

## A Study on Intention to Use e-Procurement Systems among Procurement Business Bidding Managers

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### Abstract

South Korea's e-Government is changing its e-Governance to strengthen information transparency and fairness, having passed through the preparation, diffusion, and maturation stages according to the direction and purpose of the government's policies. Various services are being offered and are evolving towards a system where businesses can bid for public informatization in a way that makes public information open to citizens. This study examined the intentions of procurement business bidding managers that use the e-Procurement system for bidding. The study model combined the UTAUT and TTF models. A positive analysis was performed using the SMART PLS for statistical analysis and hypothesis testing. The results showed that, for procurement business users, performance expectance, social influence, and facilitating conditions but not effort expectance had a significant positive influence, perhaps because systems adopted through government policies are not in a form that can be used voluntarily (e.g., smartphones, tablet PCs, Internet banking) but instead have inherent characteristics that give users no options, regardless of their wishes. This study is significant in identifying the characteristics attributable to obligatory use, instead of voluntary use, for the achievement of organizational (company) goals.

**Keywords:** e-Government, UTAUT, TTF, behavioral intention, security, e-Procurement, Online Service

### 1. Introduction

Information technology (IT) increases the efficiency and effectiveness of private and government task processes and supports managerial decision making. It is recognized as a strategic tool for improving task production and enhancing the competitiveness of organizations [1].

Business technology is building towards e-Government services based on Smart e-Gov, ubiquitous environments, and online environments. The Public Procurement Service is investing about 2.1 trillion KRW, about 60% of public expenditures, to operate informatization businesses. Of this amount, the proportion of negotiated contracts has been continually increasing, from 70% in 2012 to 72% in 2015. The contract amount of small to mid-size corporations has also been rising proportionately, from 60% in 2011 to 83% in 2015. The participation rate of small to mid-size corporations is expected to increase, and IT service policies are expected to change accordingly.

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**Table 1. Yearly Change in the Scale of Public Procurement Informatization Business Expenses**

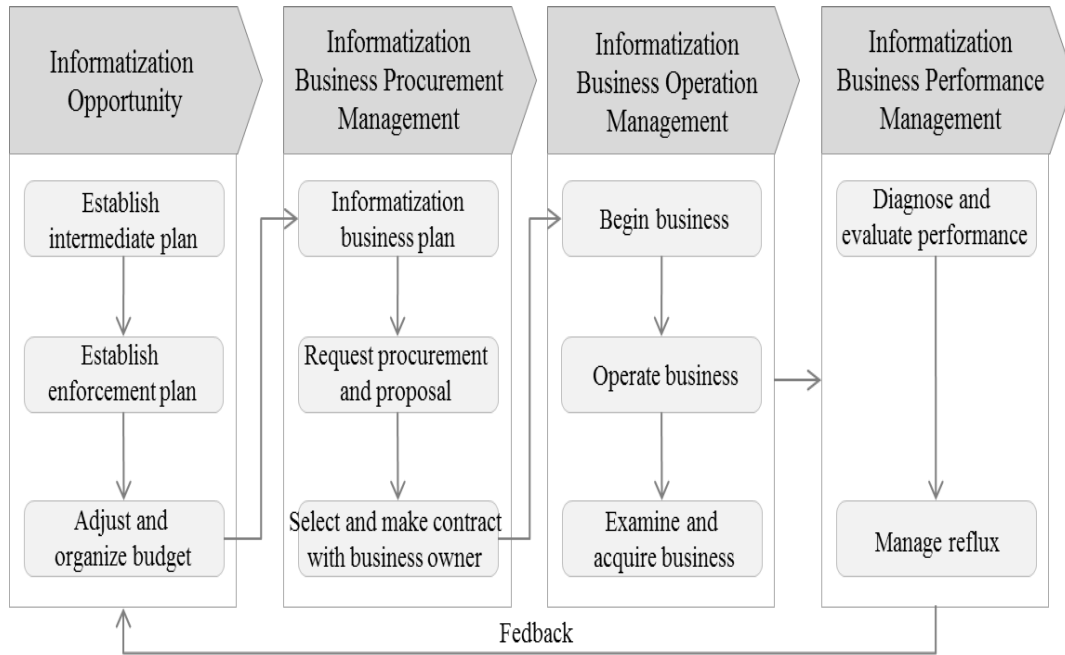
Category (Units: 100 million KRW)	2011	2012	2013	2014	2015
Procurement Contract Businesses	339,812	347,346	383,733	339,479	263,061
Informatization Businesses	19,283	21,383	21,215	21341	9,466
Negotiated Contracts	12,268	15,037	14,530	15211	9,66

