行政院國家科學委員會專題研究計畫 成果報告

以即時企業為觀點探討使用者對於RFID系統的接受行為：發展並驗證一個以價值為核心的科技接受模式
研究成果報告(精簡版)

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中文摘要： 隨著全球經濟的崛起和電子商務（E-Commerce）的成熟發展，規劃和建置高效率的企業價值鏈儼然成為必要課題。近年來，無線射頻辨識技術(Radio Frequency Identification, RFID)是通訊業界熱門的話題，它不單單是能夠取代最早期的二維條碼技術，更因結合無線通訊技術使得應用領域更加廣泛。由於RFID具有非接觸式的存取功能，資料具加密保護功能，多個電子標籤可同時被讀取，且讀取速度快、不受角度和方向的限制。同時，電子標籤具備體積小、不需電池、價格便宜、抗污性高、耐候性佳等特性，使RFID系統在資訊辨識市場已漸漸成為主流產品，也能充分運用在日常生活。

而即時企業(Real-Time Enterprise, RTE) 的目的是藉由「即時」的傳輸技術，來獲取正確的資訊、傳達給適合的人、並在適當的時間。因此，RTE的精神在於能夠自動化串連企業各種資訊應用系統、以及企業內外相關的企業流程，可以提供及時所需的資料與資訊給對應的員工、消費者、供應商與企業其他所有的合作夥伴。而運用RFID技術將是達成上述RTE目標的最佳途徑與工具。

以往許多研究探討RFID導入成功關鍵因素，但甚少研究指出其與使用者心理層面之關聯性，因此，本研究將以「認知價值」、「認知風險」兩大心理構面為出發點，整合Davis (1986)所提出的科技接受模式(Technology Acceptance Model, TAM)，去探討使用態度；另外，本研究也提出「使用經驗」構面，並整合 DeLone & McLean (2003)的資訊系統成功模式(Informational System Success Model, ISSM)，去探討使用者滿意度；最終，再以使用態度與使用者滿意度去探討使用者的使用意向。因此，本研究將從即時企業的觀點，發展與驗證一個以價值為核心的科技接受模式，去探討使用者對於RFID系統的接受行為，冀望能提供給產、學界具有實務與參考價值的模型與分析結果。

中文關鍵詞： 無線射頻辨識技術, 即時企業, 認知價值, 科技接受模式, 資訊系統成功模式

英文摘要： With the rise of global economic and e-commerce (EC), the planning and deployment of efficient inter-organizational for value chain processes has became importance. Radio-frequency identification (RFID) is evaluated to be one of the greatest technological

innovations in the twenty-first century. In the past few years, RFID technology has led to much hope and optimism. The mainstream press hails RFID as the avant-garde in technology and business.

The goal of Real-Time Enterprise (RTE) is obtaining the right information to the right person at the right time with ' real time' technology. Empowering the RTE should bring about quick and correct decisions, and enhanced agility and adaptability. In fact, the RFID technology would be helpful for companies to learn, evolve, and achieve the RTE capability. Hence, we attempt to investigate the successful critical factors for RFID systems or devices in RTE environment. In addition, we also want to understand the direct and indirect effects to influence the users' intention to use RFID systems or devices. Therefore, we will propose the suitable research model to investigate the relationship between RFID systems with users' intention to use based on RTE perspective.

Whether or not traditional IS success models can be extended to assessing the success of RFID systems is rarely addressed. Based on the Davis (1986) conceptual model of technology acceptance and DeLone and McLean's (2003) conceptual model of IS success. This research will address issues for a successful RFID system implementation by means of the conceptualization and empirical measurement of our proposed model. Therefore, this research wills integrate Technology Acceptance Model (TAM) and Informational System Success Model (ISSM) as a foundation for exploring user RFID use intention to create a causal relational model for determining the likelihood of successful integration of RFID in RTE environment. We hope the research contributions could provide related industries to consider the issues of RFID technology can deliver upon the promise of business performance.

英文關鍵詞： Radio Frequency Identification, Real-Time Enterprise, Perceived Value, Technology Acceptance Model, Informational System Success Model

行政院國家科學委員會補助專題研究計畫 ■ 成 果 報 告 □期中進度報告

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執行單位：東海大學資訊管理學系暨研究所

中　華　民　國　101　年　7　月　31　日

1. Introduction

Radio-frequency identification (RFID) is considered by some as one of the great technological innovations in the twenty-first century (Chao et al., 2007). RFID or radio frequency identification is a generic term for technologies and systems that use radio waves to transmit information that can identify people or objects. At present, wireless communications and network technology keeps growing continuously, and the development of RFID is becoming increasingly more popular. Typically, the RFID system consists of three basic components: tags, readers, and middleware, all of which is usually connected to the application system of an enterprise for data processing in order to support business activities. ABI Research (2010) also stated that the global output value of RFID would be 5.3 billion U.S. dollars in 2010, and would grow to at least 8.2 billion U.S. dollars in 2014. In addition, IDTechEx (2010) claimed that as RFID becomes more widespread, and the prices of the associated hardware would come down, they estimated that the number of RFID Tag sales would reach 231 million in 2010. Hence, it can be expected that the adoption of RFID in society as a whole and in individual life will increase rapidly. In Taiwan, the most popular RFID application is the "easy card" which can be used for the entire public transportation system, including mass rapid transit, railway system, busses, taxis, parking lots, libraries, and even 7-11 convenience stores and more. In 2010, the number of RFID easy cards in use reached 18 million, with more than 4 million transactions per day. However, at present the popularity of RFID is limited to the use of the easy card, and only in Taipei.

