RFID Implementation Readiness Model : Impact of Technology, Human, Vender, and Task Factors

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ABSTRACT

Currently, many companies are interested in (Radio Frequency Identification (RFID). Nonetheless, technical imperfection and the uncertainty of Return on Investment (ROI) is discouraging the companies' intention to implement RFID. Accordingly, while a number of companies concede the efficiency of RFID, few of them expresses enthusiasm, making a rain check to adopt RFID. Moreover, the recent economic depression has down-sized the companies' investment on Information Technology (IT), subsequently hindering RFID implementation. In adopting RFID, the collaboration of supply chain is the most importance factor. Therefore, in implementing RFID, many companies reinforced collaboration of supply chain. Therefore, this study will focus on performing an analysis on several factors which influence the intention to adoption of RFID, such as the human factor, technology factor, vender factor and task factor. The results of this study will provide useful guidelines for RFID adoption strategy to Korean companies.

Key words : RFID, Adoption, Task, Technology, Human, Vender, Readiness Model

1. Introduction

The Radio Frequency IDentification (RFID) is regarded by many companies as a new technology to replace the bar-cord technology [33]. Companies are enthusiastic about RFID since it would accomplish process innovation by facilitating a ubiquitous task managing environment and by helping the company assure predominance on competition [60][61]. Unfortunately, the current economic depression has forced companies, while admitting the efficiency of RFID, to be hesitant about actually investing on adopting RFID. This worldwide depression in 2007, along with the RFID tag recognition issue and the humongous investment cost, are impeding RFID adoption. Therefore many companies are lacking confidence on the Return on Investment of RFID adoption.

Since many companies are showing interest in adopting RFID [41], researches on this field are progressing from exploratory studies to confirmative studies [49]. Looking into important RFID studies, there was a case study on RFID efficiency [39][31], RFID application research on the system development regarding studies and several others [45][10][55]. These prior studies show that RFID can be applied to diverse fields and brings efficiency.

Hence, at this point where the efficiency of RFID is being validated and the adoption increasing, studies that would provide strategic implications for companies that are considering to adopt RFID, has become an essential need [35][36][64]. Nonetheless, studies regarding diverse factors companies should consider when adopting RFID runs short. Important factors companies' should consider in terms of stimulating adoption are the following; technology, human, task, and vender factors. There were some studies speculating RFID acceptance case by case, analyzing technological characteristics, evaluating the task suitability, or evaluating the vender, but none of them has provided a practical guideline on RFID adoption intensively. Therefore this study aims to proceed by focusing on the impacts between the major factors (human, technology, task, and vender factors) and the intention to adopt RFID.

In order to provide a theoretical foundation for RFID adoption, this study has used Davis's (1999) Technology Acceptance Model [17]. According to this model, the acceptance intention for a technology develops into an actual use of efficiently utilizing it. Therefore the adoption intention of RFID suggested in this model will eventually lead to RFID adoption.

In reality, for companies to adopt RFID, a number of conditions should precede. First, RFID infrastructure should be built within the companies' constitution. Second, RFID task support should be understood. Last but not least, RFID solution vender should be evaluated and understood. For example, companies which are in progress of adopting RFID feel the desire to benchmark companies that have successfully accomplished task innovation through RFID adoption, and feel more secure of the RFID implementation outcome if a RFID vender with high technology exists. Also, if an innovative leader within the company that possesses high IT initiates the RFID education, there would be higher liability and positive attitude toward RFID. This would also apply if a higher desire for information visualization and task innovation exists when carrying out common tasks with a supply chain partner company through the IS. Therefore analysis on human, technology, vender, and task factors, which influence RFID adoption, are required.

This research will provide the following views for companies preparing to adopt RFID. First, many companies are taking on a wait-and-see prospective about RFID adoption, due to the current economic depression and RFID uncertainty.

