Design and Development of an e-Platform for Supporting Liquid Food Supply Chain Monitoring and Traceability

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ABSTRACT

In this paper, the deliverables of a research project are presented, which aims at the development of a web-based platform capable of supporting the traceability of liquid products like milk, wine and olive oil. First, it includes the design of a supply chain reference model and the identification of the data required for the efficient operation of the traceability system. The main elements of the proposed model defined in this paper are the entities, stages, events, and processes. The reference model consists of three distinct phases that represent stages of real-life supply chains. Each of these phases is defined by certain interactions between the above basic elements. Additionally, the proposed e-platform is based on the above reference model aiming to follow and register the production and distribution processes of the raw materials, semi-finals, and final products that are used in the examined industry.

Keywords: Business Process Modeling, Information System, Internet, Supply Chain Management, Traceability

INTRODUCTION

During the past decade, the credibility of Food Industry safety schemes was heavily challenged after a number of food crises, such as Bovine Spongiform Encephalopathy (BSE) and food-and-mouth disease. The necessity of sufficient traceability systems to tackle such crises brought into light the need for reassessing and updating traceability systems currently implemented in the food sector. Thus, the successful control of the physical flow of the products along the supply chain and product safety assurance depends on the existence of an efficient traceability system (Giraud & Halawany, 2006; Morisse & Almonacid, 2005). This system must be able to identify each and every single unit produced and distributed from farm to fork.

The E.U. Regulation 178/2002 regarding the establishment of the European Food Safety Agency (EFSA) set the foundations towards more strict traceability requirements in the food sector. This regulation requires the establishment of a system that allows for the traceability of each product from its production to its consumption.

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sector and paved the way for further legal requirements at a national level assuring information flow transparency and efficient traceability in the Food Industry of each country-member of the E.U. According to the E.U. Regulation 178/2002, which took effect on January 1st 2005, “food and feed business operators shall be able to identify any person from whom they have been supplied with a food, a feed, a food-producing animal or any substance intended to be, or expected to be, incorporated into a food or a feed. Moreover, food business shall have in-place systems and procedures to identify the other businesses to which their products have been supplied. This information shall be made available to the competent authorities on demand”.

This Regulation does not lay a specific methodology to be followed by all food business operators. Instead, food companies are free to choose those mechanisms that fit their needs and ensure efficient traceability for their products. According to ISO Quality Standards (1994), traceability is defined as: “the ability to trace the history, application, or location of an entity by means of recorded information” (ISO 8402:1994). Moreover, the same institution introduced at the beginning of 2006, two new standards that define the requirements for a traceability system within a food safety management system and the data that needs to be retained (ISO 22000:2005 - Food Safety Management Systems - Requirements, and ISO 22519 - Traceability System in the Agriculture Food Chain - General Principles for Design and Development). In the food chain, traceability means the ability to trace and follow a food, feed, food producing animal or substance through all stages of production and distribution (see Figure 1) (Beulens et al., 2005).

According to definitions at Article 3, (E.U. General Food Law Regulation): “stages of production and distribution refer to any stage including import, from and including the primary production of food, up to and including its sale or supply to the final consumer and, where relevant to food safety, the production, manufacture and distribution of feed”.

The efficiency of a traceability system depends on the ability to collect safety and quality related information (Resende-Filho & Buhr, 2008; Sasazaki et al., 2004). According to Food Standards Agency (2002): “There is a wide range of traceability schemes currently

Figure 1. Generic food supply chain model
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Developing a New Theory of Integer-Valued Data Envelopment Analysis for Supplier Selection in the Presence of Stochastic Data