There is a great potential to expand the RFID applications, and an increasing number of companies have already successfully done so in the real world. Today there are two major, rather successful RFID applications, including supply chain management (SCM) integration and library management. Regarding the SCM issue, current RFID researches focus mainly on the integration process and how to adopt it from an organizational perspective. In early 2007, Brown and Russell (2007) used technological, organizational, and external factors to analyze the adoption of the RFID system in the retail industry. Recently, Kim and Garrison (2010) evaluated the adoption and integration of RFID in firms. Their results showed that organizational needs, factors of perception, and organizational readiness have a significant influence on RFID evaluation, adoption, and integration. Regarding library management issues, Gibb et al. (2011) outlined the technologies involved in RFID and reviewed the issues raised by the application of RFID in a library. However, there are few researches at the user/consumer level that focus on individual using behavior and their intention to adopt RFID.

After completing the above mentioned RFID survey, the following research questions remained unanswered. (i) Which RFID models, RFID design theories, and implementation can be used as a reference model for designers? (ii) Which factors can significantly affect individuals in their decision to adopt or not adopt RFID? Whether or not traditional IS success models can be extended to assess the success of RFID adoption has rarely been addressed. Based on Davis' (1986) conceptual model of technology acceptance and DeLone and McLean's (2003) conceptual model of IS success, our aim is to address any issues that stand in the way of a successful RFID implementation by means of the conceptualization and empirical measurement of our proposed model. Therefore, we need to investigate how this technology is being adopted and determine the factors that affect the RFID adoption process among the general public. The main purpose of this

research is to explore the relationship between perceived usefulness, perceived risk, aesthetic experience and perceived value, as well as the moderating relationship of user satisfaction between perceived value and intention of RFID adoption.

The remainder of this paper is organized as follows. An overview of the related researches and hypotheses are provided in Section 2. The participants, materials and procedure details for this research are described in Section 3. The hypothesis testing and statistical results for this research are provided in Section 4, while Section 5 describes the implications for research. Finally, conclusions and limitations are drawn in Section 6.

2. Literature Review

2.1. Perceived Usefulness, Perceived Risk, Aesthetic Experience, and Perceived Value

Many studies have investigated the key factors in technology acceptance and the success implementation of information systems. Davis (1986) proposed the famous Technology Acceptance Model (TAM), which became an important IT management theory. According to the TAM, whether or not users will accept an innovation such as the RFID service depends primarily on two types of perceptions: will using the service enhance the users' job performance (perceived usefulness), and will the service be easy-to-use (perceived ease-of-use). Extensive research has shown that perceived usefulness has a significant effect on perceived service value and usage intention (Venkatesh and Morris, 2000; Hill and Troshani, 2010; Lee and Wu, 2011). Therefore, the primary reason for people to exploit the RFID service or RFID devices is that they find RFID useful to their daily activities and for their performance.

Engel et al. (1995) saw perceived risk as the adverse results and impacts associated with the risk of a product or service. Recently, Drennan et al. (2006) proposed that perceived risk is the risk factor of a product, services, purchase, or usage, and that it will influence the purchase intention of the consumer. Therefore, many scholars in the field of marketing consider perceived risk as a risky environment for customers which affects their subjective assessment of product values (Shin, 2010). Therefore, this research will view perceived risk when users want to adopt the RFID service or RFID devices and the subjective expected risks they feel comes with that service. If the perceived risk is high, then that means that the users have a good understanding of the relevant security and safety issues that come with the RFID service or RFID device. Hence, users will have sufficient ability and RFID knowledge to withstand the risks or losses associated with RFID, and thus they will have a positive assessment of its value.

Aesthetics refers to the experience of beauty and fine art, and the psychological reaction to that experience. Therefore, when the aesthetic appearance of a product meets the basic needs and expectations of people it gives them a feeling of happiness. In recent years, scholars have begun to attach more importance to the emotional and aesthetic impact a design has on consumers (Hassenzahl et al. 2001). Schaik and Ling (2008) proposed that an aesthetic experience would affect the value of the website when evaluated by the web user. Im et al. (2008) investigated the user experience and concluded that it would affect the users' acceptance of technology and their understanding of the risks attached to it. Therefore, this research assumes that the aesthetic experience of the users affects their perception of the RFID value and their willingness to use the RFID service or devices. In addition we believe that when users have a good aesthetic experience they will have a higher perceived risk for using the RFID service.

