CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

This chapter begins with the background of the study which explain the technicality of the RFID technology along with the adoption of RFID globally and in Malaysia. Later, the research problem, questions, aim, objectives and the purpose of the study are also presented. Finally, the organisation of the study is presented to provide reader an overview of the dissertation.

1.2 Research Background

Managers always emphasise on efficiency in the business process in order to accommodate the globalisation of supply chain (Cheng and Yang, 2007). Utilising the RFID technology will expedite the business process, save cost and achieve customer satisfaction. RFID technology has large potential to accommodate the logistic industries as it acts as an input mechanism that automates most of the processes and thus has eliminated human interaction (Ustundag, Kılınç and Cevikcan, 2010). It has also improved efficiency within the supply chain such as ordering efficiency, JIT efficiency and operating efficiency (Lee and Lee, 2010).

Logistic has been part of the organisation strategy to provide competitive advantage in supply chain (Lin and Ho, 2009). It involves the process of planning; implementing and controlling the movements of goods and related information from the point of origin to the point of consumption to satisfy the customer needs. Many logistic firms are aware that to operate efficiently and effectively, technologies that would assist efficient communication between the manufacturers, warehouses and retailers must be adopted. One of those technologies is RFID.

The Radio Frequency Identification (RFID) technology is a terminology for any system of identification where an electronic device that uses radio frequency or magnetic field variations to communicate is attached to an item (RFID Essentials, 2006). It uses electromagnetic transmission (i.e., radio transmission) to store and retrieve data from an identification chip (Hossain and Prybutok, 2008). It is a rapidly-emerging identification and logging technology which allow transactions to be transparent without human intervention.

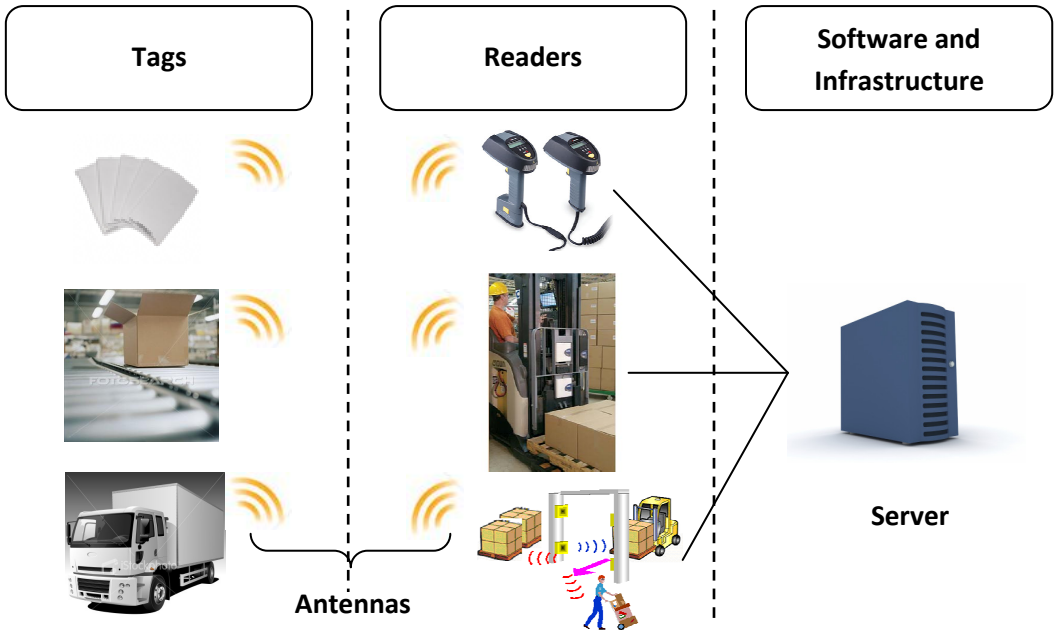

Figure 1.1: How RFID technology works

RFID system consists of five main components (Figure 1.1) – scanning antenna, transceiver with decoder for data interpretation, transponder also known as RFID tag, RFID's middleware and application software. The scanning antenna puts out short-ranged radio-frequency (RF). These RF has the functionality of communicating with the transponder and provides the RFID tag with energy to communicate (i.e. Passive Tag). On the other hand, Active RFID tag has it own life source which has the capability of receiving signal in a longer distance. However, it has limited life span compared to Passive RFID tags that do not require batteries. The RFID chip contains small antenna to communicate with the radio frequency. The process begins when RFID tag passes through the

