Impact of RFID Technology on Health Care Organizations

Véronique Nabelsi
École Polytechnique de Montréal, Canada

Florina Stefanescu
ePoly Centre of Expertise in Electronic Commerce, Canada

INTRODUCTION

Radio Frequency Identification (RFID) technology has been considered the "next revolution in supply chain management" (Srivastava, 2004, p. 60). Current research and development related to RFID focuses on the manufacturing and retail sectors with the aim of improving supply chain efficiency. After the manufacturing and retail sectors, health care is considered to be the next sector for RFID (Ericson, 2004). RFID technology's potential to improve asset management in the health sector is considerable, especially with respect to asset management optimization.

In fact, health expenses have increased substantially in Organisation for Economic Co-operation and Development (OECD) countries in recent years. In Canada, the public health budget amounted to $91.4 billion (CAD) for the year 2005–2006 compared to $79.9 billion in 2003–2004 (CIHI, 2005). Moreover, the health care industry has been the focus of intense public policy attention. In order to curb this upward trend, the public heath sector in Canada is subject to strict budget constraints. Among the different alternatives for reducing expenditures, the improvement of asset management within the different health institutions appears to be worthwhile. RFID technology seems to be a viable alternative to help hospitals effectively manage and locate medical equipment and other assets, track files, capture charges, detect and deter counterfeit products, and maintain and manage materials. In other words, health care organizations would benefit particularly from RFID applications.

The main objective of this study is to investigate the potential for RFID technology within one specific supply chain in the health care sector. Based on a field study conducted in a large nonprofit hospital, this article tests some scenarios for integrating RFID technology in the context of two warehousing activities.

We will first introduce the context of the health care sector and the current applications of RFID technology in that sector. The next section presents the methodological approach that was used in the study. The research findings and their implications are then discussed. Finally, some closing remarks are made.

CURRENT CONTEXT OF THE HEALTH CARE SECTOR

The health care sector has been investing ever more money in information technology (IT) to reduce operating costs and improve patient safety and medical services, and RFID is expected to become critical to health care organizations in achieving these goals.

The IT implementation trend in health care works toward common IT platforms, which allow patient and product information to be exchanged. For many observers, the adoption and use of IT-related technologies, especially RFID, by health care organizations could boost the effectiveness and efficiency of this information-intensive sector. However, the health care sector has been relatively slow to embrace the full potential of IT initiatives. In general, the implementation of IT in hospitals has not been particularly successful (Aarts, Doorewaard, & Berg, 2004; Hersh, 2004; Pare, 2002). The major impediments appear to be linked more to organizational issues than to technological problems (Southon, Sauer, & Dampney, 1997). Among the many factors slowing down the implementation of IT initiatives, previous studies have identified the complexity of health care organizations (Glouberman & Mintzberg, 2001; Glouberman & Zimmerman, 2002), their inappropriate organizational structure (Mintzberg, 1979), and integration issues (Christensen, Bohmer, & Kenagy, 2000; Kumar, Subramanian, & Strandholm, 2002).

Characteristics of the Health Care Supply Chain

In response to all those constraints, some visionaries understand and are already taking action to rectify supply chain processes as a key strategic factor supporting patient service. A study within certain hospital departments made it possible to identify the priorities (Landry & Beaulieu, 1999). The priorities of administrative departments are generally the review and improvement of the supply chain process, IT system modernization, and system integration on a common platform used by other health care organizations.

In fact, Beaulieu, Duhamel, and Martin (2004) state that the integration of procurement activities would improve efficiency by eliminating nonvalue-added activities; this would allow health care organizations to concentrate on more strategic activities (Landry & Beaulieu, 1999). According to some researchers, better resource monitoring and allocation will reduce costs throughout the restocking chain (Blouin, Beaulieu, & Landry, 2001; Perrin, 1994). In addition, the procurement activities represent a large proportion of health expenses. In a hospital, for instance, they range from 30% to 46% of all expenses (Bourgeon et al., 2001; Poulin, 2004). Moreover, the health sector currently loses up to 15% of its assets due to inappropriate and inefficient monitoring procedures (Nabelsi, 2007). The larger the hospital, the bigger these problems are (Nabelsi, 2007).