Oliver (1980) considered that the first concept - "perceived value" has a positive impact on the level of satisfaction and the customer's attitude, and may contribute to the improvement of the customer's intention to repurchase. Therefore, perceived value is the result of the customers' perception of their evaluation of a product or service. Parasuraman and Grewal (2002) claimed that perceived value is a function of a 'get' component (the benefits a buyer derives from a seller's offering) and a 'give' component (the buyer's monetary and non-monetary costs of acquiring the offering) and directly affects the intention to repurchase. Therefore, this research will test the following hypothesis:

- H1a: Perceived usefulness has a positive effect on the user's perceived value of using RFID
- H1b: Perceived risk has a positive effect on the user's perceived value of using RFID
- H1c: An aesthetic experience will have a positive effect on the user's perceived value of using RFID
- H2: An aesthetic experience will have a positive effect on the user's perceived risk of using RFID

2.2. User Satisfaction and Intention to Use

Hallowell (1996) argued that customer satisfaction is the result of a customer's perception of value received. Kang and Lee (2010) also found that perceived usefulness has a positive influence on user satisfaction for online service websites. The conceptualization of customer satisfaction adopted here corresponds to the summary affective response or feeling a user has in relation to her/his experience with all aspects of using an RFID device or service. Based on DeLone and McLean's (2003) information system success model (ISSM), user satisfaction is assumed to be the determinant of net benefit, and influences the individual to use a particular product. This research targets user satisfaction to determine the positive or negative feelings/attitudes users have towards the RFID service, and to assess their intention to use RFID. Thus, our hypotheses are:

- H3a: Perceived value will have a positive effect on user satisfaction and towards using RFID.
- H3b: An aesthetic experience will have a positive effect on user satisfaction and towards using RFID.
- H4a: Perceived usefulness will have a positive effect on user intentions to use RFID.
- H4b: An aesthetic experience will have a positive effect on user intentions to use RFID.
- H5: User satisfaction will have a positive effect on user intentions to use RFID.

3. Method

3.1 Participants and Data Collection

Before conducting the major survey, both a pre-test and a pilot test to validate the instrument were performed. Five respondents who were experts in the field of RFID were selected to participate in the pre-test. The selected experts were asked to comment on the items that corresponded to the various constructs, including the wording of the items, the questionnaire format, and the length of the instrument. To reduce potential ambiguity in the questions we conducted a pilot test including 30 respondents, which were self-selected from graduate students majoring in computer science and who had RFID usage experiences.

Pilot testing involves conducting a preliminary test of data collection tools and procedures to identify and eliminate problems, allowing programs to make corrective changes or adjustments before actually collecting data from the target population. In this research, we adopt the reliability analysis to assess the internal consistency of the items representing each factor using Cronbach's α. According to Wortzel (1979), a Cronbach's α coefficient between 0.7 and 0.9 indicates enhanced reliability. Following reliability analysis, Cronbach's α coefficient of intention to use is 0.834. All dimensions are over 0.700 and the overall Cronbach's α is 0.809, meaning that the questionnaire dimensions have a high degree of homogenous consistency and reliability, and distinctly reflect the structural dimensions of this study. Table 1 shows the reliability coefficients in detail.

TABLE 1. Reliability Analysis Results of Questionnaire

Variable	Pilot Testing Cronbach's α value	Post Testing Cronbach's α value
Perceived Usefulness(PU)	0.810	0.830
Perceived Value (PV)	0.806	0.822
Aesthetic Experience (AE)	0.706	0.712
Perceived Risk (PR)	0.812	0.846
User Satisfaction (US)	0.828	0.874
Intention to Use (IU)	0.834	0.866
Total	0.809	0.838

The sample population for the research was any person who uses or is familiar with RFID technology or device. Thus, the potential population was at the very most the 20 million RFID users. Given the exploratory nature of this research, convenience sampling was employed. A number of malls, shopping centers, mass transportation were visited, where more than likely, people with RFID cards would be found. A total of 400 questionnaires were distributed to a convenience sampling of individuals in northern Taiwan. Many respondents declined to participate, claiming they did not know enough about the topic. Thus, it is likely that the respondents were those who had some idea of the concept of RFID, even if they had never used it before. This is important, as lack of awareness of this technology often means that it is wrongly assumed to be no different to other wireless technology. In advance, the first part of questionnaire asks each respondent to provide their personal information, including age, sex, level of educational, if they have experience with using RFID or not, what specific RFID device did they use, and what did they use it for. Besides, the sampling size of this research fit with the general rule that ratio should never fall below 5:1, meaning that five observations are made for each independent variable in the variate (Hair et al., 2006). From this total, 320 questionnaires were returned, resulting in a return rate of 80%. Eighty-three questionnaires were excluded because of incomplete answers and/or the respondent not having any RFID usage experience, leaving a total of 237 valid samples, for a valid response rate of 74.06%. The valid responses were from 120 males and 117 females. The mean age of the respondents was 26.48 years. 68% of respondents were university/college graduates, and 23% having master degree education. Thus, the respondents represent a reasonably educated group. From the 237 valid samples with experience in using RFID, 54% of them had used multiple RFID devices. After sorting the number and type of RFID devices used by the respondents we found that the main RFID devices used were easy card (84.38%), shopping card (49.78%), and student identity card (37.13%), respectively. RFID is used for e-cash payment throughout the entire public transportation system, including mass rapid transit, railway system, buses, taxis, as well as parking lots. Other reasons for using RFID are to buy goods in 7-11 convenience stores, shopping at specific counters in some department stores, or when using library services in academic institutes. The respondent profile therefore represents a mainly young and educated group. It is reasonable to expect such a profile, as it is mainly the young and educated who are technologically savvy, and who would have an awareness of a new innovation such as RFID usage.

