RFID: From Closed Systems to Improving Visibility in the Manufacturing Supply Chain

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ABSTRACT

In many industrial sectors, the use of RFID in closed systems is evolving. To be implemented in global supply chains, all aspects related to RFID need to be standardised. By collecting, processing and distributing information efficiently, organisations should be able to improve the efficiency of their transport logistics processes, lower their operational costs, and improve their portfolio of logistics services. This case study describes the current perspectives, challenges and benefits of RFID applications in manufacturing industry. Automated, remote and wireless identification is a basic element in implementing efficient management systems in the supply chain. The most important identification techniques are barcode and RFID. Barcode is currently the most widely used method for the identification of parcels, but RFID is more suitable for automated identification for many different reasons including better readability and enhanced environmental durability. By reducing manual work and errors, RFID generates cost savings, increased productivity and efficiency of processes. There is a wide range of different RFID technologies that have varying reading ranges, protocols and data contents. There are two different approaches to using RFID tags and numbering the items to be identified. Recent standardisation developments have started to resolve the interoperability problems in the field of RFID identification.

Keywords: Automated Identification, Closed Systems, Manufacturing Industry, RFID, Supply Chain Visibility

INTRODUCTION

Due to the complexity of modern logistics networks, the availability of up-to-date information plays a key role in improving efficiency (Yu, Yan, & Cheng, 2001; Nilsson & Waidringer, 2004). Automated identification (Auto-ID) is a vital part of fast and accurate information exchange in the supply chain, as it allows identification of physical goods in a timely, accurate, and cost-efficient manner.

The information gathered using an Auto-ID can be rapidly transmitted to an information system and shared with other parties of the chain. Furthermore, an Auto-ID system represents a major opportunity to introduce tracking and tracing solutions, improve process control and support inventory management. In some cases
these may lead to a re-engineering of the supply chain and removing structural constraints that limit the performance of the chain (McFarlane & Sheffi, 2003).

**Methodology**

Research methods can be divided into two mainstreams: quantitative and qualitative methods (Saunders, Lewis, & Thornhill, 2009). Quantitative research is “hard-nosed” and data driven research that tends to optimize control and generalizability, while “soft” qualitative methods maximize realism (Kotzab, Seuring, Müller, & Reiner, 2005). This study employs case-study method, which is one rather popular form of qualitative research (Yin, 2012). The approach of the paper is analytical as it aims to explain reality by reproducing causal relations (seeking the explaining effects) by finding the current cause (Arbnor & Bjerke, 1997).

The main goal of this paper is to describe the current state of RFID applications in manufacturing supply chains, as well as present the its challenges and benefits based on literature review and empirical evidences. In order to create a comprehensive picture of challenges and benefits of RFID systems, a descriptive literature review was conducted by utilizing the most relevant scientific articles and other studies.

In empirical part of the paper, the findings of previous research review were exposed under verification by conducting a case study of a real-life RFID implementation. A case study method is widely used technique in studying contemporary phenomena in real-life context (Yin, 2002). Considering the fact that each RFID implementations usually differs from each other and there are several specific characteristics in each implementation, it is justified to use case study method that should be the method that best answers the research question (McBurnley & White, 2009).

RFID implementation in ABB Drivers manufacturing plant in Finland was selected as a case to be studied due to the several factors. As the approach of this study is to verify the findings of literature review with empirical evidences, the main criteria for case is that it should include majority of those aspects of RFID implementation aroused during the previous research review. The first reason to select ABB as a case to be researched was the fact that the company has a long history with RFID, which allows one to scrutinize the evolvement of the system, as well as the system was considered to be in mature and stable phase. The second reason was that ABB’s RFID implementation is applied to inbound supply chain functions and involves several supply chain partners. Finally, ABB is a major player in its industry, and the RFID implementation is conducted in Finland, which is in the frontline of utilising RFID technology.

Two sources of information were employed in the case study. The basic information of implementation was acquired from the case bank of RFID Lab Finland, which is non-profit organization distributing RFID related information in Finland. In addition, some press releases of ABB were explored in order to form a solid picture of RFID implementation. The empirical data was also acquired by interviewing Head of Quality and Operational Excellence in ABB Drives Finland. The open questions were derived from the results of the literature review. In practice, the important aspects (i.e., benefits and barriers) identified in previously published research, were presented to interviewed person, who may agree or reject the statement, as well as provide additional information for statement in question.

Considering the reliability and validity of employed case study method for the problem in question, few issues arise. The level of RFID adoption is still relatively low in many countries, as well as individual implementation can vary significantly on their scope. In addition, RFID can be utilized in several different solutions like personal identification, warehouse management, and product identification. These issues justify the case study method as a valid one for this research as it would be highly questionable to utilize broad scale questionnaires or similar. The reliability of the research has been taken
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