This study will analyze the effects of technology, human, task, and vender factors on RFID adoption so as to provide a conceptual framework that would help implement the RFID acceptance stances. In addition it would provide views that could be utilized as a decision making model for RFID adoption. Second, for actual RFID adoption, a successful RFID implementation guideline is essential. This research will analyze the technology, human, task, and vender factors of intention to adopt RFID, useful information for successful RFID implementation.

2. Prior Research and Hypotheses

2.1 RFID Research

Currently, a number of companies are interested in task innovation through RFID. Consequent to increase in task innovation that RFID has brought,

diverse researches have been done on RFID. The character of researches are also developing from exploratory to confirmative studies, although exploratory researches are also being continued [30]. Recent research on RFID adoption covers diverse themes such as system development research, RFID implementation case research, RFID application on practical affairs, empirical investigation to provide a RFID implementation readiness model. Lately, RFID regarding studies involve logistics, distribution, manufacture, retail, food, IT, security and medication industry. Major researches on RFID adoption are in <Table 1>.

2.2 Research Framework

The purpose of this study is to analyze preceding factors that influence RFID adoption willingness intention, and present a practical viewpoint. In accordance with this purpose, it has

<Table 1> Prior Research of implementing RFID

Researcher	Methodology	Research Contents
Lai et al. (2005)	Interview	Suggestions on opportunity and risk factors of RFID adoption in China
Jones et al.(2005)	Literature study	suggestions on factors necessary for RFID adoption in UK
Wu et al.(2006)	Literature study	Problems and Solutions for Successful RFID adoption
Ngai et al.(2007)	Case Study	Container management using RFID and their strategic implementation.
Kim, Yoon (2007)	Case Study	Researches on RFID applied to Korean domestic electronic devices
Brown, Russel (2007)	Literature study	Risk management factor analysis on successful RFID adoption in retail
Miller (2007)	Literature study	RFID Solution evaluation
Szmerekovsky & Zhang, (2008)	Empirical research	Item-level inventory management using RFID
Hossain, Prybutok, (2008)	Empirical research	RFID consumer acceptance
Muller-Seitz, et al., (2009)	Empirical research	Consumer adoption and RFID performance in retail industry
Katz, Rice, 2009	Empirical research	RFID application of medical areas
Tu, et al., (2009)	System Implementation	RFID healthcare systems
Lee & Chan, (2009)	System Implementation	RFID Adoption in logistics
Chen, Tu, (2009)	System Implementation	Development of agent systems in RFID based manufacturing
Poon, et al., (2009)	System Implementation	Development of warehouse management systems using RFID
Angeles (2009)	Empirical Research	Importance of IT infrastructure and SCM capability in implementing RFID

exerted Davis (1991)'s TAM and Kim, Ferrin, Rao (2008)'s Trust based Consumer Decision-Making Model as a theoretical basis. This study classified influential factors into human, technology, vendor, and task factors for the purpose of analyzing preceding researches and investigate the influence it has on RFID adoption intention. It will then provide viewpoints for RFID adoption.

2.3 Technology Factors

In terms of RFID adoption, technology factors such as information capacity, system infrastructure capacity are significant [5][41]. These technology factors have much influence over whether or not the company will successfully adopt RFID [38]. Especially, representative factors that consider RFID adoption of organizations are RFID capacity and system assurance capability [49].

IT capacity refers to the company members' ability to utilize IS and the management ability of the corporation [50][46]. Looking into preceeding studies, IT capacity provides a basis for improving a companies' management achievement while education, IT knowledge, and IT communication ability among members are used as a barometer for evaluating IT capacity [58][24][18][12]. Also, Lim (2010) asserted RFID capability of organizational members is important factor for implementing successful RFID [49]. Based on preceding researches, this research will suggest a hypothesis that high RFID capability possessed by a company would significantly affect RFID adoption intention.

