Chapter 20
Enhancing ERP System with RFID: Logistic Process Integration and Exception Handling

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ABSTRACT
Various contemporary information and communication technologies (ICT) have revolutionized the global computing environment. This impacts most companies, especially traditional stand-alone ERP systems are inadequate to handle the current requirements of logistics applications. This paper studies the integration of RFID and mobile technologies with web-enabled applications to an existing in-house ERP system. This enables management to utilize accurate information for analyzing their business performance and then perform any other further decisions quickly. Benefits include retrieving information more easily, reducing order processing and delivery time, increasing sales performance, enhancing communication with customer, and improving data accuracy for in-house ERP System. In particular, the authors illustrate how this infrastructure can help the integration of logistic processes and the handling of exceptions in key business processes. The authors further evaluate the approach with respect to the requirements of key system stakeholders.

INTRODUCTION
The Internet has become a global and common platform for every organization and individual. Organizations have lots of opportunities and benefits when they fully utilize the Internet such as introducing their company, products, services, and supporting on-line transactions and data processing. Traditional ERP systems, therefore, are insufficient to integrate different stakeholders such as customers, suppliers, and other business parties, especially when they are out of the company premises (Li & Peng, 2005). In this case study,
one of the authors is an IT Supervisor for the Hong Kong telecommunication service company being studied. We found that typical computer infrastructures of web-enabled systems need to be enhanced to fit the recent logistic business environment and increase the competition power at a timely manner. Otherwise, this leads to lowered productivity, competitiveness, and revenue.

This paper studies the requirements, design, implementation, and advantages of enhancing an in-house ERP system with Web-enabled applications, mobile, and Radio Frequency Identification (RFID) technology. With such integration of disparate business functions and data, we focus on how the key business processes concerning logistics can be improved through effective automation support for exception handling.

Web-enabled system (Dahanayake & Gerhardt, 2003) is a technology that allows staff, partners, and outsiders to connect to the back-end system through the Internet. Using a Web-enabled system, staff can connect to the in-house ERP system through a Web browser and perform any actions similar to using a thick client. Based on this, we further enhance the support of mobile technologies (Chiu, Cheung, Leung, et al., 2010; Chiu, Cheung, Kafeza, & Leung, 2003), i.e., various types of mobile clients, such as mobile phone, PDA, notebooks, to connect to the back-end system. This enables roaming users (e.g., sales and management), who need to work outdoors, to access the in-house ERP system through the Web server anytime and anywhere to support their business need. RFID (Rosenberg & Garfinkel, 2005) is a technology that uses radio waves to automatically identify objects. A microchip is used to store the stock information, and the stock information can be transferred using radio-frequency waves automatically. RFID supports anti-counterfeiting and is being applied to supply chain management with mobile technology. Using RFID, warehouse staff can manage stocks more efficiently (Meng, Chiu, Kafeza, Wenyin, & Li, 2010).

We share our experience in integrating the above technologies to an existing ERP system to facilitate the exception handling in various logistic processes, which is inadequately studied before. The remainder of this paper is organized as follows. First we introduce the background and related work. Then we highlight an overview of the requirements for the logistic process integration. Next, we describe our system design and implementation, followed by a tabulation of the key exception handling scenarios for the logistic processes. Finally, we discuss the advantages of our approach with respect to different stakeholders before concluding our paper with future work.

**BACKGROUND AND RELATED WORK**

The company being studied mainly focuses on telecommunication business (such as PABX, Keyline, data communication, and voice systems) in Hong Kong. Owing to its business nature, the delivery process must be smooth in order not to affect other service parties to perform their jobs (e.g., Installation Team, Training Team). According to the existing system infrastructure, some of the systems need to be upgraded or enhanced. Basically, the ERP System had been running for over 8 years with just some new business operational features and some bug fixes. There was no integration to other system or employment of new technologies. Based on the system functionalities and constraints, the existing system could only fulfill basic internal usage but not the external ones. The users often complained that they could not obtain the information from outside. Meanwhile, most of the competitors have developed Web-enabled system and can support mobile devices. To increase the productivity and competitiveness, it is necessary to develop a Web-enabled system that supports mobile devices in addition to desktop devices, as well as enhanced exception feature (Chiu, Cheung, Till, Narupiyakul, & Hung,