# Chapter 6.2
# Decision Analysis for Business to Adopt RFID

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## INTRODUCTION

The spending for RFID (radio frequency identification) has been increasing rapidly in recent years. According to Gartner, global spending on RFID is likely to reach US$3 billion by 2010 (CNET, 2005). In addition, interests continue to grow for the adoption of this mobile computing and commerce device in many different types of applications (ABI, 2006). In 2005, Wal-Mart asked its top 100 suppliers to use RFID tags, and this had a profound effect on the projected growth of RFID technology as well as potential applications in the industrial, defense, and retails sectors (Albertsons, 2004).

However, very few studies have examined and evaluated the adoption of RFID options by the organizations. Organizations face various risks and uncertainties when assessing the adopted mobile technologies. Different organizations are likely to encounter different challenges and problems. This research aims to develop a mechanism that can help organizations to specify their risks and choose a suitable adoption alternative. This research has adopted the AHP (analytic hierarchy process) methodology to analyze the data, as it is useful for analyzing different RFID adoption alternatives and can assist organizations in predicting the possible issues and challenges when adopting RFID.

The objectives of this article are to: (1) describe basic components of a mobile computing and commerce device, RFID; and (2) explore the current practices, issues, and applications in this mobile technology.

## BACKGROUND

RFID is a built-in wireless technology that incorporates a smart IC (integrated circuit) tag. It allows organizations to capture accurate information about the location and status of products, and track them as they move from the assembly line to the retail store (Albertsons, 2004). The three major components of RFID are: tags, readers, and software systems. RFID tags consist of silicon chips and antennas. Each tag uses an ID coding system and contains a unique serial number of a product. This enables the tag to store some information of the product. At present, the most well-known ID coding system is called EPC (electronic product code), which is formulated by MIT and used by Wal-Mart. The RFID EPC Network is constructed from the ONS (object name service), Savant (a middleware specific to RFID), and PML (Physical Markup Language) (AutoID, 2006; Lin et al., 2004).

An RFID reader is used to communicate with RFID tags. In reading, the signal is sent out continually by the active tags. In interrogating, the reader sends a signal to the tags and listens. It can also send radio waves to energize the passive tags in order to receive their data. On the other hand, RFID software systems are the glue that integrates the RFID systems. The software systems manage the basic functions of the RFID reader and other components that route information to servers.

Organizations are using RFID in a number of data collection applications specific to their own industry, ranging from retail environments to hospitals, as well as what is currently being leveraged in warehouses to keep track of inventory and shipping. RFID has many advantages and can be deployed to assist organizations in improving global integration, as well as used as an effective tool in the areas of, for example, retail inventory tracking, customer relationship management, supply chain management, or any other situation where the tracking of the movement of goods or people is critical (Finkenzeller, 2003).

However, there are some business and technical problems and issues with the use of RFID technology (such as data sharing, data usefulness, accuracy, costs and benefits, security and privacy, and RFID standards) and this calls for further research. In essence, RFID requires collective and collaborative actions by stakeholders and organizations as a whole to ensure successful adoption and functioning of this technology. This is often affected by the divergent factors and perceptions of the internal and external stakeholders within an organization in the process of adopting RFIDs. For example, an organization must consider the potential costs in mastering collaborative planning and implementation with its partners before attempting to share and use the RFID data (EPCglobal, 2006).

## RESEARCH METHODOLOGY AND DESIGN

The AHP methodology is deployed to analyze the data collected and to build a decision support system. AHP was developed by Satty (1980) to reflect the way people actually think, and it continues to be the most highly regarded and widely used decision-making theory. In essence, AHP is a process that transforms a complicated problem into a hierarchical structure (Lin & Liu, 2005). By reducing complex decisions to a series of one-on-one comparisons and then synthesizing the results, AHP not only assists decision makers in arriving at the best decision, but also provides a clear rationale that it is the best (Lin et al., 2005).

The AHP methodology is useful for analyzing the RFID adoption alternatives as it can assist organizations in developing an integrated assessment of the entire organizational structure. AHP can also help to assess the inter-organizational issues