# Chapter 4
# Adoption of RFID in Supply Chains:
## A Motivation and Ability Perspective

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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 many firms are already using RFID in their business processes. It was found that the uptake of RFID in New Zealand supply chains has been slow. Following on our previous work that used the motivation/ability framework to describe RFID/SC, this paper looks at the motivation and ability of New Zealand supply chains to explain the slow adoption rate. Case studies are used to illustrate the principles of the motivation/ability framework. 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 organization's motivation and ability for adopting RFID/SC, and (3) to propose actions industry can take in the adoption of RFID/SC.*

## INTRODUCTION

RFID for the supply chain (RFID/SC) has been labeled a disruptive technology (Dietz, Lemond, Moffatt, & Pak, 2006; Krotov & Junglas, 2008; 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 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. Even at its 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 chapter, we apply Christensen, Anthony, & Roth's (2004) principles of the motivation/ability framework to RFID/SC to demonstrate the effects of RFID on supply chain management. It is an extension of our previous work titled "Recognizing RFID as a Disruptive Technology" published in the International Journal of Information Systems and Supply Chain Management, issue 2, volume 1 (Soon and Gutiérrez, 2009). We found that firms in New Zealand generally had the motivation to adopt RFID, however, there was a lack of a business case to justify the adoption of RFID/SC in their supply chains. Further investigation into our case studies found that while the cases (i.e. the companies researched) perceived cost savings

through visibility of their supply chains, there were issues with technology compatibility, readiness of their supply chains, and the lack of facilitation in RFID trials. These issues are mainly the ability of the cases to realize the benefits of RFID/SC. By using the principles of the motivation/ability framework, we hope to equip managers with the knowledge about disruptive technologies and highlight the need to assess their organizations' motivation and ability in adopting RFID/SC.

This chapter is arranged in three sections. First, we review the motivation/ability framework in our previous work. Second, we present our case studies using the framework, and third, we conclude with the summary of the study and propose possible actions in adopting RFID/SC.

## MOTIVATION/ABILITY FRAMEWORK

The two factors of the motivation/ability framework describe the elements required for innovation in finding a market, be it emerging or existing. Motivation is defined as market incentives to implement innovations. Return of investment or profitability is one such motivation in the corporate world. Other motivations are cost savings and gaining market share through the use of innovations. Ability is defined as the capability to turn available input into meaningful output where there is real demand. The motivation/ability framework suggests there is a higher success rate when firms have both the motivation and ability to innovate (Christensen, et al., 2004).

The framework suggests that non-market forces affect the motivation and ability to innovate. Industry standards, unions, technological development, and government policies are such forces and these are particularly imperative in the adoption of RFID/SC. Work rules and government regulations constrain the efficient use of innovation (Frankel, 1990). This section explains three principles of the motivation/ability framework in

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