System assurance capability appertains to capacity that can stably, independently operate a network-based IS in purpose of information exchange among supply chain companies. A model that could safely enable customer information exchange between the service providing company and a service receiving company when a customer

purchases by credit card on the internet would be a good example. So would a IS that two companies could reliably utilize through mutual connection. Ambrose, Johnson (1998) takes system assurance crucial factor for information trade activation through the internet. Kini, Choobineh (1988) asserts that for the sake of smooth customer and company relations based on trust, system assurance capability is ever important [40]. RFID is a IS operating by conjoining the ERP system or preceding systems. In supply network, RFID system produces efficient outcomes when the integrity and connection to the IT system is securer [4][49]. Thus, we posit the following hypotheses.

[H1] The high RFID capability possessed by an organization significantly affects RFID adoption intention

[H2] System assurance capability significantly affects the RFID adoption intention of the company.

2.4 Human Factors

In terms of technology adoption, human factors are crucial. Davis (1989) presented TAM, emphasizing the importance of human factors in the process of technology adoption [17]. TAM is based on TRA [6]. As a research that empirically proves that beliefs toward technology influences IT adoption, attitude and intention, it is applied to diverse new IT adoptions. After Davis (1991), other researches that applied TAM are the electronic mail adoption [17][21], word-processor and spread shift software adoption [9][66], computer and internet adoption [7][34], internet banking adoption [13], electronic library adoption [28], e-commerce adoption [22] and RFID adoption [30], etc.

Also the TCDM of Kim et al. (2008), which this research founds its theoretical basis, provided a

TCDM that a customers' trust and attitude influences e-commerce and also that risk influences intention of using e-commerces, based on the TRA and TAM [38]. In addition, Ganesan (1994) said that trust in relations between purchaser and seller in the supply network can reduce risk, and eventually help build a long-term relationship [2]. In short, trust serves as a factor that helps the company achieve its goal [3,][51]. Likewisely, TCDM of Kim et al. (2008) shows that trust affects purchase intention. Thus, we posit the following hypotheses.

[H3] Trust toward RFID significantly affects the RFID adoption intention.

[H4] Positive attitude toward RFID significantly affects the RFID adoption intention

2.5 Task Factors

Companies are accomplishing task innovation through adopting IT. Recently IT has enabled task process innovation, leading to the company's management improvement. IS like ERP, CRM and SCM, which till recently have assisted process innovation within the company, are being advanced to support task process between companies. By adopting RFID to support complicated tasks, companies are attaining task innovation through enforcing task process connection between companies, and reinforcing collaboration. This study will analyze the influence of task process integrity enhancement and the collaboration factor as task factors affecting RFID adoption intention.

Task process integrity refers to connection among companies within the supply chain that can efficiently processes tasks through collaboration. The progress of Internet and information communication technology has reinforced interaction between companies through network, which has enabled the companies' innovation. The value of

business performance in supply chain enterprises dependant on supporting business process integration. Especially, in the case of today's RFID, task process integrity of the supply chain should be high in order to achieve innovative achievements [62]. According to the study of Gulati, Garino (2000), virtual integrity and physical integrity levels have a significant effect on trade relations and achievements [23]. Dynamic task capacity attained by providing various channel services facilitates integrity when consummating e-business, as stated in the research of Daniel, Wilson (2003) [16]. In conclusion, task process integrity helps achieve a companies' eventual pursuit. Thus, we posit the following hypotheses.

[H5] When adopting RIFD, task process integrity significantly affects intention to adopt RFID.

Collaboration refers to activity which one or more than two departments, or companies constitute a partnership, working towards a common goal. As IT began to serve as a process integrating value producer, a number of companies began to collaborative work through an IS among companies. Primarily, SCM oriented companies are pushing for diverse forms of collaborative work. Nowadays supply chain companies are proceeding variegated types of collaborative work as QR, ECR, VMI, CPFR to accomplish task innovation [15]. The essence of these collaboration strategies is common task pursue, mutual information commission, partnership among companies. [15][29] [10][28][66][4]. Soliman, Janz (2004) suggested major success factors of collaborative work outcome improvement through Internet based IS [57], and Byrd, Davidson (2003) asserted that IT has critical influence upon management improvement through managing the supply chain [8]. Likewise, RFID which supports collaboration among supply chain companies improves business

performance. Thus, we posit the following hypotheses.

