Some Lessons for Promoting RFID by Applying TAM Theory

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INTRODUCTION

We live in an era in which businesses collaborate with supply chain partners located in different parts of the world. To achieve competitive advantage companies are adopting new technologies in every operation, such as production, logistics and distribution. Radio frequency identification (RFID) is an important technology available to modern businesses to streamline their operations (Roberts, 2006). This new technology provides business solutions for business-to-business supply chain partners (Curtin et al., 2007; Sweeney, 2005). Although the literature is abound with a list of several advantages of RFID, this technology has not penetrated enough in the logistics sector in the UK (Ramanathan et al., 2012). Hence, the main purpose of this study is to explore factors affecting logistics service providers' intention to use RFID technology. The basic tenets of Technology Acceptance Model (TAM) have been used as the theoretical underpinning for this purpose. Specifically, this study has explored how the underlying concepts of TAM, namely perceived usefulness, perceived ease of use, perceived privacy issues and perceived security issues, are related to the intention by UK logistics companies to adopt RFID. In addition, this study has explored the roles of internal support environment in affecting this relationship. To the knowledge of the authors, very few studies have explored the use of TAM for the case of UK logistics, and there are no studies that extended TAM to include the influences of internal support environment, with the exception of Ramanathan et al. (2013) who explored the role of external (government) support. Finally, this study uses a relatively less used tool in operations management literature, namely the partial least squares structural equation modelling, for our analysis. These are the three contributions of our study.

Rest of this chapter is organised as follows. The next section provides a brief literature survey. Since much of RFID literature has been reviewed by Ramanathan et al. (2014b), RFID literature is not discussed in detail here but TAM studies are focussed. Section 3 develops the conceptual framework and the hypotheses. Data collection and analysis are briefly discussed in Section 4. Results are discussed in detail in Section 5. Conclusions are presented in the last section.

LITERATURE SURVEY

Since a detailed exposition of the RFID literature has been presented in another article (Ramanathan et al., 2014), this literature is not repeated here. Instead, the theoretical framework used in this chapter, namely the Technology Assessment Model (TAM), is focussed.

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TAM was originally proposed by Davis (1989). The basic assumption of the TAM is that actual use of an innovation depends on the intention to make use of the technology, and that intention depends on individual attitudes toward using the technology and its perceived usefulness (Muller-Seitz et al., 2009). The attitude toward using the technology arises from the perceived usefulness and the perceived ease of use. Many researchers have utilized and validated TAM for use with numerous technological environments. According to Hossain & Prybutok (2008), some studies suggested that TAM successfully predicts an individual's acceptance of various corporate information technologies. Furthermore, TAM may hold across technologies, people, settings and times. Recently, it has been applied to the introduction of healthcare information systems (Pai & Huang, 2011), RFID technology acceptance at US universities (Hossain & Prybutok, 2008), and RFID technology acceptance in the German electronic retail sector (Muller-Seitz et al., 2009). The research model of these studies were based on TAM and have used the revised TAM proposed by Davis et al. (1989), which include perceived usefulness, perceived ease of use and the intention to use. Hossain and Prybutok (2008) extended TAM by adding perceived cultural influence, perceived privacy, perceived regulations' influence, and perceived security to the model. Table 1 presents the definitions of some common TAM constructs and related literature.

CONCEPTUAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

There is a general agreement in the TAM literature that perceived usefulness and perceived ease of use have similar impacts on adoption of innovative technologies. For example, Pai & Huang (2011) found that a positive relationship between preceived usefulness and users' intention to use, and also a positive relationship between perceived ease of use and intention to use healthcare information systems. Muller-Seitz et al. (2009) found a similar result in the context of German electronic retail sector. Hence, similar to Ramanathan et al. (2013), this study has combined the constructs of perceived usefulness and perceived ease of use into a single construct called perceived usability. Since the basic tenets of TAM leads to a positive relationships between perceived usefulness/perceived ease of use and intention to use, we propose that perceived usability of RFID is posively related to the intention to adopt RFID. This is the first hypothesis.

Table 1. Definitions of common TAM constructs predictors

Acceptance Predictors	Definition	Sources
Perceived usefulness	The extent to which an individual believes that their job performance is enhanced by using a particular technology.	Deveoped by Davis et al. (1989). Applied in Hossain & Prybutok (2008); Muller-Seitz et al. (2009); Pai & Huang (2011).
Perceived ease of use	The extent to which an individual believes that using a particular system is free of effort.	Deveoped by Davis et al. (1989). Applied in Hossain & Prybutok (2008); Muller-Seitz et al. (2009); Pai & Huang (2011).
Perceived privacy	The degree to which an individual believes that he/she has the right to control the collection and use of his/her personal information, even after he/she has disclosed it to others.	Developed by Hossain & Prybutok (2008).
Perceived security	The degree to which an individual feels protected against security threats resulting from the use of RFID technology.	Developed and applied by Hossain & Prybutok (2008). Applied in Muller-Seitz et al. (2009).
Intention to use	The likelihood to use in the future.	Deveoped by Davis et al. (1989). Applied in Hossain & Prybutok (2008); Muller-Seitz et al. (2009); Pai & Huang (2011).

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