The e-Government process is an online service or information procurement method that uses information technology such as the Internet or other electronic means to improve the responsibility, transparency effects, and efficiency of government and public organizations [3]. Among these e-Government systems, no single channel offers detailed procurement information on bidding that can be used for procurement administration tasks. Therefore, the required documents must be submitted in person, resulting in the inconvenience of having to assess the bids and procurement information for each institution each time [4]. A national marketplace (G2B) system is being built by connecting and combining all institutions in order to resolve this issue, and innovative procurement tasks are being handled online. The Public Procurement Service recently started running a seamless e-Procurement administration and now offers various services such as smartphone fingerprint bidding services to provide a ubiquitous, next-generation e-Procurement system. This is a next-generation e-Procurement system operating through several enhancements that consider transparency and efficiency as important facilitating factors in procurement.

This study applies the unified theory of acceptance and use of technology model (UTAUT) on the intention to use e-Procurement systems of procurement business that participate in bidding and conducts a theoretical verification. We use confirmatory factor analysis to examine the factors that enable users to grow more comfortable with and accustomed to the e-Government system and seek to understand how the system may be most effectively used.

## 2. The Concept of the e-Procurement System

The next-generation national marketplace is being enhanced to offer system transparency and efficiency, important facilitating factors for seamless procurement administration. Developments since 2014 have resulted in an e-Procurement system that offers the procurement support services of public informatization businesses [5]. It systematically offers a series of services, from business plans for informatization to business and achievement management, through the process shown in Figure 1.



**Figure 1. Functional Design Guide for the Information Task Support System of Central Administration Institutions**

### 3. Theoretical Considerations

#### 3.1. UTAUT

The UTAUT(Unified Theory of Acceptance and Use of Technology) is composed of four key concepts, including performance expectance (PE), effort expectance (EE), social influence (SI), and facilitating conditions (FC). The model also includes moderating variables such as age, gender, experience, and voluntary participation [6].

#### 3.2. TTF

The TTF (Task Technology Fit) is the degree of harmony between the capability of information technology and task demands specifically, the capability of the information technology used to support tasks within an organization [7]. Information technology that fits the task characteristics and direction is accepted and helps improve the results. Good TTF capability promotes the acceptance of information technology among users, while poor TTF for complex tasks will reduce technology acceptance among users. Information systems must be interconnected to achieve their goals in the organizational context. User acceptance can be the minimum standard for job maintenance (baseline) in the provision of information technology by organizations, unlike in the selection of information systems according to an individual's voluntary decision [8, 9].