[H6] When considering RFID, collaboration significantly affects intention to adopt RFID.

2.6 Vender Factors

When adopting the RFID, companies execute a RFID solution evaluation. RFID solution evaluation is a critical course to efficacious RFID adoption. Many companies hold vendor technology and vender IT capacity as vendor related factors that influence RFID adoption. This study suggests RFID vendor capacity and reference embodied by RFID solution vendor as factors that affect the companies' RFID adoption motive. Vendor capacity means the companies' capacity to efficaciously embody an IS and reference refers to a successfully embodied case or an IS site. According to Aloini (2007)'s study, IT vendor capacity decides the success of ERP system implementation, therefore the selection of a vendor is critical to constituting an ERP system [2]. Ahn, Choi (2007) states that IT vendor business strategy, IT vendor's ability to develop, reputation of the vendor, successful IT embodiment case are critical factors in evaluating the ERP system vendor [1]. These factors also applies to RFID, where IT vendor ability to develop and reference is a significant evaluation criteria. Sebastian et al., (2006) in their research on RFID infrastructure evaluation, highlighted the importance of IT vendor capacity in successful RFID embodiment [56]. Also Miller (2007) asserted that IT vendor capacity and reference is an important factor through the RFID system evaluation model [52]. Therefore the probability of successful RFID establishment, heightens RFID reliability, facilitating RFID adoption. Thus, we posit the following hypotheses.
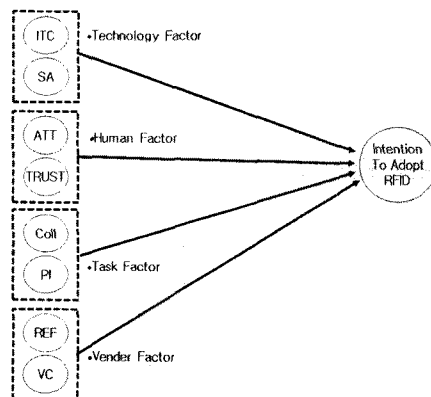
[H7] RFID vendor capacity significantly affects RFID adoption intention.

[H8] Successful RFID implementation references significantly affect RFID adoption intention.

3. Research Model

3.1 Research Model

This research provides a conceptual framework which demonstrates how human factors, technology factors, task process factors and vendor factors influence RFID adoption intention.

[Figure 1] Research Model

This research conducted to understanding for influencing factors in adopting RFID. By this, this research intends to provide the view points for efficacious RFID in adopting RFID. The research model of this research is in [Figure 1]

3.2 Research Variables

This research determinate research variables through the research hypothesis based on preceding RFID studies. The research variables are roughly divided into 5 criterions. Mainly, the independent variables consist of human, technology, process and vendor factors. The dependant variable is the RFID adoption intention. First, RFID adoption intention, which is the dependant variable, has been covered

in many technology endorsement related researches. This study has enacted 5 measurement items by referring the prior studies [21][38][42][49]. Second, human factors represent the organization members' perception of RFID adoption. This study composed organization members' attitude and trust towards RFID as research variables. Attitude towards RFID was measured by 3 items based on the prior study [42][43][59]. Also, RFID trust was measured by 4 items based on prior research [21][42][43][49][19]. Third, technology factor refers to managerial and technical matters related to RFID adoption. This study enacts RFID capacity and system assurance capability as research variables. System assurance capability is measured by 4 items based on the prior study [21][41][49]. RFID capability measured by items of Lim (2008). Forth, vendor factors refer to matters related to the technology of the system integration service providing company. The RFID vendor capacity is composed of 4 items based on the prior study [51][42][43][19]. Vendor reference is composed of 3 items based on the prior study [42][43][19]. Fifth, task factors refer to factors regarding task innovation in result of RFID adoption. This study composed task process integrity and collaboration as research variables. Task process integrity was measured by 3 items based on the prior study [32]. Collaboration was measured by 3 items based on the prior study [61][66][4][49]. Studies on the measurement items of each research variables are as in <Appendix 1>.