3.2 Materials and procedure

Following reliability analysis, Cronbach's α coefficient of user satisfaction is 0.874. All dimensions are over 0.700 and the overall Cronbach's α is 0.838, meaning that the questionnaire dimensions have a high degree of homogenous consistency and reliability, and distinctly reflect the structural dimensions of this study. Table 2 shows the reliability coefficients in detail.

A factor analysis was conducted to assess the construct validity of the measures. The 237 responses were examined using a principal-components factor analysis as the extraction technique with varimax as the orthogonal rotation method. In order to assess the fit between the items and their constructs, all of the primary factor loadings should be greater than 0.5 and have no cross-loadings (Hair et al., 2006). A factor analysis was run again to determine whether the factor structure remained stable. Table 2 demonstrates that there was a good match between each factor and the related items.

TABLE 2. Factor analysis results and α coefficients

	PU	PV	PR	AE	US	IU
PU1	.91					
PU2	.87					
PU3	.77					
PU4	.74					
PV1		.70				
PV2		.74				
PV3		.84				
PV4		.81				
PV5		.78				
PR1			.86			
PR2			.86			
PR3			.95			
PR4			.89			
PR5			.81			
AE1				.90		
AE2				.70		
AE3				.80		
US1					.85	
US2					.84	
US3					.87	
US4					.89	
IU1						.86
IU2						.92
IU3						.87
IU4						.84

PU: Perceived Usefulness; PV: Perceived Value; AE: Aesthetic Experience; PR: Perceived Risk; US: User Satisfaction; IU: Intention to Use.

4. Results

In this research, we used the path analysis to investigate the causal relationships which were hypothesized by the Structural Equation Modeling (SEM) methodology. SEM always checks the goodness-of-fit of a statistical model because it describes how well it fits a set of observations. In our experiment, the goodness-of-fit of the proposed model is described in Table 3. Hair et al. (2006) claimed that the goodness-of-fit has some features, including the fact that the χ^2/df value should be smaller than 3, SRMR should be smaller than 0.05, and NFI, NNFI, and GFI should be larger than 0.9. In addition, Browne & Cudeck (1993) also claimed that RMSEA should be

smaller than 0.05 and that CFI should be larger than 0.9. Therefore, the empirical results show that our proposed model has a very good goodness-of-fit.

TABLE 3. Goodness-of-fit of the proposed model

Index	*Testing Result*	*Ideal Value*	*References*	*Result*
χ^2/df	1.644	<=3	Hair et al. (2006)	Support
RMR	0.008	<=0.05	Hair et al. (2006)	Support
NFI	0.986	>=0.9	Hair et al. (2006)	Support
NNFI	0.983	>=0.9	Hair et al. (2006)	Support
CFI	0.994	>=0.9	Browne & Cudeck (1993)	Support
GFI	0.989	>=0.9	Hair et al. (2006)	Support
RMSEA	0.042	<=0.05	Browne & Cudeck (1993)	Support

After the reliability, validity, and goodness-of-fit testing are completed, Fig. 1 shows the properties of the causal paths, including the standardized path coefficients, P-values, and the variance for each equation in the hypothesized model.

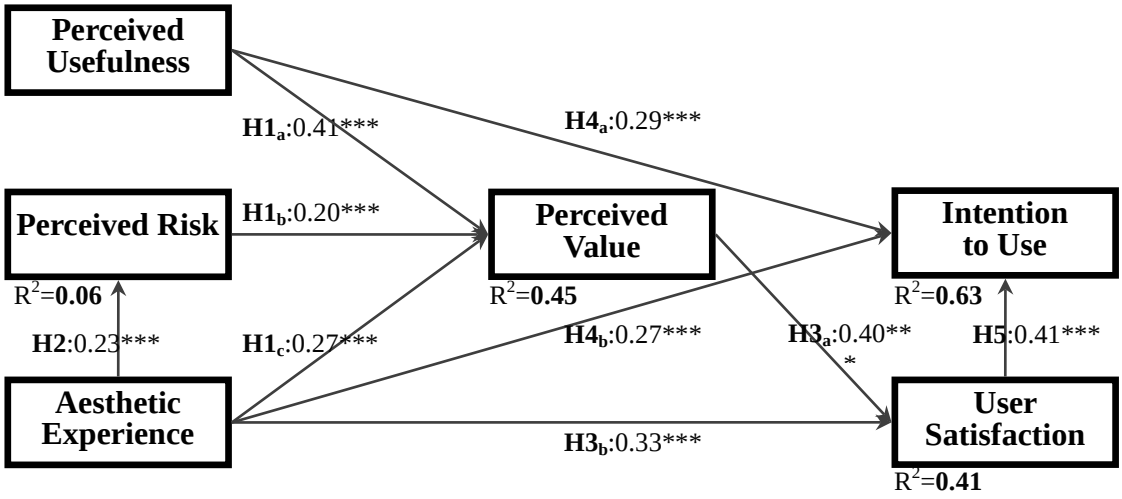

FIGURE 1. Model testing results (***p<0.001,**p<0.01,*p<0.05)

