Chapter 13
Finding the Role of Time Lags in Radio Frequency Identification Investment

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ABSTRACT

Radio Frequency Identification (RFID) is a highly beneficial technological advancement which could eventually change the way of doing business. However, the difficulty in assessing the potential benefits of RFID has been delayed RFID related investment decisions within organizations. Especially, time lag, or payback time from RFID investment, has been one of key barriers in RFID investment. This study provides a conceptual framework for time lags in RFID to enhance the understanding of RFID pay-offs. Time lags are determined by IT type and a firm’s IT capability. Therefore, it takes longer for firms to realize the value of RFID since it requires more efforts and changes to implement and utilize. Also the expected time lags of RFID may be modified by the level of IT capability of each firm. The stronger IT capability the firm has, the shorter time lags the firm experiences.

INTRODUCTION

Information systems (IS) researchers have made impressive efforts to demonstrate the measurable performance improvements resulting from information technology (IT). These efforts not only can help initiate and sustain IT investment but also prevent distrust among top executives that may unfavorably bias technology-based investment decisions (Grover et al., 1998). However, finding measureable performance improvements is still a challenging task and often creates productivity paradox.

Radio Frequency Identification (RFID) is a technology used to identify, track, and trace a person or an object without using a human to read and record data, and enables the automated collection of important business information (Asif
RFID applications are currently used in many areas including airport baggage handling, electronic payment, retail theft prevention, library systems, automotive manufacturing, parking, postal services, and homeland security. RFID is a highly beneficial technological advancement which could eventually change the way of doing business.

However, the difficulty in assessing the potential benefits of RFID has been delayed RFID related investment decisions within organizations. Especially, time lag, or payback time from RFID investment, has been one of key barriers in RFID investment. According to Whitaker et al. (2007), RFID investment is highly associated with expectation of an early return on RFID investment. However, it has been reported that 75% of RFID users expect Return on Investment (ROI) longer than a year (SCD, 2009). Even though a majority of them are optimistic about the ROI, the fact that there is not enough information to help them estimate the time of RFID ROI is delaying RFID related investment decisions.

The purpose of this study is to propose a conceptual framework for such lags in order to enhance the understanding of RFID pay-offs. Although a large number of studies have found time lags between IT investment and firm performance, little attention has been given to what causes time lags and why different time lags exist among different firms and types of IT. Specifically, this study attempts to answer the following questions: 1) What causes time lags and why do RFID investments expect relatively longer time lags? 2) Do different time lags exist among different firms in the same industry when using RFID?

**THEORETICAL BACKGROUND**

Information systems (IS) researchers have made impressive efforts to demonstrate the impacts of information technology (IT) on firm performance. However, a great deal of controversy still exists. While some researchers have reported positive impacts (Anderson et al., 2003; Osei-Bryson & Ko, 2004), other researchers have found negative or no impacts (Strassman, 1997). Several explanations from both theoretical and methodological viewpoints have been offered for these contradictory results, including mismeasurement problems and possible time lags between IT investments and firm performance (Chan, 2000; Senn, 2003).

**Mismeasurement**

Mismeasurement has consistently been introduced as one of the main reasons for productivity paradox (Bakos, 1998; Brynjolfsson, 1993; Chan, 2000; Kohli & Devaraj, 2003). For example, the primary focus of much of the earlier research in the business value of IT has been on the productivity impacts of IT. However, considerable research has found that a large proportion of the benefits from IT have not appeared in productivity statistics (Bakos 1998; Bharadwaj et al., 1999; Soh & Markus 1995; Tallon et al., 2000). In other words, most intangible benefits, such as improved inventory management, greater product variety, and enhanced customer service, have been excluded from analyses of IT pay-off. Furthermore, it is very difficult to separate the specific contribution of IT which mostly affects firm performance indirectly (Peffers & Saarinen, 2002). Other research has found that firms have difficulty observing some values because they are captured by trading partners or competed away (Melville et al., 2004).

RFID technology has many benefits over the traditional bar coding that many firms have become accustomed to using. First, RFID technology is superior to barcode technology in that its user does not need to know where an object or person is and does not need to be close in order to collect the data (Smith & Konsynski, 2003). RFID tags can be read at a distance and do not require line-of-sight. Unlike barcode and magnetic strips