inadequate pricing, distribution and communication. And that is how the whole purpose of the cooperative will be threatened. But generally the problems identified are global, and related to the organizational, managerial and financial aspect according to Souaqui and Bennani (2020), Costa, Amorim Junior, & Silva (2015).

In this context, the traceability approach offers an undeniable competitive advantage and thus constitutes a crucial sales and communication argument, essentially thanks to the relationship of trust that it facilitates to build with the customer who becomes from day to day informed and sensitized regarding the quality of the products, their origins and especially their containers and conditions of packaging and transport. In other words, the traceability system is a means of advancing competition by achieving "differentiation based on quality, safety, reliability and information" as described in Fabbe-Costes & Lemaire (2001p.28).

In order to adapt to the changing national and international economic and social environment and to be able to compete, several cooperatives have developed their managerial and organizational structures in order to achieve a minimum necessary for the implementation of a traceability approach helping to improve their quality approach.

3.1 Research Methodology

The subject of traceability is a little studied phenomenon which is necessarily exploratory (Groulx, 1998)¹¹, especially in the context of cooperatives. To study this theme, we

¹¹ William A. Ninas, W-A., (2002). PhD thesis: types and processes of empowerment in community economic development initiatives in Quebec, school of social service, faculty of social sciences university Laval, Quebec January 2002. P 103.

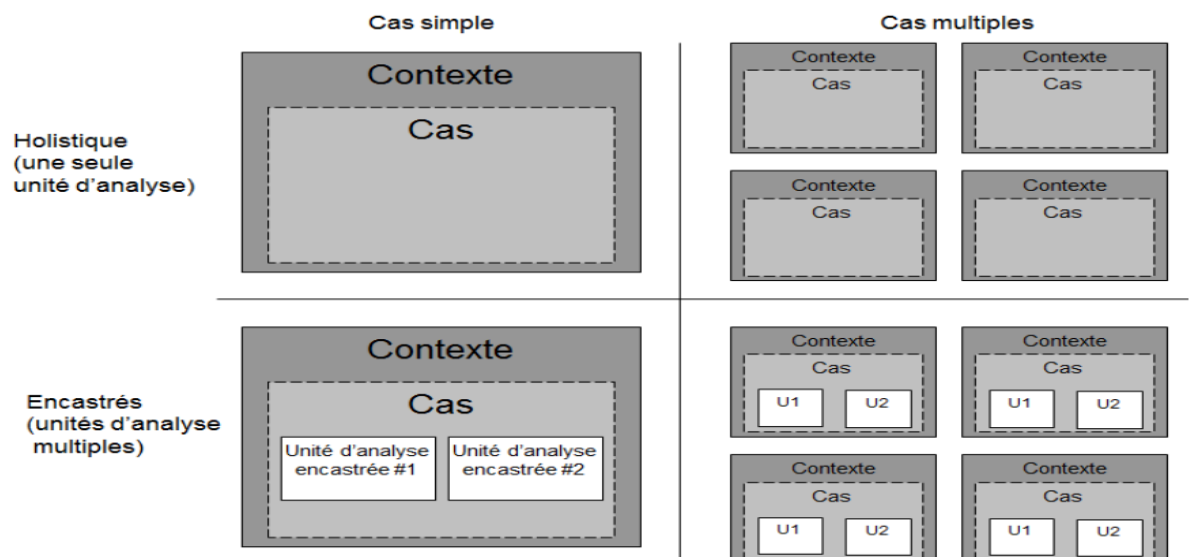
choose a qualitative methodology that is used to explore and understand the meaning attributed by individuals or groups to a human or social problem. It focuses on the researcher’s ability to analyze data and variability in the contexts studied (Depover, 2009)¹².

The choice of data collection and analysis tools and their proper application are crucial for all research. These techniques and tools enhance the work by obtaining the majority of the necessary data; not applying them correctly risks destroying all the research. They are numerous and vary depending on the approach taken and the level of data collection (primary or secondary). For the qualitative approach, interview, observation, case study, action research, content analysis and speech analysis are essentially the most common instruments (Thietart, R-A., et al. 2014)¹³. However, maintenance is the most widely used technique in exploratory studies because of the simplicity of its implementation. He has been the target of several writings and has developed in various disciplinary fields (Becker, 1954, 1956; Whyte, 1953, 1957, 1960; Guillemette, 2008). It is considered to be a technique for collecting information (Boutin, 2006; Mucchielli, 2009) that follows an exchange between an investigator and an interviewee (Boutin, 2006; Poupart, 1997; Savoie-Zajc, 2009) in order to share expert knowledge and understanding a phenomenon (Savoie-Zajc, 2009). These writings highlight a variety of types of interviews including mainly non-directive, semi-directional, understanding, explanatory, group and individual. Optimal size is achieved when saturation is reached and a new interview does not provide new information (Gavard-Perret, Gotteland, Haon, & Jolibert, 2008).