First, we investigate the relationship of the perceived usefulness, perceived risk, and aesthetic experience with the perceived value. The results indicate that the perceived usefulness is positive and significantly associated with the perceived value (β=0.41, t-value=7.32). In addition, perceived risk is positive and significantly associated with perceived value (β=0.20, t-value=3.99). Finally, aesthetic experience also is positive and significantly associated with perceived value (β=0.27, t-value=4.69). Thus, $H1_{a,}$ $H1_b$, and $H1_c$ are supported. In addition, these three factors explain 45% of the variance in perceived value. The results show the perceived usefulness has the highest direct impact on perceived value, followed by aesthetic experience. Users who respond more positively for perceived usefulness, and nice operation experience are more willing to participate and fondness of RFID service. The result corresponds with findings from Schaik and Ling (2008), Lee and Wu (2011). Furthermore, perceived risk has a significant direct effect on the perceived value and indirect effect on adoption intention of high-tech service, but some TAM researchers have found contradicting results (Cheng et al, 2006; Wu and Wang, 2005). Thus, it is suitable when applying TAM to explain the users' adoption of new high-tech service, not only the adoption intention but also the perceived value should be included in order to understand users' actual use and behaviors under perceived risk. Similarly, aesthetic experience also has a

significantly positive relationship with perceived risk (β=0.23, p=0.000). Therefore, H_2 is supported and the result consistent with findings from Im et al. (2008).

Second, the results for user satisfaction show that perceived value has a positive effect on user satisfaction for RFID (β=0.40, t-value=6.80). In addition, aesthetic experience also has a positive effect on user satisfaction for using RFID (β=0.33, t-value=5.57). Thus, $H3_a$ and $H3_b$ are supported. In addition, these two factors explain 41% of the variance in user satisfaction. In terms of direct effect, we found perceived value has the greatest impact. Thus, a RFID service that provides more benefits (e.g., as a useful, stable, privacy operation for users) will have a more positive impact on user satisfaction. These results correspond with findings from Hallowell (1996), DeLone and McLean (2003), and Chong et al. (2010). Besides, Davis (2010) also found the convenient value was the most important factor in mobile phone usage. The findings could provide RFID service companies some references for understanding users' need.

Finally, we examined the relationship between the causal paths and intention to use. In our analysis, we found that intention to use is significantly affected by perceived usefulness (β=0.29, t-value=6.23), aesthetics experience (β=0.27, t-value=5.32), and user satisfaction (β=0.41, t-value=8.56). These three factors explain 63% of the variance in intention to use. Thus, $H4_a$, $H4_b$ and H5 are supported. User satisfaction has the highest direct impact, followed by perceived usefulness. In advance, in terms of total effect, we found aesthetic experience has the greatest impact. The results indicated that ubiquitous connectivity and contextual offering have significant effects on flow experience, including perceived enjoyment, and perceived control and attention focus. It means the concepts of aesthetic experience equally important functions for the design of the RFID service, as important as the technology itself.

5. Implications for Research and Practice

Past research investigated whether or not an individual is used to the information system and their intention behavior. To expand this line of research, this study examined the multidimensional perception (perceived usefulness, perceived risk, and perceived value) and psychological variables (aesthetic experience and user satisfaction) to further explore the behavioral patterns of users with the intention to use RFID.

First, perceived usefulness has a higher positive influence on perceived value than perceived risk and aesthetic experience. Perceived risk has the least influence on perceived value. Thus it is evident that when an individual believes RFID is valuable they also feel it is useful. In addition, if the RFID device provides a nice looking interface and pleasure during the service, it improves its value. However, empirical results showed that perceived risk is the least of the factors that affect the decision of an individual to use or not use RFID. This might be due to the fact that there is no guarantee for relevant security or safety issues that come with the RFID service or the RFID device at present. Thus, users do not have a way to make a proper assessment of the possible risks. Although individuals may agree that the perceived risk involved is a critical factor for deciding to use a RFID service or not, they also doubt the current wireless transmission technology and information security with RFID at present. Furthermore, the empirical results also show that the aesthetic experience can affect an individual's perception of perceived risk for RFID. This means that the aesthetic appearance of the RFID service or device catches people's attention and that the feeling of pleasure in using the device can be used to promote it while ignoring the potential risk

of the RFID service.

Second, we investigated user satisfaction and its relationship with other dominants. In this research we found that perceived value has the highest direct impact, followed by aesthetic appearance. In addition, aesthetic appearance has the highest total effect on user satisfaction, while perceived usefulness and perceived risk both have a weak positive indirect impact on user satisfaction. Therefore, it is the perceived value that forms the users' perception of a product or service. Thus, if RFID service or devices can simultaneously provide useful, safe, and aesthetic appearance functions, then it will induce positive user satisfaction. Thus, those RFID users that can not readily be satisfied with one feature only, such as useful function, safety service, or aesthetic appearance, will now be satisfied. This finding is contrary to the prior researches that found that perceived usefulness was the most important factor affecting the users' satisfaction. Our empirical results present the novel findings that information technology providers should offer a total solution to give users proper satisfaction, and they should focus on the value of the product. Besides, the aesthetic appearance of a product will help to enhance the users' satisfaction.

