

Chapter IV

RFID Technology for Agri–Food Traceability Management

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ABSTRACT

This chapter deals with the use of RFID technology for improving management and security of agri-food products. In order to protect health and to make transparent the production flow of alimentary commodities, traceability is becoming mandatory for food products in an increasing number of countries. Everywhere, innovative solutions are investigated by agri-food companies in order to improve their traceability management systems. The RFID technology seems to be able to solve in a very efficient way the requirements for traceability systems, however some technological problems, such as the lack of consolidated systems, and the costs are the main obstacles to the wide adoption of RFID-based traceability systems. In this chapter the peculiarities of agri-food traceability and the most relevant results reached by the state-of-the-art research studies are detailed.

INTRODUCTION

Traceability is considered today a crucial factor for the agri-food sector. An effective traceability

system brings many benefits, such as increasing the security of customers, and so their confidence, and controlling the effects of commodity withdrawal. Furthermore, in many countries

traceability is a mandatory requirement for the agri-food sector. In EU, The European Parliament And The Council (2002) establishes that “1. The traceability of food, feed, ... shall be established at all stages of production, processing and distribution. 2. Food and feed business operators shall be able to identify any person from whom they have been supplied with a food, ... To this end, such operators shall have in place systems and procedures which allow for this information to be made available to the competent authorities on demand. 3. Food and feed business operators 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. 4. Food or feed which is placed on the market or is likely to be placed on the market in the Community shall be adequately labeled or identified to facilitate its traceability, through relevant documentation or information in accordance with the relevant requirements of more specific provisions.”

The Traceability in the agri-food sector is often managed by systems that employ labels or barcodes for the commodity identification. However, the new requirements of accuracy and efficiency have promoted the research of more efficient and effective solutions for traceability management. One of the most promising alternatives to traditional solutions is represented by the Radio Frequency Identification (RFID) technology. RFID systems, constituted by passive low cost transponders, are currently being used in a variety of applications and environments as detailed in this book. Many research projects have been developed to evaluate if RFID technology can be properly exploited for agri-food traceability activities.

The ISO 9001:2000 (ISO, 2000) standard defines traceability as the “ability to trace the history, application or location of that which is under consideration”. The activities involved by Traceability Management (TM) are also strongly linked to Supply Chain Management (SCM).

For The Council of Supply Chain Management Professionals “SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, SCM integrates supply and demand management within and across companies” (Gibson, Mentzer, & Cook, 2005). On the one hand, TM aims at detecting and recording the path and the history of items; on the other hand, SCM aims at improving the production chain, so SCM can manage the traceability of products, but it is only an optional intermediate step to reach business improvements. Furthermore there are issues that characterize agri-food sector, and that affect both TM and SCM: (a) the management of perishable products requires special solutions like controlled storages in refrigerating rooms; (b) The Out-of-Shelves problem (Corsten & Gruen, 2004) is a threat for all kinds of brands and in particular for perishable products (Kranendonk & Rackebrandt, 2002), producing direct losses to retailers and manufacturers, such as lost sale, brand switch, and store switch. Therefore many research projects provide data about SCM and Automatic Identification and Data Capture (AIDC) that concern activities comprised by TM.

New traceability systems based on RFID technology are starting to be effectively employed, but small and medium companies, which represent a large part of the agri-food enterprises, are wayward to invest in technologies that are not conventional. Hence, it is evident the importance of studies that present the knowledge about features and properties of the RFID technology application. The aim of this chapter is to provide readers with a complete overview of studies about agri-food traceability characteristics and about how RFID technology can be applied to traceability activities. Conceptual and simulation papers and field studies, concerning topics related to RFID-based

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