RFID APPLICATIONS IN HEALTH CARE ORGANIZATIONS

The market potential is interesting: according to a recent study, the worldwide market for RFID tags (active, passive and semi-active) and systems in the health sector will rise from $90 million in 2006 to $2.1 billion in 2016 (Harrop & Das, 2006). The sale and implementation of a complete RFID platform solution would obviously represent much higher revenues for the participating solution providers.

The application of RFID in hospitals has received a great deal of attention over the last few years, with a "boom" in early 2003 due to the rapid spread of Severe Acute Respiratory Syndrome (SARS) in Taiwan (Li, Liu, Chen, Wu, Huang, & Chen, 2004; Wang, Chen, Ong, Liu, & Chuang, 2006). This emergent technology plays a significant role in the global fight to contain SARS; some hospitals have tested an RFID infrastructure system that tracks the movement of patients, medical professionals, and visitors in order to trace and identify when and where people may have been in contact with patients infected by SARS (Li et al., 2004; Wang et al., 2006). The real-time information can be received from this system to trace detailed patient medical records and read bio-information such as pulse, temperature, and respiratory rate (Li et al., 2004).

A number of hospitals have announced new projects including several that will use RFID for supply chain management applications. Tracking assets has become a potential area for improving hospitals' performance (Anonymous, 2006a). In addition, the use of RFID technology for equipment tracking in the health care supply chain can lead to a tremendous reduction in inventory levels and better collaboration among supply chain players. For example, RFID can reduce the time staff members spend looking for equipment they need, thereby improving the utilization rate of equipment and cutting down on missing equipment (Ostbye et al., 2003). Furthermore, the greatest use of RFID in the health care sector will be for labels on medical equipment, drugs, and other products at the item level and the infrastructure and services to support this throughout the supply chain. It will also be used in health care facilities to protect products against counterfeiting. The primary purpose will be to prevent counterfeiting by establishing the full history of a given package at all times—known as its pedigree.

Furthermore, RFID technology can trace patients and materials in hospitals in order not only to optimize the health care process but to minimize human errors. The Food and Drug Administration (FDA) is paying increasing attention to RFID, especially to avoid mistakes because errors involving medication and drug administration are very expensive for the health care sector. A number of studies state that about 7% of patients (Bates, Cullen, & Laird, 1995) in the USA experience an adverse drug experience (ADE) and that the costs of these amount to about US$80 billion annually (Johnson & Bootman, 1995). In addition, clinical studies suggest that Bar Code Medication Administration (BCMA) might significantly decrease ADEs by up to 58% (Jensen, Merry, Webster, Weller, & Larsson, 2004). Another use that has been suggested is cross-checking of blood transfusions (Anonymous, 2006b). A pilot study in Massachusetts General Hospital used

Related Content

Using Transfer Learning and Hierarchical Classifier to Diagnose Melanoma From Dermoscopic Images

Priti Bansal, Sumit Kumar, Ritesh Srivastavaand Saksham Agarwal (2021). *International Journal of Healthcare Information Systems and Informatics (pp. 73-86).*

www.irma-international.org/article/using-transfer-learning-and-hierarchical-classifier-to-diagnose-melanoma-from-dermoscopic-images/269406

Capturing Data in Healthcare Using Patient-Centered Mobile Technology

Sarah Pajak, Lorraine H. De Souza, Justin Goreand Christopher G. Williams (2010). *Health Information Systems: Concepts, Methodologies, Tools, and Applications (pp. 717-732).*

www.irma-international.org/chapter/capturing-data-healthcare-using-patient/49895

Information and Communication Technologies in the Healthcare: Future Trends for Project Success

Jorge Gomesand Mário Romão (2018). *International Journal of Privacy and Health Information Management (pp. 72-83).*

www.irma-international.org/article/information-and-communication-technologies-in-the-healthcare/211977

Biometric Technologies in Healthcare Biometrics

Rinku Datta Rakshitand Dakshina Ranjan Kisku (2022). *Research Anthology on Securing Medical Systems and Records (pp. 31-58).*

www.irma-international.org/chapter/biometric-technologies-in-healthcare-biometrics/308991

Electronic Patient Monitoring in Mental Health Services

Werner G. Stritzkeand Andrew Page (2010). *Health Information Systems: Concepts, Methodologies, Tools, and Applications (pp. 871-888).*

www.irma-international.org/chapter/electronic-patient-monitoring-mental-health/49904