Chapter 6.7
Recognizing RFID as a Disruptive Technology

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ABSTRACT

Recognizing radio frequency identification (RFID) as a disruptive technology unearths interesting facts that could help managers decide how to approach their RFID projects. RFID for the supply chain (RFID/SC) has attracted global attention and the adoption pace is quickening. It has characteristics resembling that of a disruptive technology. To better understand RFID/SC, we use Christensen's principles of disruptive technology and the motivation/ability framework to illustrate the uniqueness of RFID/SC. The principles provide valuable information for managers steering their RFID projects toward success. We provide cases studies as vignettes to support the applications of the theories. The objectives of this paper are: (1) to equip managers with the knowledge of disruptive technology in the context of RFID/SC, (2) to highlight the need to assess an organiza-
tion's motivation and ability for adopting RFID/SC, and (3) to propose further research areas in RFID/SC in the IS field.

INTRODUCTION

RFID for the supply chain (RFID/SC) has been labeled a disruptive technology (Dietz, Lemond, Moffatt, & Pak, 2006; Owen et al., 2005; Raynor, 2008; Spekman & Sweeney-II, 2006). The adoption path has been likened to that of mini-computers in the late 1970s to the Internet applications in the late 1990s (Raynor, 2008; Walt, 2005). There are certain characteristics of a disruptive technology that managers need to know when they are adopting RFID technology. Raynor (2008) suggests that "disruptive innovations require a radically different approach to business because they require organizations to

do what they are programmed not to do: ignore their best customers" (p. 7). Disruptive technologies often find application in niche markets when they first appear (Christensen, 1997). This is because disruptive technologies often do not meet the requirement of the mainstream markets when they are first implemented. Adner (2002) describes disruptive technologies as "inferior to mainstream technologies along the dimensions of performance that are most important to the mainstream customers" (p. 668). He further explains that because of the different performance disruptive technologies offer, they only serve certain segments that match their requirements. While disruptive technologies improve to a level that meets the mainstream expectations, the established mainstream technology has itself improved in performance.

We have seen a wide variety of RFID applications in railroad car tracking, electronic toll collection, EAS, and access control to buildings and offices (Bhuptani & Moradpour, 2005; Finkenzeller, 2003; Landt, 2001). Because of its proximity reading and information storage capabilities, RFID in various forms has found niche markets in those domains. Conversely, RFID/SC is still in the pilot testing stage, thus relatively new to supply chain management. Even at this early innovation stage, RFID is already threatening to displace the incumbent technology, the barcode, from the supply chain. While RFID technology is improving, there are still certain limitations manifested within the improvement. Barcode as the established technology is itself still evolving and improving (Katz, 2006; Ng, 2007). Thus, RFID/SC fits the description of disruptive technology explained above.

In this paper, we apply Christensen's principles of disruptive technologies and motivation/ability framework to RFID/SC to demonstrate the effects of RFID on supply chain management. The application is supported with vignettes of cases studies as a mean of producing more valid and reliable measures of the theory of disruptive technology (Alexander & Becker, 1978). Our intention is to equip managers with the knowledge of disruptive technology and to highlight the need to assess their organizations' motivation and ability in adopting RFID/SC. The study also proposes to the researchers in the IS field to further explore RFID in the areas discussed herein.

This paper is arranged in four sections. First, we discuss Christensen's (1997) five principles of disruptive technologies. Second, we discuss the effects of the intervention of government policies and other institutions using Christensen, Anthony, & Roth's (2004) motivation/ability framework. Third, we support the discussion with vignettes of cases studies. Last, we conclude with the summary of the study and propose future research areas.

To begin with, we present here in Table 1, a tabulated summary of our study, as a forefront to the discussion of the paper. The table provides a snapshot of the frameworks used in this paper in the context of RFID/SC.

Five Principles of Disruptive Technology

Christensen's five principles of disruptive technologies draws upon the facts that leaders often do not stay at the top when there is technological change in their industries (Christensen, 1999). The diversity of the market, the uncertainty in demand and supply, and the ever increasing competition, are complicating business decision making. Innovation comes in two forms: sustaining technology and disruptive technology. Sustaining technology is the improving of existing products or services to meet the demand. Most leading companies are capable of sustaining such innovation. Disruptive technology is the technology that leading companies fail to embrace (Christensen, 1997). This section highlights five important principles that managers should be aware of when evaluating emerging technologies.

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