Towards a Better Understanding of Organizational Adoption and Diffusion of RFID Technology: A Case Study Approach

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ABSTRACT

This paper aims to acquire underlying knowledge about the dynamics of RFID adoption and diffusion and explore the drivers that shape the RFID diffusion pathway. The paper uses a case study methodology to conduct and present the research and its findings. The paper presents an RFID adoption/diffusion model that can guide enterprises to transition from standalone RFID deployments towards new RFID systems that are deeply integrated with business processes. The diffusion process follows a three-stage model with isomorphic feedback mechanisms. The first stage is an isolated/sensing phase, the second stage is an absorptive phase, while the last stage is an integrative phase. The proposed model suggests that a combination of endogenous and exogenous factors constitute the driving forces behind each phase of the diffusion pathway. Our research reveals that some congruence between organizational and individual aims is plausible during the adoption phase and that RFID adoption can be initiated through organizational free-will as opposed to coercive pressures from influencing organizations.

Keywords: Business Dynamics, Business Process Management, Case Study, Innovation Diffusion, IT Innovation, Management Information Systems, RFID Adoption, RFID Diffusion, Theory Building

1. INTRODUCTION AND MOTIVATION

The prevailing economic downturn, coupled with increasing global competitive pressures are exerting a greater burden on organizations to better control, optimize and streamline their processes for improved efficiency and effectiveness. Business Process Management (BPM) has been growing in popularity over the past years and can be considered to be a successor to the Business Process Re-engineering (BPR) movement of the late 1990s. BPM strives to integrate
technology in business processes in order to achieve business effectiveness, efficiency, flexibility, and innovation, thus leading to a more cost-efficient organization.

Information Technology is one of the most valuable resources by which organizations can create value (Kohli and Devaraj, 2004). Information Technology has been a major enabler for value-added enterprise operations and management (Tapscott & Caston, 1993). However, by itself, IT cannot be held accountable for any eventual success or failure of business strategies (Grabowski & Lee, 1993). The relationship between IT and process reengineering has emerged as a key factor in justifying IT investment towards business value creation (Hammer & Champy, 1993; Davenport, 1993, cited in Tzeng et al, 2008). However, at least two conditions must be met before technology can effectively and efficiently empower business processes. Firstly, the existing business processes must be well understood and, secondly, the capabilities and limitations of the enabling technology must also be completely comprehended before implementation (Hanebeck, 2004).

1.1. RFID Technology

Among the emerging technologies, RFID has been at the forefront in revolutionizing the way business processes are being managed (Bendavid & Cassivi, 2010). RFID promises to improve inventory control, reduce labor and logistic costs, enrich customer experience, and enhance physical security (Kamoun, 2008). As an enabling technology, RFID has the capability to validate critical business processes, reduce human-induced errors and enhance operational workflow and efficiency (Frisch et al, 2010). At the outset, when compared with barcodes, RFID stands as a transformational technology that enables operational efficiency through its capability to simultaneously scan hundreds of tagged items with unprecedented speed (Hanebeck, 2004).

RFID is a wireless automatic identification and data capture (AIDC) technology that provides organizations with unprecedented improved visibility and tracking of critical resources. RFID is a technological, organizational, and process innovation. The technology replaces printed barcodes and enables electronically tagged items to be identified, tracked, and intelligently managed in real-time. An RFID system typically consists of three major units: (1) a tag (transponder) containing a chip, which is attached to the physical item to be tracked, (2) a reader (interrogator) which works with an antenna to communicate simultaneously with many tags without requiring a line of sight and (3) a host server, running a middleware application, that manages the RFID system based on preconfigured business rules and that can (optionally) interact with an enterprise application, such as Enterprise Resource Planning (ERP) or Warehouse Management System (WMS).

For the past few years, many companies have been engaged in RFID pilot projects as well as large-scale deployments. For many, the adoption was mainly driven by the need to comply with mandates from influential customers such as Wal-Mart, Albertson, Target, and the US Department of Defense. In addition, some recent surveys (see, for example, RFID Journal (2009)) revealed that business process improvement has become a leading stimulus for RFID adoption, surpassing other important drivers such as cost reduction and mandatory compliance. Understanding the dynamics of RFID adoption and diffusion, and the underlying drivers, has been a key challenge for researchers and practitioners who need good empirical evidence to build validated models and support good decision-making. Such an understanding is required if we are to develop appropriate RFID adoption and diffusion models and then evaluate their effectiveness.

1.2. IS Adoption and Diffusion

Research on general IS adoption and diffusion has focused on the individual, organizational, industry, and/or country level (Adhiarna et al, 2013). This research focuses on the organizational
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