3.3 Measurement

To test the research model, we conducted a survey on RFID intention to adoption with employees of companies that are planning to adopt RFID. The survey was conducted with expert surveyors that is the world survey company (http://www.wsurvey.net). The measurement items of this research was composed of a seven point

Likert types scales. The survey for this study was carried out during March 2009. In this research, we ware collected 250 respondents and statistically analyzed by individuals.

4. Empirical Analysis

4.1 Basic Information

This research has used SMART PLS 2.0 to conduct a reliability analysis, validity analysis and SEM analysis. SMART PLS 2.0 is a software frequently used in studies using as SEM a tool to test hypotheses. The study conducted a structural and measurement model analysis with the collected surveys. The category of business and the position, age, industry types, experience of the survey subjects are as the following in [Appendix 2].

4.2 Reliability and Validity

This research investigated the RFID adoption intention and influence factors. It also has analyzed the reliability and validity of the measurement variables. Regarding the reliability analysis, we conducted a Cronbach's alpha and AVE value. And for measuring validity, we conducted factor analysis and correlation analysis.

<Table 2> Reliability and AVE

Variables	AVE	Composite Reliability	Cronbachs Alpha
adopt	0.725182	0.929485	0.905007
att	0.743976	0.920696	0.885071
col	0.756204	0.902949	0.838994
itc	0.760001	0.904655	0.842159
pi	0.664719	0.856014	0.747674
ref	0.830162	0.936131	0.897468
sa	0.782794	0.935098	0.907442
trust	0.735102	0.917352	0.880084
vc	0.755157	0.924973	0.891698

First, we conducted a Cronbach's alpha test and AVE value on the research variables drawn from the factor analysis. Generally in social science studies if the Cronbach's alpha value and AVE value is higher than 0.7, the data is regarded as reliable [14][54]. Also, the CSRI evaluate validity.

In this study, the CSRI value showed over 0.7, it is attained the reliability [26]. The factor analysis result of the research variables and the Cronbach's alpha test, AVE, and CSRI result are as the following.

We analysis the factor analysis. This research

<Table 3> Factor Analysis

	adopt	att	col	itc	pi	ref	sa	trust	vc
ITC1				0.827895					
ITC2				0.891308					
ITC3				0.894518					
atti1		0.812859							
atti2		0.893203							
atti3		0.872575							
atti4		0.869462							
bi1					0.791017				
bi2					0.827730				
bi3					0.826627				
colla1			0.854629						
colla2			0.881266						
colla3			0.872691						
adopt1	0.817273								
adopt2	0.859633								
adopt3	0.824279								
adopt4	0.885462								
adopt5	0.869212								
refer1						0.890428			
refer2						0.937532			4
refer3						0.904797			
sa1							0.850824		
sa2							0.905202		
sa3							0.896069		
sa4							0.885970		
trust1								0.856350	
trust2								0.847069	
trust3								0.863368	
trust4								0.862636	
vender1									0.834941
vender2									0.898640
vender3									0.866490
vender4									0.874724

<Table 4> Correlation Analysis

	adopt	att	col	itc	pi	ref	sa	trust	vc
adopt	1.000000								
att	0.621757	1.000000							
col	0.626519	0.664280	1.000000						
itc	0.616943	0.546164	0.626239	1.000000					
pi	0.558120	0.513727	0.677205	0.610996	1.000000				
ref	0.685640	0.580136	0.552010	0.555356	0.500952	1.000000			
sa	0.512560	0.466902	0.516389	0.520016	0.464760	0.471706	1.000000		
trust	0.603792	0.736165	0.633929	0.530386	0.525801	0.529402	0.390457	1.000000	
vc	0.688241	0.555494	0.562063	0.478657	0.563802	0.718421	0.552789	0.560386	1.000000

suggested the human, technology, task, and vendor factor as factors that influences RFID adoption. the result of reliability test and validity test have sufficient validity and reliability in terms of RFID adoption intention.