In this research, and in accordance with our methodological choice, we are first conducting an exploratory study of the literature review on traceability to identify the general context and clarify the research environment. Secondly, we will conduct a field study using the case study method. The latter is to be carried out using semi-directional individual interviews and observation as the main data collection techniques.

The methodology of the case study allows a deep analysis of a limited number of subjects which make part of a phenomenon in real situation (Yin, 2003; 2009) . Thus, a case study is used that includes several embedded units of analysis (P-J. Barlatier, 2018)

Figure 1. The different designs of case study research according to Yin (2009)



Source: Pierre-Jean Barlatier’s DBA research methods

¹² Quoted by Jaen-Jacques Quintin (Lecturer in Educational Sciences). Approaches and approaches to educational science research; course support; université lumières Lyon. (Quintin., 2009)

¹³ Thietart, R-A., et al, «method de recherche en management», collection management sup, 4th edition, publisher Dunod, year 2014

The objective of this study is the deep investigation of the research field. For this, we limit our discussions to those responsible for traceability in agribusiness cooperatives. This will allow us to interview experts with different profiles and study co-ops that meet the selection criteria. This approach allows us to better analyze our theme and will help possibly build « a repository of data », rich for any other deep future study.

3.2 Development of Research Assumptions

It is clear from our literature review that traceability is one of the means of improvement in agribusiness production entities, strengthening the trust between customers and the brand and possibly improving the reputation of the producer and its products. It can be a key success factor for any economic entity. Thus, focusing on traceability in an entity can positively impact its reputation and performance on several levels. Corroborating this reality on the ground, especially in the Supply Chain SC of Moroccan agribusiness cooperatives, means asking a central question:

How does the traceability approach influence the performance of Moroccan agribusiness cooperatives?

To answer this question, the following assumptions should be analyzed in the light of the literature review:

- S1. Traceability is an important means of improving the economic and marketing performance of the agribusiness cooperative.
- S2. Traceability is an important means of improving the logistics performance of the agribusiness cooperative.
- S3. Traceability is an important means of improving the legal performance of the agribusiness cooperative.

This is tantamount to approaching the field of research through an exploratory approach that we will briefly present in the next point.

3.3 Presentation of the research area

Our research focus has been on agribusiness co-operatives, given that cooperatives are rapidly growing socio-economic development actors in Morocco in recent years and that the agribusiness sector is most affected by the issue of traceability.

- Thus, the cooperatives studied are located in different sites and operate in different agribusiness branches. The criteria we have established to identify the sample are:
- Co-ops must have been in operation several years ago to be able to see the impacts of establishing the traceability approach on the overall performance of the co-op.
- Co-ops must be accessible.

Table 1: General Presentation of the Sample

Co-ops	Industry	Location	number of members	date of creation	Capital	Products
C1	Packaging and export of citrus fruit	Sebt El Guerdane Taroudante	500	1978	>100 MDHS	Citrus
C2	Extraction and marketing of argan oil	Essaouira	80	2005	3 000 000 DHS	Citrus fruit
C3	Conservation and marketing of plant products without heat treatment	CR Douirane, cercle Mejjat, Chichaoua	115 members			Pickled olives and vegetables

Source: built by the authors

Our sample includes three cooperatives:

a) The first is active in the packaging and packaging of citrus fruit for export, it is a large unit with more than 3000 hectares of citrus plantation area, with a refrigeration capacity of 6500T and an annual processing potential of 60.000 T. It is located in Taroudant, Souss-Massa region.

b) The second cooperative specializes in the manufacture and marketing of argan and Amlou oils. It is a cooperative of women in unfavorable socio-economic situation that produces argan oil according to the manual artisanal method, it is installed on an area of one hectare and located in Essaouira, region Marrakech-Safi.

c) The third cooperative operates in the conservation and marketing of olives of Moroccan origin and the preparation of marinated vegetables and lemon and is located in the center Douirane, Mejjat circle, Chichaoua, Marrakech-Safi region.

