Use of RFID Technology for Automatic Job Costing

Jeremy C. Bellah, College of Business Administration, Sam Houston State University, Huntsville, TX, USA

Kunpeng Li, Department of Management, Utah State University, Logan, UT, USA

Pamela J. Zelbst, College of Business Administration, Sam Houston State University, Huntsville, TX, USA

Qiannong Gu, Department of Information Systems and Operations Management, Ball State University, Muncie, IN, USA

ABSTRACT

Radio frequency identification (RFID) technology has been used to collect information for use in information systems that support knowledge-based business decisions. Most applications involve using the technology for automatic identification and tracking within facilities and supply chains. However, there are a number of other uses for the technology in the context of supporting knowledge-based decisions. By describing an innovative use of RFID technology, this study contributes to research and practice in the area of knowledge-based tools. Specifically, the process created in this study uses RFID technology to automatically and accurately calculate job costing information for fixed-position projects. By implementing the methods described in this process, business professionals can reap important benefits from the knowledge generated by the system.

Keywords: Automatic Identification, Business Intelligence, Information Systems, Job Costing, Radio Frequency Identification

INTRODUCTION

Radio frequency identification (RFID) is a technology that uses radio waves to read information stored on labels or tags. The technology has traditionally been used for automatic identification of inventories (raw material, work-in-process, finished goods) in supply chains (Zelbst, Sower & Green, 2008; Kelepouris, Pramatari & Doukidis, 2007; Lekakos, 2007; Angeles, 2005; Asif & Mandviwalla, 2005). RFID readers can automatically communicate with the RFID tags attached to product packages, without the requirement of line-of-sight. It is a significant improvement over bar code technology (Zelbst et al., 2008; Angeles, 2005; Asif & Mandviwalla, 2005).

RFID technology has gained widespread support in practice, even though it has not yet been prominent in Operations Management.

DOI: 10.4018/jissc.2013070105
textbooks (Zelbst et al., 2008). Many organizations, such as Wal-Mart, Target, Albertson’s, and the US Department of Defense, have required the implementation of RFID technology from their suppliers to gain better control of supply chains (Zelbst et al., 2008; Angeles, 2007; Asif & Mandviwalla, 2005; Kinsella, 2005; McPartlin, 2005). The use of RFID technology has been shown to improve operational efficiencies throughout supply chains (Zelbst et al., 2008; Murphy-Hoye, Lee & Rice, 2005).

The most widespread use of RFID technology is in the application of automatic identification in supply chains, but that is by no means the limit of the possible applications of the technology. The potential for collecting data using RFID technology opens significant opportunities in the area of business intelligence. Many new advancements in technology have created opportunities for organizations to gain greater information that in turn can be used to make better decisions. These advancements in technology enable organizations to collect and store vast amounts of information that can be harnessed in the context of business intelligence.

In this paper, we contribute to the knowledge on uses of RFID technology by introducing an innovative use of the technology. We begin by describing related work and our research motivation and objectives. We then discuss related theories and our research methodology. We further describe two simulations that were developed to provide tangible examples of RFID technology implementation. The simulations are followed by a discussion, focusing on potential challenges to implementation and benefits from implementation in a business environment. Finally, we summarize our contributions and suggest areas for further work.

RELATED WORK, MOTIVATION, AND OBJECTIVES

Accurate information is crucial in the context of managing large projects. It is essential that businesses that perform work on large, labor-intensive projects have accurate job costing information, particularly with the labor part of the job. The motivation for this project came from our interaction with a business that faced challenges with respect to the job costing of projects. This business had many large projects going at the same time, and their employees worked intermittently on all of the projects. At the end of the week, the project foreman estimated the amount of time that each employee worked on each project for job costing purposes. His estimates were not very accurate, so neither was the job costing information.

Our research objective was to develop an innovative use of RFID technology to address the challenge of collecting accurate job costing information. Our idea was to equip workers with RFID tags and collect information automatically at reading stations located at the individual project locations. After collecting the data, an information system would have to be developed to make use of the data for the purposes of job costing.

Technology/Business Intelligence

Technologies, such as RFID, cloud computing, mobile applications, etc., enable organizations to collect data from real time information systems (Gattiker & Goodhue, 2005; Kent & Mentzer, 2003). Real time information systems allow for analysis of current information resulting in better and more reliable decisions (Garcia-Crespo, Colomo-Palacios, Gomez-Berbis & Martin, 2010, Lee & Fiedler, 2011). Organizations that have greater knowledge from an integration of technologies can make better decisions (Anselma, Bottrighi, Molino, Montani, Terenziani & Torchio, 2011, Zelbst, Green, Sower & Baker, 2010). For example, Kamaladevi (2010, pp. 45) identified that RFID technology can “increase product visibility, reduce out-of-stock items, trim warehouse costs, eliminate stock errors, reduce theft and shrinkage and allow companies to regularly update their logistics and inventory databases.”

The information gathered using RFID technology can be useful in the context of business intelligence. The functions of business
Related Content

The Essence of Organizational Knowledge: A Social Epistemology Perspective
www.irma-international.org/chapter/essence-organizational-knowledge/52220/

Sociotechnical Framework for Participatory Flood Risk Management via Collaborative Modeling
www.irma-international.org/article/sociotechnical-framework-participatory-flood-risk/78316/

Review of Regional Workplace Development Cases: A Holistic Approach and Proposals for Evaluation and Management
www.irma-international.org/article/review-regional-workplace-development-cases/52075/

Enhancing Accessibility to Information Systems by Dynamic User Interfaces
www.irma-international.org/chapter/enhancing-accessibility-information-systems-dynamic/52134/

Building a Measurement Framework for m-Government Services
www.irma-international.org/article/building-measurement-framework-government-services/72331/