Valuation Methods for RFID Investments

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INTRODUCTION

Radio Frequency Identification (RFID) technology is one of the major disruptive innovations in the twenty-first century and continues to evolve and grow over time. In various industries, RFID technology shows great potentials for cost reduction, business process redesign, supply chain improvement, and on-site customer support. Recently, RFID technology has been touted as the foundational enabling technologies for the realization of the Internet of Things (IoT). The market for RFID hardware, software, and infrastructure has been strong and will remain strong with the growth of pervasive computing and the IoT.

Due to the ability to track movements of goods in a supply chain, RFID has given unprecedented visibility to the supply chain and has been able to save labor cost, improve supply chain coordination, reduce inventory and increase product availability (Lee & Özer, 2007). RFID promises to transform supply chain management by providing detailed information on the flow of products throughout the value chain (Whitaker et al., 2007). Furthermore, RFID is considered as a strategic value information technology which brings new value propositions, creates new markets, and builds competitiveness in various industries (Christensen et al, 2004; Krotov & Junglas, 2008; Tajima, 2007). Therefore, understanding the value of the RFID will be critical to the timely adoption of RFID, as the technology advances at a stupendous speed.

RFID technology management is the process of evaluating RFID technology, developing RFID systems, and managing RFID infrastructure to achieve business goals. In the evaluation stage of RFID technology, managers identify potential business process redesign opportunities or business improvement opportunities, explore different RFID technology options, assess their cost-benefit, and choose the best technology. To assess their cost-benefit, certain metrics need to be developed including quantifiable and unquantifiable benefits and costs of each RFID technology option.

Despite the popularity of RFID technology and a large body of research on RFID benefits, there is still a lack of comprehensive approach to the evaluation process which combines identification, forecasting, and assessment of RFIT technology (Baars et al., 2009). Despite the need for a useful evaluation method in the industries, RFID valuation methods have not been fully operationalized, and developing a strong business case has been challenging for managers. Traditionally, accounting and financial project evaluation methods have been widely used to assess the value of projects. Return on investment, net present value, and payback period methods are classic in project evaluations. However, these traditional accounting and financial methods have played a limited role in justifying the RFID investment opportunities, because many benefits are hard to quantify and usually realized in the future.

In light of the ongoing debate on the valuation of RFID investment in the academia and industries, this chapter provides an overview of RFID applications in different industries and previous evaluation studies, presents an RFID investment evaluation model, and discusses a future direction for researchers and practitioners. Our chapter proceeds with literature review in Section 2, the evaluation model in Section 3, and the conclusion in Section 4.

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LITERATURE REVIEW

The global industry for RFID technology has been growing steadily and is expected to expand fast for some time in the future. The dwindling prices of RFID tags are a driver for widespread adoption of item level tagging. Currently, the United States has the largest market worldwide, followed by Europe. Although developed markets such as US and Europe continue to remain the largest revenue generators for RFID manufacturers and software developers for some time, future growth in the market will be primarily driven by major Asian countries such as China and South Korea with the support extended by their governments (PRWeb, 2012).

RFID in Healthcare

RFID has been applied in the healthcare industries for the purpose of tracking medical equipment, monitoring patients, administering right medication to patient, and identifying counterfeit medicine (Ting et al., 2011). RFID technology not only offers tracking capability to locate equipment, supplies and people in real time, but also provides efficient and accurate medical data access for healthcare professionals (Yao et al., 2012). However, RFID adoption in the healthcare industry is far behind the earlier prediction. Major barriers to RFID adoption include technological limitations, interference concerns, prohibitive costs, lack of global standards and privacy concerns (Yao et al., 2012).

Bendavid et al. (2010) analyze a hospital nursing unit that has evaluated and approved a two-bin "e-kanban" replenishment system based on passive RFID tags. Results show that implementing the e-kanban RFID solution with the redesign of the ward floor and of the roles and functions can significantly improve business and operational performance. The most important benefits for the hospital include the time saved from non-value-added activities that can be transferred to patient care activities and the significant reduction of on-hand inventory at distributed storage locations.

A 2007 national survey of 1,404 Americans reveals varying degrees of sentiments regarding mobile healthcare services (Katz & Rice, 2009). The survey shows that high levels of interest in emergency intervention services, but much less interest in health information and monitoring services. The interest in RFID-based personal medical technology was positively associated with high level of trust in others and social support. Personalized RFID tags raise privacy concerns even when not directly carrying private information, as the unique tag data can be read and aggregated to identify individuals, analyze their preferences, and track their location (Park, 2011). There is a need for strong security measures for safe use of personalized RFID tags in conjunction with RFID services.

According to participant observation and interviews with hospital staff members and industry consultants in the United States, hospital staff, especially nurses, have concerns about the surveillance issues of these tracking technologies (Fisher & Monahan, 2008). Nursing staff frequently experience an intensification of labor as a result of the deployment of RFID systems, because the task of keeping the systems operational often is assigned to them. Privacy concerns and work intensification for nursing and other hospital staff should be taken into consideration in the design and implementation of the RFID technology.

RFID in Construction

RFID technology brings about cost savings for various construction projects via increased speed and accuracy of data entry. Wang (2008) proposes an RFID-based quality management system, which functions