The first cooperative practices traceability since its creation in 1982. According to the manager questioned, at the beginning the objective was to know his income on the count, currently the practices of traceability have much evolved and allow to identify the destination of the production, the rate of deviation, the rate of export, the transformations of production... etc. While the other two cooperatives started the traceability process as soon as it was required by ONSSA.

Table 2: Production description of the cases studied

	C1	C2	C3
Finished Product	Citrus and Packaged Primers	Argan Oil and Amlou (Spread)	Canned olives and vegetables.
Raw materials	<ul style="list-style-type: none"> - Citrus - Early vegetables and fruits 	<ul style="list-style-type: none"> - Affiache (argan fruit) - Almonds 	<ul style="list-style-type: none"> - Olive - Lemon - Water - Turnip - Carrot
Perishable products	Raised from finished products and raw material	<ul style="list-style-type: none"> - Low for argan oil (best use by 3 years) - Low for Affiache (5 years) - Average for fines and argan almonds (3 months) 	<ul style="list-style-type: none"> - Low for finished product - Raised for raw material
Origin of raw material	Local	Local and imported	Local
Sources of raw material supply	<ul style="list-style-type: none"> - Producers who are members of the cooperative: - large producers who operate on standard areas of more than 20 to 12 hectares 	<ul style="list-style-type: none"> - Affiache suppliers are women members of the cooperative or local residents - Resellers of imported fines 	local farmers

Source: built by the authors

The interviewees are traceability managers with several years of field experience (on average 13 years) that enabled them to enrich traceability practices in their organizations, despite their basic training in distant scientific specialties. Indeed, the traceability manager in C1 is an engineer in agronomy, the president "manager" of C2 is licensed in

economics, while the traceability manager in C3 has the baccalaureate level. They are people trained by the field and daily practice.

4. RESULTS AND DISCUSSION

As part of an overall interpretation of all the empirical data collected from the Moroccan cooperatives interviewed, we provide an overview of traceability experiences, which leads us to define this technique in the sense of the actors interviewed, learn about its implementation and its impacts on the control of SC in the cases studied. The intention is then to identify the differences between the theoretical notions set out in the literature review and those brought about by empirical reality. To conduct this study, we asked a central question that states:

How does the traceability approach influence the performance of Moroccan agri-food cooperatives?

The answer to this question leads us to analyze the following assumptions, based on the literature review:

- S1. Traceability is a topical concept defined differently from person to person.
- S2. Implementing traceability in an agribusiness cooperative is a complex need to understand.
- S3. Traceability is an important means of performance improvement for the SC of Moroccan agribusiness cooperatives CAM.

Our analysis of the results will thus be broken down into three parts corresponding to the suggested assumptions.

4.1 ASC Traceability, Concepts and Definitions

The literature review mobilized in this article, has highlighted a definitive pluralism of the term traceability. In our empirical work, we have confronted this theoretical vision with a simple question posed in the context of our semi-directional interviews and which says: "If I tell you traceability, what does it mean to you?"

Compared to the standard ISO 9000 definition that traceability is "the ability to track the history, implementation, or location of what is being reviewed," interviewee A.O. of cop C1 said: "Traceability refers to the set of documents related to the product allowing to find its history from downstream to upstream or the contrary during the stages of its packaging. When we talk about upstream to downstream, we mean the delivery slip, receipt slip, data related to producers, especially the treatment sheets... at the station... In short, it refers to the set of cards relating to the steps to which the product is subjected during the packaging chain. We can say that the traceability system links production and quality."

This definition summarizes the traceability in the documents and records necessary to find the history of the products without mentioning either their implementations or their locations, however it has lost an important index, that of the attachment of the traceability system, quality and production.

For A.E. from cooperative C 2: "Traceability is the ability to return from the finished product to the initial product (the raw material), it allows to track my product in all places and so i can easily detect products that do not comply in case of a problem".

We find that this definition mentioned the history and location of the products, not to mention their implementations. The specificity of this definition lies in the importance given to the meaning (path) of traceability by enhancing the upstream traceability

(bottom-up) which allows from a product, to find its history and its origin by going back to the raw materials.