Finally, we investigated the intention to use and its relationship with other dominants. In terms of direct effect, we found that user satisfaction has the greatest impact, followed by perceived usefulness and aesthetics experience. Thus, if users are satisfied with the RFID service, than that will have much greater positive impact on intention to use. In addition, if the RFID provides a useful service and an enjoyable experience for users then that will have a larger positive impact on adoption behavior. In terms of indirect effect, we found that perceived value and aesthetic experience have the largest impact on intention to use. In terms of total effect, aesthetic experience has the highest significant influence on users with intent to use RFID, followed by user satisfaction and perceived usefulness. Furthermore, if users have a good aesthetic experience while using RFID they will not only be directly satisfied but it will also stimulate their behavior for RFID adoption.

6. Conclusion

This research made several key findings regarding the implications and determinants of RFID adoption on individuals. These key findings are as follows. (1) Four variables (i.e., perceived usefulness, perceived value, aesthetic experience, and user satisfaction) were found to be significant determinants of RFID adoption. However, perceived risk was found to be an insignificant determinant of RFID adoption. (2) Among the determinants, perceived value was the most direct influential factor affecting user satisfaction for adopting RFID, followed by aesthetic experience. (3) Among the determinants, aesthetics experience was the most influential factor affecting RFID adoption, followed by user satisfaction (4) This research found that these two significant determinants of RFID adoption (i.e., aesthetics experience and perceived value), were seldom explored in prior research on IT adoption. (5) This study empirically used a large and representative sample consisting of RFID users in Taiwan. Thus, the findings of this research are valuable and provide several important implications for research in RFID adoption and in practice.

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附錄

- 本研究計畫成果發表在下列國際期刊：

1. C. C. Chen* (2012), "Identifying drivers for adoption intention in RFID service", *International Journal of Mobile Communications*, Vol. 10, No. 3, pp. 231-247. (SSCI, Impact Factor: 0.940)
   JCR Ranking in 2010: Journal in communication (25/67)

- 本研究計畫成果發表在下列國際研討會：

1. C. C. Chen, B. S. Lee and H. S. Chiang (2012), "Why Do People Use Radio Frequency Identification in Fashion Industry?", The 2012 International Conference on Business and Information (BAI2012), July 3-5, Sapporo, Japan.
2. C. C. Chen, H. H. Tseng and T. C. Huang (2012), "Development a Smart Shopping Environment in Home Furnishing Retailer System with RFID Technology", The 2012 International Conference on Business and Information (BAI2012), July 3-5, Sapporo, Japan.

國科會補助專題研究計畫項下出席國際學術會議心得報告

日期：101 年 7 月 9 日

計畫編號	NSC 100-2410-H-029-043		
計畫名稱	以即時企業為觀點探討使用者對於 RFID 系統的接受行為：發展並驗證一個以價值為核心的科技接受模式		
出國人員 姓名	陳佳楨	服務機構及 職稱	東海大學 資訊管理學系 助理教授
會議時間	101 年 7 月 3 日至 101 年 7 月 5 日	會議地點	日本札幌
會議名稱	2012 International Conference on Business and Information (BAI2012)		
發表論文 題目	Why do people use radio frequency identification in fashion industry?		

一、參加會議經過

後學於101年7月3日出席BAI2012國際研討會，此研討會共進行三天的議程安排與論文報告，本研討會主要是由台北大學商學院與實踐大學合辦，超過1,100篇的投稿文章且來自於42個不同的國家，而最後共接受645篇論文投稿，並且分在79個議程中來進行報告，算是非常大型且成功的國際研討會。本次發表的文章「Why do people use radio frequency identification in fashion industry?」，乃是是整合科技接受模式(Technology Acceptance Model，TAM)與創新擴散理論(Diffusion of Innovation Theory，DIT)的研究變數，去探討服飾業採用RFID應用服務技術的關鍵因素與消費者的使用意願，最後提出本研究的實驗模型與分析結果。

二、與會心得

本研討會地點安排在Renaissance Sapporo Hotel的國際會議廳舉行**(如圖一)**，由於後學於8點就到研討會場地報到，藉著寶貴的機會能向國際學者交流與學習，而在會場大廳中巧遇BAI2012研討會主席方文昌院長(台北大學)與盧希鵬教授(臺科大)，言談之中，深深感受到方院長對於籌辦國際研討會的用心與規劃，而盧希鵬教授的謙卑態度與嚴謹學術追求也是後學所敬佩的，雖然只短暫交流了半小時，但卻是非常難能可貴的經驗**(如圖二)**。

後學的論文是在「Technology and Innovation Management 」議程的早上10點10分至12點場次中報告，由於較早到會場而有機會與上一場議程主持人Suranaree University of

Technology的Nittaya Kerdprasop 教授合影**(如圖三)**，並討論相關有趣的文章與研究；而本場次中的第五篇文章「Smart Phone System Rethink: A New Technology Acceptance Model for Travel Industry」，其研究方法也是採用科技接受模式於旅遊業，而研究結果也提出不同於以往的觀點與研究構面，相當具有原創性與實用性，可見許多國際學者在探討資訊系統採用意願或是使用者滿意度皆會採用或是整合TAM至論文中。