4.3 Correlation Analysis

This research analyzed the correlation to determine the discriminant validity of the variables. The correlation analysis are as in <table 4>. The correlation analysis result of all research variables were under 0.8, permitting a conclusion that it is a generally acceptable result [37]. Since the correlation value of the research variables are between 0.3 and 0.7. Also the independent research variables proved satisfactory discriminant validity.

4.4 Regression Analysis

This research conducted a PLS analysis of technology, human, vendor, and task factors that influence the RFID adoption intention. We employed the bootstrap technique with 1000 option [14] The PLS result showed in <Table 5>.

We observed the PLS analysis result of the influence that technology factors, human factors, task factors, and vender factors have on RFID adoption intention. The R^2 of our model were 0.641627. The regression analysis result of our

model as the following.

First, the RFID capability are t = 0.368095, (β = 0.185605), therefore the significance level was p < 0.001 allowing the hypothesis to be adopted. The attitude of RFID are t = 0.183092, (β = 0.095136),

<Table 5> SEM result

Hypotheses	β	T-Statistics	Result
itc ⇒ adopt	0.185605	0.368095***	Accept
sa ⇒ adopt	0.034757	0.074231	Reject
att ⇒ adopt	0.095136	0.183092**	Accept
trust ⇒ adopt	0.095805	0.190168**	Accept
col ⇒ adopt	0.097624	0.183668**	Accept
pi ⇒ adopt	0.009322	0.020345	Reject
ref ⇒ adopt	0.216199	0.396227***	Accept
vc ⇒ adopt	0.258202	0.468557***	Accept
※ R Square (Intention to adopt RFID) = 0.641627			
※ *** p-value < 0.001, ** p-value < 0.05			

therefore the significance level was p < 0.05 allowing the hypothesis to be adopted. The RFID trust are t = 0.190168, (β = 0.095805), therefore the significance level was p < 0.05 allowing the hypothesis to be adopted. The collaboration in supply chain are t = 0.183668, (β = 0.097624), therefore the significance level was p < 0.05 allowing the hypothesis to be adopted. The reference are t = 0.396227, (β = 0.216199), therefore the significance level was p < 0.001 allowing the hypothesis to be adopted. The vender capability are t = 0.468557, (β = 0.258202), therefore the

significance level was $p < 0.001$ allowing the hypothesis to be adopted. In conclusion, the RFID capability, attitude, collaboration, reference, trust, and vender capability affected RFID adoption intention.

Second, the system assurance capability are t = 0.074231 (β = 0.034757), therefore the significance level was $p < 0.001$ not allowing the hypothesis to be adopted. And, the task process integrity are t = 0.020345 (β = 0.009322), therefore the significance level was $p < 0.001$ not allowing the hypothesis to be adopted. In conclusion, the task process integrity and system assurance capability did not significantly affect RFID adoption intention. This result will provide viewpoints in terms of RFID adoption intention.

5. Conclusion

5.1 Summary

This research found an influencing factors on RFID adoption intention. Lately, attention on RFID has reduced according to the economic recession. However, due to anticipation that the economy will recover in the near future, interest towards RFID is increasing. Global leading companies of the US already possess several success cases regarding RFID adoption intention. For example, Wal-Mart, a worldwide retail company, is benchmarked by several companies as the best practice of RFID implementation.