And finally K.M from Cooperative C 3 explains:“Traceability consists in following the product from the harvest of the raw material to the sale on the solidarity market”.

This definition focuses on history and neglects product implementation and location. In addition, it has limited the chain of traceability from the harvest of raw material to sale on the solidarity market.

It appears from the speakers' speech that the definition of traceability is not unanimous and addresses points of importance that differ from one person to another depending on his field of activity. Thus, the analysis of the information collected has revealed several elements of definition such as documents, tracking sheets, the path or direction of traceability, its role, the boundaries or limits of tracking, etc. These reflections are not set out in the definition given in the literature review. We will conclude that this concept and course of evolution differs according to the practitioners.

Ultimately we can confirm the first assumption S1 that says: "Traceability is a concept of topical defines differently from one person to another".

4.2 Implementation and operation of a traceability system TS

a) What is a TS for executives interviewed

The responses of the executives interviewed do not clearly represent a TS. For example, for C1, a TS is "to find the history of a finished product or of any type of product". The concept remains ambiguous and requires clarification. Depending on the size and resources of the company, the nature of the products and their degree of development, the size of the batches and the safety issues, we encounter several types and structures of TS, even more rudimentary (paper and pencil) at the most advanced based on an ad-hoc computerized system (Vergote, et al., 2009). In this sense, we have devoted part of our maintenance guide to exploring the structure of the TS in te units studied. The results are presented briefly in the following table:

Table 3: Description and structure of TS of cases studied

	C1	C2	C3
The technological tools used	<ul style="list-style-type: none"> - Capacity probes and blood pressure monitors to track water consumption and calculate irrigation needs. - a Bee One¹⁴, it's a system, implemented by Argi Data - 5G¹⁵ Technology Geo Cookies 	<p>A rudimentary and manual traceability system for lack of mastery of technological means (PC and software).</p>	<ul style="list-style-type: none"> - computers to store information (Excel) - Smartphones to send delivery orders or purchase orders.
Documents and physical instruments used to illustrate product traceability	<p>Registers and control sheets filled in by a qualified technician at the level of all the stages of packaging of the products from the orchards to the export.</p> <p>Bar code</p>	<ul style="list-style-type: none"> - Records, sheets and paper documents for each month that detail each production step. - A product identification code, created manually, according to the guidelines and explanations in the ONSSA manual. 	<ul style="list-style-type: none"> - Paper records and documents (purchase orders, delivery orders, etc.) - the bar code

¹⁴ Bee One: It is a system of traceability and monitoring of treatments performed at the level of orchards and recordings of irrigation data, yields realized at the level of orchards, annual water consumption and other several parameters.

¹⁵ They are installed at the container level to follow the cold chain, humidity ... products during its journey to determine responsibility if there was a break in the cold chain.

The data and information that must accompany the product to ensure its traceability along its SC.	<ul style="list-style-type: none"> - the loaded pallet number, - lot number, - information from the producer, - the container lead number, - the tracking number 	<ul style="list-style-type: none"> - product of Moroccan origin, - the appointment of the product, - the quantity, - the address, - production and DLC dates, - co-op specific code 	<ul style="list-style-type: none"> - the product name, - the ingredients, - percentage of ingredients (salt and olive) - production date and DLC - the ONSSA approval number, - the address, - the e-mail address, - the logo, - the bar code, ...
Criteria for selecting TD tools	<ul style="list-style-type: none"> - customer requirements - The strategy of the exporting company which is another subsidiary of the cooperative. 	<ul style="list-style-type: none"> - the orientations of the ONSSA 	<ul style="list-style-type: none"> - the orientations of the ONSSA
Computer incompatibility issue	No problems of incompatibility with partners.	Lack of a computer system	Lack of a computer system

Source: built by the authors

It turns out that C2 and C3 cooperators do not have a good technological infrastructure that should have helped them implement a computerized TS. They generally rely on sufficient qualified paper documents to ensure the traceability of their products. However, by moving towards the gigantic structure of the C3, paper devices are no longer enough. There is as well as, the use of Bee One, a computerized traceability and tracking system that provides several functions.