scanning antenna which activates the signal. When the RFID chip detects the activation signal, it will transmit the information contained in the chip to the scanning antenna which will be processed later. The reader interprets the received information in digital form and sends it to the application software via the middleware. The latter provides connectivity with readers; processing raw RFID data and provide an application level interface to manage readers and capture events (Rundh, 2008). Information gathered is store in company's centralised database for retrieval, reporting and forecasting purposes.

In the supply chain environment, system integration and standardisation enable both manufacturer and retailer to share common information such as product information, route schedule, date of delivery and other information. When a manufacturer issues an RFID tag, a unique electronic product code (EPC) is generated. This information will be stored in both places (e.g. manufacturer and retailer) database or handled by third party service provider through the web based network which is available for online queries. Both parties will have product visibility from the place of origin to the final destination as the RFID's readers installed throughout the supply chain path will transmit the information and stored it in the databases for tracking purposes. This supply chain visibility (SCV) would be one of the benefits expected by RFID adoption firm to track the flow of goods, information and inventory in the supply chain (Roh et al., 2009).

1.3 RFID Adoption in Malaysia

Multimedia Development Corporation (MDeC) is owned and funded by the Malaysia government to oversee the development and the success of Information and communication technologies (ICT) in Malaysia. The government has an important role in promoting the RFID technology in the country. For instance, they could provide incentive (e.g. grant) to local company to evaluate the RFID technology to be embedded into their operation. According to the Ninth Malaysia Plan document under the section 5.38, the government encourage the internal used of RFID technology to create ubiquitous network which will generate new value added activities and services within the ICT industry (Malaysia Ninth Plan, 2009).

The RFID technology is already being used in Malaysia in several consumer applications. For instance, Kuala Lumpur International Airport had deployed the Malaysian auto gate system which enables Malaysian traveller to place their ePassport on auto gate slot followed by their fingerprints on a biometric scanner (Ismail, 2007). The process of the verification takes less than 10 seconds to complete. The embedded RFID chip in the passport allow the system to detects any criminal suspects or immigrants trying to enter Malaysia and as government determination to battle terrorism.

In the transit industry, the implementation of Touch N Go card on toll highways provides increased convenience to end users as they mitigate the traditional queuing for manual payment (Frost & Sullivan, 2006). The Touch N Go card is a contactless smart card which needs to be purchased along with a RFID transponder (Smart Tag – card will be inserted) so that the toll booth reader able to read the smart cards from a distance of 10 meters. This indirectly smoothen the traffics congestion in Malaysia.

The Department of Museum Malaysia (DMM), which manages more than 20 museums around the country, uses the RFID technology to tag a million relics as well as shelves used to store them for better management and tracking of the artifacts (Wessel, 2007). The replacement of traditional method using cardboard to label the artifacts consider inconvenient as cardboard tags frequently fall off because the string rips through the cardboard. Using bar-coded label approach was rejected as compared to RFID tag since it is available in variety of shapes and size for convenient purposes.

The joined venture of semiconductor Intel and engineering conglomerate Siemens will roll out an RFID blood bank management system in Malaysia which called Blood Bank Manager. RFID technology being used is such a manner that combines blood-tagging with smart cabinets to enable the automated, efficient track and trace visibility for which RFID is known (Anonymous, 2007). The

benefits of adopting the technology were blood bag identification, inventorying and logistics.

1.4 Significance of the Study

Logistics is defined as the management of the flow of goods, materials, services, information and other resources from the point of origin to the point of consumption in order to meet the customer requirements and satisfactions. “Logistics means having the right thing, at the right place, at the right time” (Logistic World, 2010). Globalisation and intensive competition among business rivals in the logistic industry has creates new set of environment for competition. Many logisticians are becoming more customers oriented by improving their services such as providing faster, cheaper, accurate and quality delivery to their customer. At present, communication mediums such as telephone, fax and email are commonly used for dealing customers and suppliers in logistic operations. According to Chow et al. (2007), these methods involves ample of manual procedures that are considered as inefficient and unresponsive. Therefore, investing in new technology such as RFID system may help the firms to out beat their rival and stay ahead the competition.