Currently, RFID adoption level is still in its elementary stage [30]. Many companies are engaged, or at least adopting RFID for task process in some divisions. Since the utility of RFID adoption is inspected, RFID adoption will increase. At this point, providing Factors for successful adoption is very important. Beforehand of actual adoption, this researched has suggested viewpoints of factors that influence RFID adoption intention so

as to encourage RFID adoption.

This research analyzed factors that influence the intention to adopt RFID, specifically focusing on technology, human, task, and vendor factors. According to empirical results, six factors (RFID capability, attitude, trust, collaboration, reference, and vender capability) affect intend to adopt RFID and two factors (task process integrity and system assurance capability) didn't affect intention to adopt RFID

5.2 Implication and Discussion

RFID is the core technology of the future that will realize management innovation. Nonetheless, For now, technical imperfection and uncertainty of the ROI time is hindering RFID implementation in spite of high RFID adoption intention. Therefore companies are preparing for RFID adoption in several dimensions. This research attempted an analysis on antecedents and outcomes around RFID reliability as to encourage RFID adoption. The research implication are the following.

First, academic studies on RFID adoption are staggering at an exploratory level, providing framework of basic success factors. This research is an empirical research that analyzed the influence of RFID technology, human, vendor, and task factors that affect the intention to adopt RFID. This research is a progress compared to preceding researches and has suggested a theoretical framework that assists a strategic approach towards RFID implementation. Also, this research has contributed by providing antecedents inside and outside of the organization based on preceding researches.

Second, adopting new technologies like RFID, it is like pioneering an undeveloped new land for companies. Therefore there are several risk factors. In order to avoid risk, benchmarking information of successful RFID adoption is necessary. This

research has analyzed factors that affect RFID adoption intention. We find a difference of the impact factors regarding RFID technology, human, vendor, and task process factors. The result will provide a useful guideline.

Third, several factors are meticulously involved when a company goes through a decision making process regarding RFID. This study has analyzed technology, human, vendor, and task factors that affect RFID adoption to provide implications that would improve RFID trust, RFID capacity of organizational members, process innovation, vendor relationships, which would enhance RFID adoption intention. The research result will support the companies' successful RFID adoption.

5.3 Limitation and Future Direction

This research has a few limitations. First, this research' limitation exist in sampling process. we collected sample data using non probabilistic methods form a online survey company. These may be a limitation of this research, restraining generalization of the research result [63]. Therefore, future studies should conduct a scientific sampling process for collecting data.

Second, this researched classified factors that influence intention to adopt RFID into technology factors, human factors, vendor factors and task factors. In reality, there are various situational characteristics when adopting RFID. For example, the level in organizational informatization, RFID perception attitude of organization members, IT budget of the organization, the mind for new technology of the organization CEO. However, this research only analyzed the technology, human, vendor, and task factors when conducting the additional analysis according to RFID adoption intention level, limiting the research results from reflecting various situational factors. Actually, various situational characteristics would exhibit diverse factors that affect RFID adoption intention. Therefore, future researches should consider diverse situational variables that would contribute to research results that are more divergent and practical.

Third, this research presented comprehensive factors that affect RFID adoption. In reality RFID can be implemented to diverse businesses and various spheres. Also, RFID can be implemented not only comprehensively but also inclusively. The limitation of this research is that it did not consider the differences between businesses or tasks, or the RFID implementation characteristics, only presenting comprehensive factors that affect RFID adoption intention. Therefore future researches should be more profound by putting into account characteristics of businesses, tasks and RFID implementation characteristics.

Although it has its limitations, this research has provided viewpoints for adopting RFID, by analyzing the RFID adoption intention and the technology, human, vendor, task factors that affect it. Currently the global recession that seemed to go long-term is slowly recovering. Therefore, companies will pay more intention to RFID adoption, and actual adoption will appear. Although there are companies that have adopted RFID, not a lot of companies have adopted it comprehensively. Therefore the adoption level of RFID is still in its early stage. This research will hopefully provide useful viewpoints to companies that are preparing to adopt RFID.

