

INFORMATION SYSTEM FOR MONITORING TRACEABILITY IN THE WINE SUPPLY CHAIN

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Abstract: *The designing, development and implementation of an information system for managing the representative events and actors involved on the wine supply chain represents a challenging mission for both practitioners and researchers. This paper will present a short overview about the wine supply chain and. The main features and benefit of an information system for tracking traceability on the wine chain supply are presented. Conclusions and future directions of the research are discussed.*

Key words: *food safety and security, traceability, information system, wine supply chain*

1. INTRODUCTION

In the actual economic context, the agro-food economy it is focused on a responsive fulfillment of consumer demands regarding quality, safety and security of food and foodstuff (Wolfert et al., 2010). In the last decade the food safety and security represents one of the most important issue for many researchers, organizations and governments. The research objectives of this study are: (a) presenting a short overview regarding the food traceability and information system; (b) discussing how an information system for monitoring traceability can meet the food safety challenges of today.

In the Regulation (EC) No 178/2002 of the European Parliament and of the Council it is specified that **food** (or **foodstuff**) represents “any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be ingested by humans”, including “drink, chewing gum and any substance, including water, intentionally incorporated into the food during its manufacture, preparation or treatment” and that **traceability** represents “the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution”. ISO 22005:2007 considers that **traceability** represents “ability to follow the movement of a feed or food through specified stage(s) of production, processing and distribution”.

Some of the most known international standards regarding the process of traceability for foods are: GS1 - Global Traceability Standard, ISO 9001 and ISO 22005, EUREPGAP, Codex Alimentarius’ food safety standard HACCP.

According to ISO 22005:2007 “a traceability system is a tool that should be designed within the context of a broader management system”. The evolution of the information technology and communication domain (Cucui et al., 2010) and the increasing requirements specified in the national or international regulations or laws regarding food safety and security had determined the development of the new system for tracking the traceability of agro-food products and the entire supply chain. The using of an information system for monitoring the traceability on the wine supply chain can represent an activity which can generate some important advantages: (i) enhancing food safety and security (Liddell and Bailey, 2001); (ii) increasing the trust of consumers in the acquired foodstuff; (iii) the increasing efficiency of the process

of collecting taxes generated by more strict information regarding the quantity of produced wine; (iv) enhancing the protection of the consumers against fraud or the producers from competitors from “black market” (Golan et al., 2002). GS1 (2005) states that wine supply chain can be divided in into the following key areas: (i). grape grower; (ii) wine producer; (iii) bulk distributor; (iv) transit cellar; (v) filler / packer; (vi) finished goods distributor; (vii) retailer. Because, in order to provide better solutions, the information systems used in the process of decision-making are using huge amounts of data, information and knowledge (Anica-Popa and Cucui, 2009), it is necessary that a traceability information system on wine supply chain to collect data in order to provide a better management of all representative events which may appear on this chain, from the producing of grapes till the wine selling.

2. INFORMATION SYSTEM FOR WINE SUPPLY CHAIN

According to Peffers et al. (2007) the Information System (IS) can be included in the category of applied research disciplines and use theories from other disciplines (economics, computer science etc.) in order to “solve problems at the intersection of IT and organizations”. Hevner et al. (2004) consider that for design science in IS Research it is necessary to take into consideration the following guidelines: (i) design as an artifact; (ii) problem relevance; (iii) design evaluation; (iv) research contributions; (v) research rigor; (vi) design as a search process; (vii) communication of research. March and Storey (2008) state that the design phase is fundamental to the information systems and one of the most relevant scope it is to iteratively identify the deficiencies of the built prototype software systems and propose solutions in order to solve that problems (Markus et al, 2002).

A well known method used in the process of the analyses and design of the IS is Structured Systems Analysis and Design Method (SSADM) which includes five stages: modules for feasibility study, requirements analysis, requirements specification, logical system specification, and physical design. Another method, developed by French researchers, is MERISE (*Méthode d'Étude et de Réalisation Informatique par les Sous-Ensembles* or *pour les Systèmes d'Entreprises*) which includes the following levels of modeling: conceptual, organizational, logic and physic, each level includes two types: data and processing, consequently, for the conceptual level we will have data conceptual model, processing conceptual model.

An information system for monitoring the traceability must provide information to all management levels (operational, tactical and strategic), therefore must contain and a decision support system (DSS). The DSS must use a data warehouse which is “a subject-oriented, integrated, time-variant and non-volatile collection of data in support of management's decision making process” (Inmon, 2005). In order to use the data stored into the data warehouse there are two architectures: Corporate Information Factory (CIF) and multidimensional (MD), both of

them succeed to fulfill the requirements of supporting decision-making process.

The main objective of the proposed system for monitoring the traceability is to handle the various processes that are related with the wine supply chain, starting with the vine until the wine is bottled. The main actors involved in wine supply chain are: (a) grape producer, (b) wine producer, (c) wine filler, (c) wine distributor. The main function of the designed information systems are: (i) storing the data regarding the treatment applied over the soil or the plant for every area planted with vine; (ii) storing the data regarding the suppliers of grapes for each grapes lot that will be used in order to obtain brut wine; (iii) storing the data regarding all treatment and processes applied to brut wine in order to obtain final bulk wine; (iv) storing the data regarding the suppliers of bulk wine or every bulk line lot that will be used in order to obtain the lot of bottled wine.

The proposed architecture of the information system consider that the data must be stored in an intranet database and only some relevant data to end-consumers will be uploaded in a database can be accessed using a web-developed application. One of the main advantages of the web-based application developed for the end-consumers is that in order to access this application is necessary to have only an internet browser installed on the computer and any upgrades or updates of the application will be available immediately to the user requiring no installations on local computer. The developed applications will use client-server architecture which involves that a request issued by the client side to be executed on the server side and to the client side to be provided only the results.

3. CONCLUSION

In 2000, at the Lisbon, European Commission adopted a strategy that aims to let the European Union become “*the most dynamic and competitive knowledge-based economy in the world*” (High Level Group, 2004). Based on these principles, the regulations adopted at the European level regarding food safety and security, determined the organizations to build and implement new information systems that must fulfill at least the minimum requirements specified.

This paper (a) present an overview regarding the food traceability and information system; (b) discuss how an information system for monitoring traceability can meet the food safety challenges of today; (c) introduce an information system for monitoring the traceability on wine supply chain.

Information systems developed for monitoring the traceability on wine supply chain will generate: a method of providing safer food supplies and a better connection between producers and consumers (Regattieri, 2007), an increasing trust of the end-consumers in the acquired products, will generate an enhancing of the organizational performances. In the same time, inside the companies, these systems will determine an increasing level of responsibility for every department and any employee involved on the wine supply chain. From fiscal point of view, will be possible to evaluate more accurate the quantities of produced wine by companies in order to improve the process of collecting taxes and, in the same time, the amounts of money from “black market of wines” will decrease significantly.

Future direction of the research will be focused on designing a framework for data exchange between information system for monitoring traceability implemented by companies and a national system for monitoring traceability (NSMT) on wine supply chain. In the same time, a NSMT wine supply chain must collect data and information from companies which import unbottled wine in order to mix this wine with local wine. Therefore is a must that data and information about these quantities of imported wine to be stored in a system in order to have a full picture of national wine market.

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