RFID Adoption:
Issues and Challenges

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ABSTRACT

Radio Frequency Identification (RFID) is becoming increasingly important and is being used in business, production, manufacturing and logistics industries. However, RFID technology is still not fully development. This article examines the collection of some of the issues and challenges facing the RFID technology adoption in industrial applications and offers an initial roadmap to view the challenging and problems for further research. From this article, we see that the more research effort and development put into RFID study, the more successful RFID adoption we can see. [Article copies are available for purchase from InfoSci-on-Demand.com]

Keywords: Radio Frequency Identification (RFID); RFID Research Issues and Challenges

INTRODUCTION

Radio Frequency Identification (RFID) is an emerging technology that has been increasingly used in logistics and supply chain management in recent years, particularly in the US and Europe. It has emerged as new forms of inter-organizational systems (IOS) and is used to improve the efficiency of the processes in a supply chain. Because of their capability for use in real-time identification and tracking over long distances, some believe that RFID systems will fundamentally change the way companies do business (Smith and Konsynski, 2003). World’s largest retailers are increasingly requiring their suppliers to be RFID compliant. We are seeing an increasing interest in this technology by companies (Prater and Grazier, 2005; Curtin, Kauffman and Riggins, 2007).

Radio frequency identification (RFID) is a small tag containing an integrated circuit chip and an antenna, and has the ability to respond to radio waves transmitted from the RFID reader in order to send, process, and store information (Wu et al. 2006). Despite the potential applications of RFID in supply chain management, a number of issues that need to be addressed to successfully adopt RFID in real life environments. Wu et al. (2006) classify the issues into: (a) technology, (b) standard, (c) patent, (d) cost, (e) infrastructure, (f) return on investment (ROI), and (g) barcode to RFID migration.

RFID is revolutionizing the way products and goods are tracked and traced in a supply
chain. It can identify, categorize, and manage the flow of goods and information throughout a supply chain (Ngai et al., 2007). Rapid development of RFID combined with a major push coming from mandatory RFID tagging decree by Wal-Mart and the U.S. Department of Defense and others like European companies Metro AG and Tesco, has caused companies to take a hard look at what RFID can do for them and whether they should give further consideration to adopting the technology.

Recently, there is an increasing trend in the number of articles on RFID. This indicates the importance of this technology in both manufacturing and service applications. Domdouzis et al. (2007) introduces the concepts of RFID technology and presents the principles which characterize the function of an RFID system and the history of RFID technology. Moreover, they discuss the applications of RFID in the construction industry which include: automated tracking of pipe spools, on-site inspection support system using RFID tags and PDAs, automated tracking of structural steel members at the construction site, tracking of items on the construction site, and location of buried assets. Qui (2007) proposes an RFID-enabled method to bridge the gap between shop floor automation and factory information systems. RFID technology supports rapidly retrieve information of a product as it advances through shop floors. He presents a framework to enable instant delivery of suitable data and information on a uniquely identifiable job/product at point-of-need across factories.

Ngai et al. (2008) present a literature review of 85 academic journal papers that were published on RFID between 1995 and 2005. They organize the papers into four major categories: technological issues, application areas, policy and security issues, and other issues. The implications for RFID researchers and practitioners and suggestions for future research directions are also discussed. The following are some of the future research directions suggested by them: (1) models and theories for the design and implementation of RFID, (2) strategic and operational design considerations of RFID in practice and their implications, (3) impact of RFID on organizational supply chain and logistics performance, and (4) the critical success factors for the adoption of RFID. Reviewing some of the articles on RFID reveal, there is no papers that exclusively deal with the RFID issues and challenges facing the RFID technology adoption from an integrated managerial and technological perspective.

Realizing the importance of RFID, an attempt has been made in this article to discuss some of the issues and challenges facing this technology adoption in industrial applications.

CURRENT ISSUES FACING RFID ADOPTION

Though RFID offers a great scope in many areas of applications, but not without issues in the adoption. The following are the current issues facing RFID adoption: (i) globally interoperable standardization problem, (ii) environment, (iii) security and privacy, (iv) data management, (v) tag failure rate, (vi) quality assurance, and (vii) RFID expertise for deployment. The details of these are presented below.

Globally Interoperable Standardization Problem

There is lack of global standards for RFID adoption. It is no doubt that the adoption of official standards, enabling interoperability between applications or devices, can significantly accelerate the adoption of RFID technology. The RFID industry has been mainly using two different standards. One is being developed by the International Standards Organization (ISO), the world’s main developer of standards that has developed several standards around RFID which are used in Europe. The other is the Electronic Product Code (EPC) system, which is being commercialized by EPCglobal, a non-profit organization set up by EAN International and the Uniform Code Council. What standard
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