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※ [Appendix 1] Questionnaire Items

- [IA1] Our company wishes to adopt RFID.
- [IA2] Our company would enthusiastically support RFID adoption.
- [IA3] Our company is interested in RFID, investigating several related spheres.
- [IA4] Next year a budget for RFID will be set to encourage seminars and studies.
- [IA5] Next year, task innovation through RFID will receive more interest.
- [ATT1] I think RFID adoption will ease tasks.
- [ATT2] I think Using RFID for task innovation is recommendable
- [ATT3] I think RFID adoption will realize task process innovation.
- [ATT4] I think RFID have a positive attitude towards RFID.
- [TRUST1] I believe that task innovation using RFID will enhance accuracy, providing reliability.
- [TRUST2] I believe that task accomplishment using RFID is efficient compared to existing methods.
- [TRUST3] I believe that RFID eases information ownership and information exchange.
- [TRUST4] I believe that Information and data received through RFID is reliable.
- [SA1] The existing systems in our company are very secure now.
- [SA2] An IS is reliable in our company.

- [SA3] Our company's IS are operating in an interactive way.
- [SA4] Our company's IS have very excellent performance in the aspect of security.
- [RFIDC1] Our company has sufficient enough IT capacity to adopt RFID system and utilize it.
- [RFIDC2] The members of our company sufficiently understand the functions of RFID system and process.
- [RIDC3] Our company members generally have ability to communicate with IT related authorities when a problem regarding RFIS system constitution has occurred.
- [COLL1] Our company cooperates with a supply chain partner company in business.
- [COLL2] Our company exchanges information through IT with our supply chain partner company.
- [COLL3] Our company has built trust through forming a collaborative partnership with our supply chain partner company during business.
- [PI1] Our company's task involves close relations with supply chain companies.
- [PI2] Our company utilizes an inter-company IS for task accomplishment.
- [PI3] Collaborative work is so inseparable that when the IS of our company breaks down, related supply chain companies undergo severe inconvenience.
- [REF1] I have observed cases of companies that accomplished successful RFID implementation.
- [REF2] I have observed companies within the same business that accomplished task innovation through RFID adoption.
- [REF3] I have observed companies that improved outcome through RFID adoption.
- [VC1] The RFID vendors I recognize are well

known.
- [VC2] The RFID vendors I recognize have high technology.
- [VC3] The RFID vendors I recognize pursue customer oriented business.
- [VC4] The RFID vendors I recognize have adequate development ability.

※ [Appendix 2] Profile of respondents
- Industry types

Summary	250	100.00%
1. Machine	24	9.60%
2. Metal	20	8.00%
3. Electronic	71	28.40%
4. Fiber	8	3.20%
5. Chemical	5	2.00%
6. Beverage	15	6.00%
7. Miscellaneous	1	0.40%
8. Distribution/Retail	30	12.00%
9. Non-metal	7	2.80%
10. Service	57	22.80%
11. Logistics	12	4.80%

- Age

Summary	250	100.00%
1. 20~29	80	32.00%
2. 30~39	80	32.00%
3. 40~49	57	22.80%
4. Over 50	33	13.20%

- Position

Summary	250	100.00%
1. Staff	95	38.00%
2. Senior Staff	13	5.20%
3. Assistant manager	38	15.20%
4. Manager	31	12.40%
5. Deputy general manager	14	5.60%
6. Team leader	24	9.60%
7. General manager	23	9.20%
8. Managing director	8	3.20%
9. CEO	4	1.60%

• Working experience

Summary	250	100.00%
1. Under 5 years	104	41.60%
2. Between 5 and 10 years	67	26.80%
3. Between 10 and 15 yesrs	34	13.60%
4. Between 15 and 20 years	22	8.80%
5. Between 20 and 25 years	12	4.80%
6. Over 25	11	4.20%

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