As a result, understanding the determinants behind the adoption of RFID technology is crucial for the widespread of the technology in logistic industry Malaysia. There has been a significant amount of studies have been conducted

on the RFID technology in the logistic industry worldwide but fairly limited in Malaysia. For instance, the order-picking operation in warehouses in Hong Kong (Poon et al., 2008), reverse logistics operation (Li and Olorunniwo, 2008) and automatic inventory replenishment in USA (Myers et al., 2000).

The significance of this dissertation would be in the following ways. First, it explores the logistic service provider (LSP) initial exposure on the emerging RFID technology and factors that determine the top management team (TMT) prerequisite decision to evaluate the technology suitability prior the adoption of the technology.

Second, this paper further in-depth investigation on the benefits gained and challenges faced by the LSP upon the adoption or evaluation of the RFID technology in the industry.

Third, the study look into the determinants that ensures the persistent use of the RFID technology in the logistic industry and justification on whether RFID able to address the LSP needs at the current stage.

Therefore, it depicts how important this study to allow logistic firms in Malaysia to gain better understanding of the deployment of RFID technology in logistic industry Malaysia.

1.5 Research Objectives

Malaysia is blessed with natural resources which involve activities such as manufacturer processing raw material into semi or finished goods. Logistics not only play an important role but act as intermediary in ensuring the smoothness of producing goods by manufacturer. The primary objective of the LSP is to ensure the process of transferring the raw materials from the farm to the manufacturing plants is cater. Efficient supply chain processes allow logistic activities to be performed in short time and effective way. Logistic company experienced dramatic changes in past few decades with the emergence of new technology such as RFID. It is being introduced as a technology to improve the efficiency and effectiveness of the entire supply chain's activities. Therefore, the research aim would be:

1. To identify the factors that influence the LSP decision makers (initial exposures) prior the adoption of the RFID technology in logistic industry Malaysia.
2. To examine the benefits obtained and challenges faced by the local LSP upon the adoption of the RFID technology in the industry.

3. To explore the determinants on the long-term persistent use of the RFID technology in logistic industry Malaysia and whether the technology is able to address the local LSP needs at the current stage.

1.6 Research Questions

This study attempt to answer the research questions concerning the determinants that influences the adoption of RFID technology by Malaysian logistician. They are as below:

1. What are the primary factors that influence the LSP's intention to invest or evaluate the RFID technology in logistic industry Malaysia?
2. What are the criteria that being evaluate by the LSP during the adoption of the RFID technology?
3. What are the factors that determine the long-term persistent use of the RFID technology and how to ensure the wider adoption of the technology in this country?

The primary goal of the research questions above is to address the concerns by Malaysian logistician at different level of RFID adoption. Exploring these factors would assist the LSP's decision maker to have a better understanding and works as a tool to evaluate the appropriateness of the technology prior any investment made. A failure in determining the appropriateness of a technology would cause

a massive waste of resources in term of monetary, time and manpower invested. Therefore, it is essential for the Chief Information Officer (CIO) of LSP to review, assess and evaluate all the possibilities prior the adoption in the event of causing losses to the organisation.

1.7 Organisation of the Study

This study is organised into 5 chapters. Chapter 1 presents the fundamental of RFID technology and how it being implemented and used globally. The adoption of RFID technology in different fields is depicted here as well in the Malaysia context. This chapter further includes significant of the study, the objective of the study, research questions and finalise with the organisation of the study.

Reviewing the existing study on adoption of RFID technology would be covered in Chapter 2. A review of the literature on the extents of the RFID technology, benefits gained and challenges faced by the local LSP upon the adoption of RFID technology is covered in this section.

Chapter 3 presents the methodology of the study which includes the data collection methods and analysis of the data.

Chapter 4 details the overall findings of the study. The collection of the data via interview technique will be examined and interpreted into meaningful information.

Chapter 5 concludes the study by summarising the findings and interpret the results towards the implication of the study. Limitations and recommendation for future research will be provided in this section as well.