

Evaluating the business value of RFID: Evidence from five case studies

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Abstract

This paper presents an in-depth analysis toward understanding the business value components an organization can derive from adopting radio frequency identification (RFID). Although this subject is currently a hot topic, many organizations are slow in warming up to the idea of using RFID to conduct more effective and efficient business processes. We propose a framework for evaluating the business value of RFID technology, hoping that a better understanding of the business value of RFID will encourage more organizations to implement it. Emphasis is on delivering business value through refining business processes and expanding the business model. We illustrate these concepts drawing on the experience of five early adopters from the Taiwan healthcare industry and formulate this framework as a set of propositions based on relevant literature, cases from pioneers in the field and our intuition. These propositions will need to be validated through empirical evidence.

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1. Introduction

Information technology (IT) is one of the most important resources in creating organizational value (Kohli and Devaraj, 2004) through its capability to transform the nature of products, processes, companies, industries and even competition itself (Porter and Millar, 1985). Owing to its “MOST” (mobility, organizational, systems and technologies) characteristics, radio frequency identification (RFID) has received considerable attention and is

considered to be the next wave of the IT revolution. An RFID can allow any tagged entity to be mobile, intelligent and communicate with an organization's overall information infrastructure (Curtin et al., 2007). Its applications are not a new phenomenon. The British Royal Air Force (RAF) used RFID-like technology in World War II to distinguish between enemy and friendly aircraft (Asif and Mandviwalla, 2005). Most recently, it is gaining importance and popularity in many areas such as marathon races, airline luggage tracking, electronic security keys, toll collection and asset tracking, etc. (Angeles, 2005; Ericson, 2004; Karkkainen, 2003; Srivastava, 2004) and is considered to be the next revolution in supply-chain management (Srivastava, 2004) and the healthcare industry (Ericson, 2004).

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The RFID is expected to add intelligence and capabilities to organizations by its identification, tracking and tracing nature. It can acquire a vast array of location and property information through entities that can be physically tagged and wirelessly scanned (Curtin et al., 2007; Weinstein, 2005). As the various entities associated with business processes become increasingly mobile in the presence of RFID, the ability of the organization to monitor the location, history and changing states of these tagged entities increases the level of process freedom (Keen and Mackintosh, 2001). The strategic importance of RFID applications cannot be underestimated. The rapid pace of adoption and advancement of RFID creates opportunities for new and innovative services provided through RFID infrastructures. The emergence of RFID is expected to drastically affect a number of industries and impact their strategic management (Curtin et al., 2007).

Both academics and practitioners are keenly aware how organizations can extract business value from RFID (Weinstein, 2005; Curtin et al., 2007). They include mechanical and electrical engineering (Glidden et al., 2004), systems and software engineering (Juels, 2004), health management (Thompson, 2004), marketing and customer relationship management (Compton, 2004). Among the questions being asked are how can our business integrate RFID into existing lines of business? How can we use RFID to reduce costs and increase competitiveness? How can RFID impact internal and external business processes? What are the new business opportunities enabled by RFID? This paper aims to develop a framework for evaluating the business value of RFID applications. The research question that underlies this study is “How should one evaluate the business value of RFID applications?” We will propose some research propositions based on our case studies. These propositions form the basic framework for further research into RFID applications.

Research to assess the strategic impact of RFID on organizations is scarce. This paper is a step towards filling this gap. It presents the results derived from case studies identifying the value of RFID in five healthcare organizations and shows how RFID can have a strategic impact and create business value. The research problems are as follows:

- How should enterprises evaluate the strategic implications of RFID applications?

- Present a framework for evaluating the business value of RFID applications.

The paper is organized as follows: Section 2 presents an overview of pertinent literature on RFID, IT business value and IT applications in the healthcare industry. Section 3 reports the research method. Five healthcare institutions are investigated in Section 4. Based upon our findings, we present seven propositions in Section 5. Finally, Section 6 presents our conclusions and some thoughts for future research.

2. Relevant concepts from the literature

The preliminary step in this research was to review four existing streams of research to gain an understanding of the source of value creation in RFID applications. These streams of research are RFID technology, IT business value, business process reengineering (BPR) and IT applications in the healthcare industry.

2.1. Background on RFID

RFID is an emerging technology intended to replace traditional barcodes in many ways (Asif and Mandviwalla, 2005; Chuang, 2005; DoIT, 2004a–c, Wang et al., 2005). Its wireless tracking nature allows a reader to activate a transponder on a radio frequency tag attached to, or embedded in, an item allowing the reader to remotely read and/or write data to the RFID tag (Das, 2002; ITAA, 2004; Want, 2004). It enables organizations to deliver value-added applications related to the tracking and intelligent management of any entity tagged with an RFID chip. The technology has been around for more than 50 years; however, it has not been widely used. Since 2003, when Wal-Mart announced its intention to introduce an RFID application, it has brought new business opportunities to many information companies (Chuang, 2005). With both identification and tracking characteristics, RFID may dramatically change an organization's capability to obtain real-time information about the location and properties of tagged object(s), such as people or products (Angeles, 2005; Karkkainen, 2003). Current research and development on RFID focus on the manufacturing and retail sectors to improve supply-chain efficiency and to learn more about consumer behavior. Healthcare is considered

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