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E-BUSINESS APLICATION TO IMPROVE TRACEABILITY AND SUPPLY CHAIN FOR FRESH FOOD

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Abstract

The agri-food sector in Romania is of particular importance for the market economy, referring to agriculture, food industry, commerce, and not ultimately the final consumer. Due to changes in consumer behavior of agri-food products, it is increasingly desirable to know the food traceability, the concept from farm to fork being constantly developing. In the context of ensuring food security, it is important to have an efficient monitoring of the food route in order to keep it fresh. An important factor in this process is the new communication and information technologies, which are in continuous development especially from the applicative point of view. This paper aims to support the producers and suppliers of fresh agri-food products in order to improve management at the short supply chain by exemplifying some types of computer tools that can be used in their work. The conclusion was that GIS maps and GPS location enable the use to know where production is located and the storage conditions.

Key words**:** *fresh food, supply chain, traceability, e-business tools*

INTRODUCTION

Traceability is a concept that refers to all products and to all types of supply chains. At present, in a system where companies compete in a highly consumer-centric environment, traceability is an indispensable tool in conducting an efficient activity. Its direct benefits are supply chain optimization, product safety and improved marketing.[8] There are several definitions in the literature for the traceability concept. The Webster's Dictionary defines traceability as "the ability to track or study in detail, or step by step, the history of a particular activity or process" [11].

There is also a definition that says ”traceability is the ability to track a batch of products and its history throughout the entire production chain or part of it, from harvest to transport, storage, processing, distribution and sale” [6].

Moreover, traceability is, according to the European Commission, a major factor in ensuring food security, which is a risk management tool. [2]

Against this background, due to the importance of the traceability concept in a competitive agri-food economy, it is important for the distribution chain to have an effective monitoring and control system.

Thus, managerial decisions can be made based on different parameters, such as the status of fresh food or the location of agri-food products.

MATERIALS AND METHODS

In this paper we will use as methods the analysis of specialized literature, indigenous or international, to define the technologies used in the traceability system. The novelty of the paper is represented by a series of applicative recommendations from which users could start to develop a traceability system in their economic activity for fresh food such as vegetables or fruits. It will also analyze the positive effects that a traceability system can bring to the enterprise level, socially and environmentally.

RESULTS AND DISCUSSIONS

It is known that the implementation of an efficient traceability system can bring a number of beneficial effects to the users.

Moreover, it can be a pillar in ensuring food safety, and benefits can also be observed at the social or environmental level. In Table 1, we briefly outline some of the benefits that traceability can bring at an economic, societal and environmental level.

Table 1. Efficient Traceability System Benefits

Category	Positive effects
Economic level	Cost saving; Increasing profit; Sales reduction protection
Social level	Consumer and public protection; Animal protection; Local business protection; Competition protection Labor protection.
Environmental level	Preventing air/soil/water pollution Protecting environmental resources

Source: Kraivuth K.., Ting Z. (2011) [4]

In our opinion, the only weak point of the traceability system's development is that this procedure implies a increased implementation cost. But this cost will bring a lot of benefits for the user of the traceability system. In literature, different technologies are delineated to bring traceability from the concept stage to the practical stage. The more information the traceability system can generate, in terms of production times, lots, storage conditions, the more cost-effective the economic activity becomes and, why not, the reputation of the user. Currently, localization and identification technologies used on a large scale are:

-*Alphanumeric codes:* the presence of sequence numbers or letters on product labels generated by a company's organization;[1]

-*Bare Codes:* optical representation of the data, giving an automatic reading of data on production, distribution, storage or retail sale; [3]

-*RFID: Radio Frequency Identification:* allows automatic identification of products, being considered a more advanced version of bar code reading; [10]

-*GIS: Geographic Information System:* technology based on a computerized information management system in terms of space coordinates; [7]

-*GPS: Global Positioning System:* satellite positioning system, based on 24 satellites, which continuously orbits the earth. [9].

In Table 2 we synthesize the positive effects that these technologies can produce.

Table 2. Positive effects of different technology types

Technology Type	Positive Effects
Alphanumerical codes	economical; easy to use, but it implies high costs with the human resources that manipulates them;
Bar code	fast and cheap approach, but there is a physical dependence on the product that needs to be tracked
RFID	high level of the data identification and does not require a manual scanning of the product
GIS	the use of this tool in the supply chain can lead to a sustainable development of the food chain
GPS	GPS localisation can provide real time information and this type of instrument is

Source: Kraivuth K.., Ting Z. (2011) [4]

By briefly presenting the technologies used to ensure the traceability system and analyzing the positive effects they bring, we can state that GIS and GPS technologies are superior to others. Of course, account must be taken of the particularities of the user's activity.

In case of this paper, we refer to the traceability system for fresh food, such as vegetables or fruit. Thus, it is important for the user to have accurate information about the humidity, pressure and temperature at which foods are subjected during transport or storage. All the more, the different storage conditions vary according to each product. Taking the example of certain types of vegetables, we can see in Table 2 that the optimum humidity and temperature differ for each of them.

With a good traceability system, the user will be able to see on the GIS maps if their products are maintained in optimal parameters to ensure the quality of the high end product. Also, using the GPS tracking system, it is possible to check the route of the products at any time whether we refer to their route from the farm to the processing and processing plants (in the case of commercial companies)

or from the place of production to the consumer (in the case of individual households). [5]

Table 3. Humidity and temperature parameters for different types of vegetables

Type of vegetables	Humidity parameters	Temperature parameters
Tomatoes	85% - 95%	0ºC - 1ºC (4-5 weeks) or 1,6ºC - 10ºC (until maturity)
Cucumbers	80% - 90%	6ºC - 10ºC
Cabbage	85% - 95%	0ºC - minus 1ºC

Source: Marin A., et. all,2016 [5]

In our opinion, at the level of supply chain management, for fresh products, there should be a traceability system to ensure:
-Effective management of the supply chain for fresh food or agricultural products;
-Monitoring the status of agrifood products through a web tool, chosen according to the particularities of the activity and the financial resources available to the company;
-Providing real-time information on the route that agrifood products are going through, using, for example, GPS technology to make it effective;
-Providing important information to properly manage the supply chain, such as: stock of products, raw materials, auxiliary materials, this can be done through mobile applications.

CONCLUSIONS

In the first part of this paper we analyzed the traceability concept and the benefits that an efficient traceability system can bring to the user level. Due to the development of information technology, there are multiple variants of transformation of traceability from the concept stage into practice. Analyzing the widely used technologies, we conclude that it would be advisable to turn our attention to GIS maps and GPS location. Thus, the user will not only know where production is located, but he will be able to see if the production is stored under optimum conditions and fit into specific parameters such as humidity or temperature. We took the example of these parameters for tomatoes, cucumbers and cabbage. At the end of this paper we outlined some recommendations on what an IT system should provide.

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