三、建議

後學非常感謝人文處管理二學門的鼓勵與支持，讓後學有如此寶貴的機會與經驗至日本札幌參加BAI2012國際研討會，且能夠與許多國際學者進行學術交流與分享彼此的研究歷程與願景，的確是一趟非常棒的學術旅程。另外，後學也與兩位碩士班指導學生共同前往，相信對於兩位同學來說也是從中學習到上台報告的經驗與對於學術研究有更深層的認識。最後，再次感謝學門的支持與栽培，希望未來能夠有更多的機會去參加與學習。

四、攜回資料: 後學攜回 BAI2012 論文集與論文光碟**(如圖四)**。

圖一、BAI2012 研討會刊登版(後學與指導學生合影)

圖二、後學與 BAI2012 研討會主席方文昌院長(台北大學)、盧希鵬教授(臺科大)合影

圖三、後學與議程主持人Suranaree University of Technology的Nittaya Kerdprasop 教授合影

圖四、BAI2012 國際研討會論文集與光碟

五、接受信函與議程安排

來源: BAI.program <bai.program@atisr.org>
收信: emily@thu.edu.tw
日期: Tue, 17 Apr 2012 20:35:21 +0800
標題: BAI2012 Program/Schedule (Tentative)!

Dear BAI2012 conference participants,

Greetings from BAI2012 conference!

A. Your paper had been arranged as follows. Please kindly check.

B. Please notify your co-authors, review all of your information, and alert us by Tuesday, April 24, 2012 as to any errors or changes that need to be made.

Nothing will be changed after April 25, 2012.

We do our best to make up the schedule.

Please kindly understand any changes will affect the arrangement of BAI2012 agenda.

Please avoid exchanging the sessions unless you have special demand.

Your kindly understanding and cooperation will be appreciated.

C. The session is “NONE” when we have not received registration fee.

Unpaid papers will be treated as withdrawing. PLEASE KINDLY UNDERSTAND.

The presenter's name is blank when we have not received registration. Please log in the account to make registration as soon as possible.

Please contact us if any change is need.

Sincerely,

BAI2012 Organizing Committee

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For the problems about BAI2012, please email to bai@atisr.org

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For conference program, please email to bai.program@atisr.org

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Paper Title	Authors	Session	Presenter’ s Name
Paper ID: #5225 Why Do People Use Radio Frequency Identification in Fashion Industry ?	Chia Chen Chen No.181, Sec. 3, Taichung Port Rd., Xitun Dist., Taichung Cit Bing Shin Lee No.181, Sec. 3, Taichung Port Rd., Xitun Dist., Taichung Cit Hsiu Sen Chiang No.181, Sec. 3, Taichung Port Rd., Xitun Dist., Taichung Cit	H4 10:10~12:00, July 05, 2012	Bing Shin Lee Tunghai University

Session [H4] **10:10 – 12:00** **Raffaeollo II**

Technology and Innovation Management

Session Chair: Kenneth G. Huang **Singapore Management University**

Why Do People Use Radio Frequency Identification in Fashion Industry?

Chia-Chen Chen Tunghai University
Bing-Shin Lee Tunghai University
Hsiu-Sen Chiang National Taichung University of Science and Technology

Local Technology Embeddedness and Intellectual Property Rights Does Subsidiaries Role Matter?

Wen-Bin Chuang National Chi-Nan University
Chun-Chie Huang National Chi-Nan University

Uncertain Intellectual Property Conditions and Knowledge Appropriation: Evidence from the Genomics Industry

Kenneth G. Huang Singapore Management University

Management of Service Innovation in the Manufacturing Industry

Chia-Lung Chen National Taichung University of Education
P. Y. Yang National Taichung University of Education

Smart Phone System Rethink: A New Technology Acceptance Model for Travel Industry

Sheng-Wei Lin Chinese Culture University
Shinyi Lin Chinese Culture University

The Relationship Amongst Moral Consciousness, Corporation's Environmental Strategy, and Economic Performance

Cheng-Li Huang Tamkang University
Kun-Shan Wu Tamkang University
Ju-Lan Tsai Tamkang University

Business and Information 2012
(Sapporo, July 3-5)

WHY DO PEOPLE USE RADIO FREQUENCY IDENTIFICATION IN FASHION INDUSTRY?

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ABSTRACT

Business is always seeking innovation and new IT technology to maintain competitive advantage. The Radio Frequency Identification (RFID) is a new applied technology in the limelight. However, companies have to pay for the import process, such as system integration and technical training. As the result, business still keeps reservations about this technology in the current phase.

RFID have been widely used in the United States, Europe and Japan though this technology. However, the RFID development and implementation is still in start-up phase. For example, PRADA has tagged RFID on all clothes in New York PRADA Epicenter, to record all clothing styles, sizes, colors and price information. When customers pass with the PRADA clothes, the RFID system start play the same style demonstrated in Milan Fashion Show on the screen and meet the customer's sense of accomplishment. The Germany company - Gardeur also has applied RFID technology into supply chain to reduce unnecessary expenses in 2003. In addition, the Swedish company - Taracci also has used RFID in their newly opened stores at Forum Nacka shopping mall in 2008. By labeling all commercial items, the RFID increases the speed of inventory and replenishment dramatically. Moreover, the RFID technology let the customer can immediately obtain related information in the fitting room. Despite all the successful experience, most companies in Taiwan is still keeping reservations about RFID technology and its implementation.