On the other hand, we found that executives interviewed about the technological tools used are not familiar with certain tools such as RFID (Radio-Frequency Identification), EDI and ERP which are of great importance in the traceability and supply chain management literature. Based on this observation, we can say that technological means are not factors hindering the adoption of traceability in the SC of Moroccan agribusiness cooperatives. The C2 interviewee supported our suggestion by stating that: « For our cooperative there is not a large amount of production (between 50 and 60 pieces). For this, the traceability of our products is easy. We use a code that we created manually, according to the guidelines and explanations in the ONSSA manual to identify the products. This code may contain the origin of the raw material, date or other information. We rely on paper records and documents. Our traceability system is manual because we don't handle the PC and the software. But in the future, if we have large orders or a large amount of production, we will develop and computerize our TS».

Based on these results, we can say that confronting the contextual terrain of the cases studied allows us to approve the information set out in the literature review since the C1, TS with a large size and export-oriented production is more advanced than those of the others cooperatives which have a small size and production generally marketed on the internal market. In addition, it must be said that, despite the possibility of traceability without using technological means, the latter are considered as one of the driving factors

for the control and success of the traceability process as they facilitate and ensure the reliability of this monitoring process.

b) Motivations and challenges for implementing a TS in the cases studied

By exploring the reasons for implementing traceability, it is clear that the motivations of practitioners are multiple and different. However, the analysis of respondent's responses undermines the fact that the main reason is to ensure compliance with standards and regulations in this regard. This finding, joins the literature review (Wanscoor, 2008) which explained that compliance with the regulations is the first trigger of a traceability process. In fact, Moroccan agribusiness cooperatives (especially those exporting to foreign markets) are under great pressure from governments to generalize full traceability throughout their SC. In this sense, the implementation of a TS capable of approving the monitoring of all the links of their SC was their main priority to comply with the regulatory and normative requirements imposed:

« Before the regulatory requirement, we had no idea about the traceability process. Subsequently, ONSSA informed us and explained the advantages and objectives of its implementation. And since on our unit, we receive international visitors, it seems appropriate to us to adopt traceability, to avoid authenticity problems » (A.E.).

« After the international traceability obligation, the most important motivation was to meet the regulatory requirements because there are problems at the destination country level regarding the use of unauthorized active ingredients. This situation is putting pressure on the national authorities, who are forced to design new legislation to control the traceability of active ingredients » (K.M).

« We have adopted traceability to meet the regulatory requirements imposed by ONSSA in order to have the authorization to sell our products in retail stores, especially in the solidarity market » (A.O.).

In addition to regulation, other motivations and issues appear to be important factors in the implementation of a TS following the cases studied. It is essentially concerned with:

- Meet the requirements of the target markets;
- Compete;
- Address the concerns and specificities of foreign distributors;
- Legal protection;
- Selling point especially towards of foreign customers;
- Proof of product authenticity and protection against tampering.

After its insertion, the cooperatives studied expressed their satisfaction and esteem for this new tool because of the favorable changes observed in their structure. However, they said that a lot of difficulties influenced its implementation.

c) Difficulties in implementing a TD in the cases studied

The managers interviewed mentioned the existence of several difficulties when setting up a TS at the level of their cooperatives. They focused on the problem of training and the complexity of understanding the tracing process because of the relatively low intellectual level of the operators. This difficulty leads to a lack of skills among staff and consequently a lack of qualified people in this field. As such, the three cooperatives claim that self-training is provided for operators to adapt their level of knowledge to the principles of this new approach. The training strategy differs from co-op to co-op:

- For C1, its strategy is to conduct internal training provided by the quality manager and external by GIAC- AGRO¹⁶ and by invited university professors as part of the

¹⁶ Interprofessional Support Group for the agribusiness Sector Council.

organization of study days yet on the market news concerning the pesticides to use, the development of citrus fruits; more planning of annual refresher training for all the cooperative's services (financial, accounting, export and logistics, quality, etc.).

- For the 2nd and 3rd cases, the managers of the cooperatives benefit from technical training from ONSSA (traceability and quality techniques), DPA¹⁷ (sectoral training of production and storage best practices), and from ODCO¹⁸ (management techniques and good governance, marketing and communication) and in turn provide simplified training sessions in dialect or Berber to members.

A.E states in this context "I organize an evening to educate and inform women by adapting the training content to their level: I laugh with them and I try to simplify things as much as possible."

The information collected highlights the lack of information, the financial difficulties, the heavy investment and the difficulty of local development. The establishment of a TSS requires in fact the installation of new technologies, the costs of certification and standardization, training costs, etc. In fact, the implementation of this tool must be seen as a major investment that requires a considerable budget.

d) Impact of traceability on the performance of the SC of the cases studied.

