EXPLORATORY FACTORS OF RFID TECHNOLOGY ADOPTION: A MICRO ANALYSIS FOR INDUSTRIES IN TAIWAN

Cheng-Yuan Ku, Department of Information Management, National Chung Cheng University, 168, University Rd., Min-Hsiung, Taiwan, R.O.C., 886-5-2720411-34603, cooperku@mis.ccu.edu.tw
David C. Yen , Department of Decision Sciences and Management Information Systems, Miami University, Oxford, Ohio 45056, U.S.A., (513) 529-4827, yendc@muohio.edu
Yi-Wen Chang, Department of Information Management, National Chung Cheng University, 168, University Rd., Min-Hsiung, Taiwan, R.O.C., 886-5-2720411-24608, azure@mis.ccu.edu.tw

ABSTRACT

This paper investigates the factors affecting the RFID adoption within Taiwan industries. Grounded in the existing Innovation-Diffusion Theory (IDT), Technology Acceptance Model (TAM), concept of Change Management (CM) and other related characteristics, we examine the cognitive, environmental, and experiential antecedents of RFID adoption and use factor analysis to examine them. By interviewing key persons of industries, we also use semi-structured qualitative analysis to explain this result and discover some special concerns beyond the model.
Keywords: RFID Adoption, Innovation-Diffusion Theory, Technology Acceptance Model, Factor Analysis, Semi-Structured Interview

INTRODUCTION

With competition in the workplace, new technology plays an important role on which great economic benefit rests. The emergence of RFID tags also leads to a dramatic revolution for many areas and organizations. Nowadays, there have already been evidences that some significant benefits exist by implementing the RFID systems. Even though numerous reports and practical operations also agree this concept, there is still a dearth of research regarding to identifying the organizational considerations about adoption of RFID. Especially for Taiwan industries, the implementation of RFID seems to be talked on-paper rather than actually done while comparing with other developed countries. Thus, we launch this study to discover the factors affecting the RFID adoption and aim to improve the understanding of RFID adoption in Taiwan industries.

LITERATURE REVIEW

In academic, the Innovation Diffusion Theory (IDT) and the Technology Acceptance Model (TAM) form two well-known theories for explaining the behavior of new technology acceptance. The IDT describes the process of adoption/diffusion by which an innovation is introduced into a social system [4] and the TAM shows the individual's behavior toward accepting a new technology [5]. Researches about information technology acceptance using IDT and TAM could be found in [6][7][8] and [9][10][11], respectively. However, Chau et al [12] asserted that TAM should be supplemented with other model due to its parsimony. The research method, which combine IDT and TAM simultaneously, was adopted in [13][14]. Besides of the determinants in IDT and TAM, many studies also discover factors from environmental, organizational characteristics and so on. For instance, "characteristics of the firm", "competitiveness and management strategies of the firm", "influences of internal and external parties on the adoption decision process" and "characteristics of new technologies adopted" are defined by

Lefebvre et al. [1] as four categories of factors influencing SMEs new technology adoption. In addition, Iacovou et al also choose ”perceived benefits of organization”, “organizational readiness” and “external pressure” to be the major factors of EDI adoption by small business [2].

RESEARCH MODEL

As mentioned above, this research combines the determinants of IDT and TAM to explore the influencing factors of RFID adoption. In addition, since the key persons often have a significant effect in the adoption of IT, the attitude and knowledge of key persons may influence the decision [3]. Hence, this study also puts individual innovation acceptance into factor examination. In the following, we list the determinants of technology adoption which our research considers.

Table 1 Determinants of RFID Adoption Model

Determinants	Selected Reference	Determinants	Selected Reference
Relative Advantage	Robison [17]	Customer’s Demand	Ramamurthy et al.[25]
Compatibility	Rogers [4]	Perceived Ease of Use	Davis [5]
Complexity	Rogers [4]	Perceived Usefulness	Davis [5]
Trialability	Rogers [4]	Innovation Attitudes	Igbaria [28]
Observability	Rogers [4]	Network Externalities	Katz et al. [26]
Uncertainty	Venkatraman [18]	Competitive Pressure	Chatfield et al. [27]
Organization Size	Thong [19]	Organization Strategy	Karimi et al.[15]
Organization Structure	Cohn et al. [20]	Social Approval	Tornatzky et al. [16]
Innovativeness of Organization	Han et al. [21]	Commitment of Managers	Lee [24]
Marketing Activity of Suppliers	Frambach et al. [23]	Interconnectedness of Social Network	Lind et al. [22]
Risk	Ramamurthy et al.[25]		

RESEARCH METHODS

To explore and identify the related factors of the adoption of RFID system and explain how they support the diffusion, this study uses survey method to collect the quantitative data. Targeting both on adopters and non-adopters of RFID technology, we develop an instrument to find the main influence factors of RFID usage. Meanwhile, a semi-structured field interview will be also used and analyzed without any specific framework in mind. This is because the RFID technology is with the nature of contemporary such that the theory in this area is still not well developed. We use this qualitative technique to capture the reality in substantial details, and expect to discover some industry-dependent concerns that our general research framework can not discover. We also use this technique to achieve the purpose of replication logic, in which literal and theoretical replication is achieved. Through the phases of combining the filed survey and case interview, we avoid to be criticized for the lack of empirical proofs or scientific generalizability.

We create a sampling frame with different industry, which includes manufactures, retailers, logistics, medicines … and so on. For the questionnaire survey, the subjects were classified as RFID adopters and non-adopters and we choose our samples with systematic sampling method. For the multiple-case study, we choose two representatives from each industry. The two representatives include one RFID adopter and one RFID non-adopter. However, all questionnaire/ interview respondents should be a chief

information officer or the key personnel of IT decision.
The range of data analysis will include demographics, construct validity and reliability, convergent and discriminant validity. Since our research is an exploratory study, we use factor analysis to reduce the number of measured variables in our model. This technique helps us summarize the variables and group them into main respective factors. Principal component and varimax rotation is used for factor extractions. For the multiple-case interview, we choose "content analysis" in analyzing our interview transcripts. Single interview transcripts and cross interview transcripts will be progressed in turn. Then the inductive and deductive approaches will be used to categorize the factors and variables.

CURRENT STATUS, EXPECTED RESULTS AND FUTURE RESEARCH

Now, the questionnaire has already developed and will be distributed. The interview cases are also chosen. After the related data are collected, we will start the statistic and content analysis. This study will, hopefully, explore the factors influencing RFID adoption for industries in Taiwan. We expect that the results could provide a useful insight for both practitioners and researchers. The RFID hardware/software providers could realize the present situation of RFID adoption for different industries in Taiwan, and find the potential business opportunities. The managers of an organization could know what kinds of factors should be considered when making a decision of RFID adoption. Researchers could reexamine the perfomance of this combined model and discover some interesting factors beyond the past literatures. This study may also point out some important issues that require further research, such as "non-adoption of innovation", "the factors influencing different pre-adoption stages", "adoption process with organization", and so on. A longitudinal perspective would be necessary and should be done in the near future.

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