Convenience of RFID has let it be one of the most popular technology for the firms in the world, but still few in the clothing industry, especially in Taiwan. Most of the RFID research before are focus on retailers and supply chain, few of them is about

the using in physical store, so the issue of this study is “Why Do People Use Radio Frequency Identification in Fashion Industry ?”, use the Technology Organization Environment(TOE) framework, investigate the external and internal situation of technology, organization and environment in clothing industry, with the theories like Technology Acceptance Model(TAM) and Theory of Diffusion of Innovation(DOI), through the analysis of technical requirements, organization operation mode, industrial environment and the impact of the competitors, find out the assist and resistance power to figure out the reason clothing industry introduce new technology or not, and hope the result can extend to other industry.

Keyword: Radio Frequency Identification, Fashion Industry, Technology Organization Environment, Technology Acceptance Model, Theory of Diffusion of Innovation

國科會補助計畫衍生研發成果推廣資料表

日期:2012/10/29

國科會補助計畫	計畫名稱: 以即時企業為觀點探討使用者對於RFID系統的接受行為：發展並驗證一個以價值為核心的科技接受模式
	計畫主持人: 陳佳楨
	計畫編號: 100-2410-H-029-043- 學門領域: 資訊管理

無研發成果推廣資料

100 年度專題研究計畫研究成果彙整表

計畫主持人：陳佳楨	計畫編號：100-2410-H-029-043-
計畫名稱：以即時企業為觀點探討使用者對於 RFID 系統的接受行為：發展並驗證一個以價值為核心的科技接受模式	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	0%	篇	
		研究報告/技術報告	0	0	0%		
		研討會論文	0	0	0%		
		專書	0	0	0%		
	專利	申請中件數	0	0	0%	件	
		已獲得件數	0	0	0%		
	技術移轉	件數	0	0	0%	件	
		權利金	0	0	0%	千元	
	參與計畫人力（本國籍）	碩士生	1	1	100%	人次	本計畫原先核定為 1 名碩士生，而實際參與人力為 1 名碩二生，非常感謝人文處管理二學門對後學的栽培與補助。
		博士生	0	0	0%		
		博士後研究員	0	0	0%		
		專任助理	0	0	0%		
國外	論文著作	期刊論文	1	1	100%	篇	本研究成果刊登在 SSCI 期刊(International Journal of Mobile Communications)一篇，非常感謝人文處管理二學門對後學的栽培與補助，才能有此成果。
		研究報告/技術報告	0	0	0%		
		研討會論文	2	1	200%		本研究成果刊登在國際研討會 2 篇，非常感謝人文處管理二學門對後學的栽培與補

							助，才能有此成果。
		專書	0	0	0%	章/本	
	專利	申請中件數	0	0	0%	件	
		已獲得件數	0	0	0%		
	技術移轉	件數	0	0	0%	件	
		權利金	0	0	0%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	0%	人次	
		博士生	0	0	0%		
		博士後研究員	0	0	0%		
		專任助理	0	0	0%		

其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)	本研究成果刊登在下列國際 SSCI 期刊： 1.C. C. Chen* (2012), ’ Identifying drivers for adoption intention in RFID service’, International Journal of Mobile Communications, Vol. 10, No. 3, pp. 231-247. (SSCI, Impact Factor: 0.940) JCR Ranking in 2010: Journal in communication (25/67) 本研究成果刊登在下列國際研討會： 1.C. C. Chen, B. S. Lee and H. S. Chiang (2012), ’ Why Do People Use Radio Frequency Identification in Fashion Industry?’, The 2012 International Conference on Business and Information (BAI2012), July 3-5, Sapporo, Japan. 2.C. C. Chen, H. H. Tseng and T. C. Huang (2012), ’ Development a Smart Shopping Environment in Home Furnishing Retailer System with RFID Technology’, The 2012 International Conference on Business and Information (BAI2012), July 3-5, Sapporo, Japan.

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

□實驗失敗

□因故實驗中斷

□其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文：■已發表 □未發表之文稿 □撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：(以 100 字為限)

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）(以 500 字為限)

1. 學術成就: 以往許多研究探討 RFID 導入成功關鍵因素，但甚少研究指出其與使用者心理層面之關聯性，因此，本研究將以「認知價值」、「認知風險」兩大心理構面為出發點，整合 Davis (1986)所提出的科技接受模式(Technology Acceptance Model, TAM)，去探討使用態度；另外，本研究也提出「使用經驗」構面，並整合 DeLone & McLean (2003)的資訊系統成功模式(Informational System Success Model, ISSM)，去探討使用者滿意度；最終，再以使用態度與使用者滿意度去探討使用者的使用意向。

2.學術價值: 因此，本研究將從即時企業的觀點，發展與驗證一個以價值為核心的科技接受模式，去探討使用者對於 RFID 系統的接受行為，冀望能提供給產、學界具有實務與參考價值的模型與分析結果。

3.社會影響: 相關產業或公司採用創新的資訊系統或技術(RFID、ZigBee)，皆可透過本研究所提出之建議與結論，來設計資訊技術導入策略與階段，對於改良公司營運方式與提升顧客忠誠度上，預期有明顯的貢獻與參考價值。