In fact, according to the discourses of the interlocutors the TS fulfils other missions of great importance besides that of following the products, as noted in the table below:

Table 4: Missions of a ST other than product follow-up according to the cases studied

	C1	C2	C3
Tasks of a traceability system	<ul style="list-style-type: none"> - production management, - stock and supply management, - scheduling, - export planning, - calculation of performance indicators - dashboard design - Helps achieve objectives - Decision Support 	<ul style="list-style-type: none"> - Production and distribution management. - Supply and Sales Management - Accounting Management - flight control 	<ul style="list-style-type: none"> - Improving the organization across the co-op - Facilitates work - Help with the division of tasks.

Source: built by the authors

According to this table, interviewees placed great importance on the role played by the TS in the organizational and internal management aspects of their unit. They stated that this system uses cross-cutting functions that necessarily have very powerful and favorable impacts on the performance of all the links of their SC (managerial, economic, legal, logistics, competitive, etc.). The impacts cited are as follows:

- ✓ Better identification of the product and its origin without any difficulty.
- ✓ Plot batches remotely.
- ✓ Facilitate access to information by all employees.
- ✓ Control costs and especially production costs
- ✓ Assist with inventory, production and day-to-day management
- ✓ Manage management risks, particularly legal and logistical
- ✓ Better manage product prices, increase sales and improve final yield
- ✓ Save time and minimize wastage rate.
- ✓ Improve the reputation of the cooperative nationally and internationally.
- ✓ Gain customer confidence, satisfaction and loyalty

¹⁷ Provincial Directorate of Agriculture

¹⁸ Office for Cooperation Development.

- ✓ Facilitate financial management and properly estimate expenses
- ✓ Improve total quality.
- ✓ Improve the competitiveness of the cooperative.

Based on these results, we envisage that TS can be considered as a very powerful managerial innovation likely to create a real revolution in the sphere of Moroccan agribusiness cooperatives.

5. CONCLUSION

After exploring the subject of traceability in the Supply Chains of Moroccan agribusiness cooperatives, we will conclude that this tool constitutes, from now on, a main link and a major necessity for the existence, survival and success of any agro-entity. In the search for economic and marketing performance, and to reassure consumers who have become increasingly concerned about the quality and safety of their food, all Moroccan agribusiness cooperatives must build an agile traceability system capable of tracing their entire supply chains, especially that the local food systems cater to food traceability and high food safety.

Today, traceability systems have become more reliable, accurate and useful thanks to information and communication technologies, which ensure a good link between information flows and physical flows. However, in most Moroccan agribusiness cooperatives, the process of adopting traceability is still based on rudimentary means in the form of papers and seizure sheets. This is due to the costs involved in this action, which are not bearable by all cooperatives and then, are often large entities with a solid funding capacity that access them. Moreover, it remains somewhat complex and difficult to apprehend by several people. As a solution, we suggest that cooperatives compare the cost of traceability with the value of the product and that public authorities provide more state support by seeking to:

- Provide cost-effective technology or provide investment grants to help these cooperatives introduce information and communication technologies into their TS.
- Create branches of traceability training in schools and universities in collaboration with the cooperative fabric in the agribusiness sector to better target needs, detect gaps and improve skills in this field.
- Work on the specificities of Moroccan agribusiness products in the context of certification and standardization to comply with international requirements in this area.

We agree that even if the Moroccan State in person of the ONSSA has introduced the traceability called «from the stable to the table and from farm to fork », as an obligation and one of the pillars of national legislation on food safety, it remains until now in the adoption or development of several actors of the Moroccan agribusiness sector specifically cooperatives. In this context, public authorities are invited to diagnose the ground to identify the obstacles to accelerating this action and to remedy them by involving all stakeholders. On our part, we have tried to corroborate the situation of agribusiness cooperatives in order to study the situation and present key findings.

In conclusion, we affirm that traceability continues to be a value-creating force and a factor of differentiation and reliability for agribusiness cooperatives in the face of the health, legal and economic challenges imposed by the global ecosystem. It must be seen as a rigid managerial approach which must not be reduced to a simple rudimentary system and which must mobilize the smartest technologies and international scientific advances to optimize the exploitation of this tool.

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