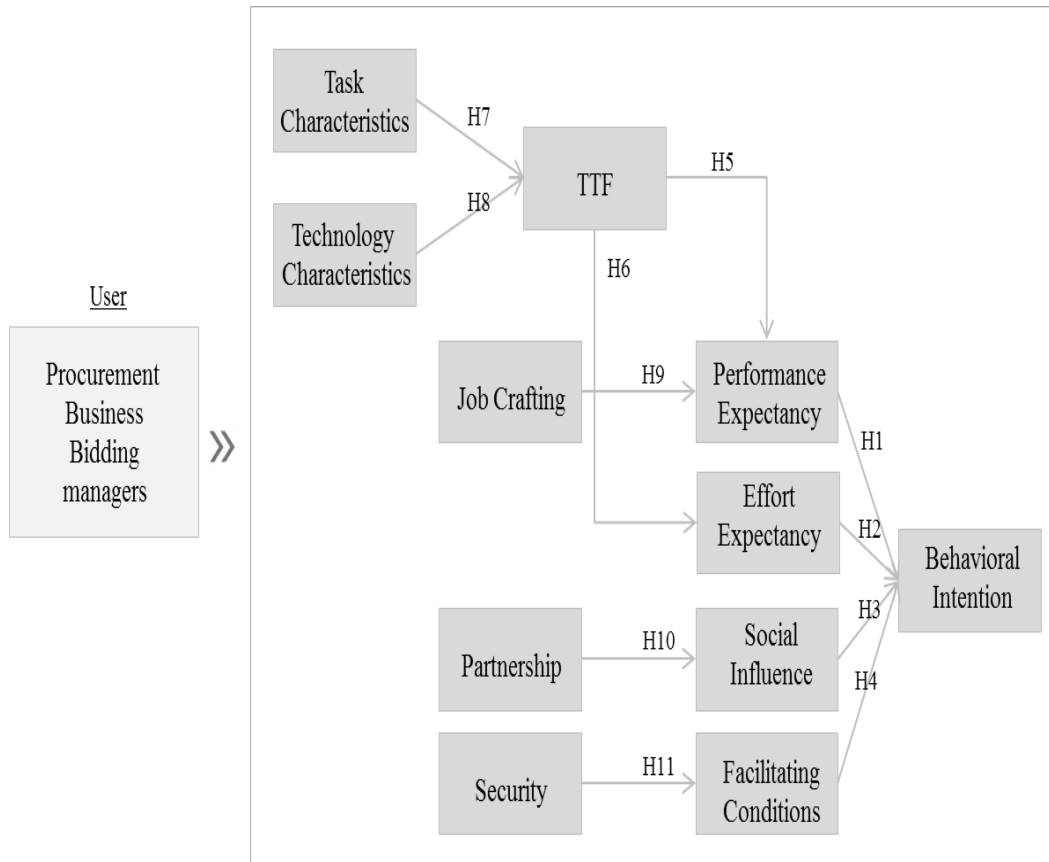
### 4. Research Model and Data Analysis

#### 4.1. Research Model

We analyzed the acceptance factors for e-Procurement systems using partnership, security factors, TTF, and job crafting competence variables based on the UTAUT of Venkatesh *et al.* (2003) to establish a study model.

The subjects of this study were procurement business bidding managers who had received training in e-Procurement system usage of Procurement Businesses. Of the 148

survey respondents, 80% were male, 8.8% were in their 20s, 37.2% were in their 30s, 43.9% were in their 40s, and 10.1% were in their 50s.



**Figure 2. Research Model of Procurement Business bidding managers**

#### 4.2. Hypotheses

In this study, 11 hypotheses are established to examine the behavioral intention of Procurement Business bidding managers.

[Hypothesis-1] Performance Expectancy has a positive impact to Behavioral Intention of e-Procurement System.

[Hypothesis-2] Effort Expectancy has a positive impact to Behavioral Intention of e-Procurement System.

[Hypothesis-3] Social Influence has a positive impact to Behavioral Intention of e-Procurement System.

[Hypothesis-4] Facilitating Conditions has a positive impact to Behavioral Intention of e-Procurement System.

[Hypothesis-5] TTF has a positive impact to Performance Expectancy.

[Hypothesis-6] TTF has a positive impact to Effort Expectancy.

[Hypothesis-7] Task Characteristics has a positive impact to TTF.

[Hypothesis-8] Technology Characteristics has a positive impact to TTF.

[Hypothesis-9] Job Crafting has a positive impact to Performance Expectancy.

[Hypothesis-10] Partnership has a positive impact to Social Influence.

[Hypothesis-11] Security has a positive impact to Facilitating Conditions.

### 4.3. Definition of Research Variables

The research variables are defined as shown in (Table 2). They are extracted by reviewing variables used in previous studies.

**Table 2. Research Variables**

Factor	Variables	Source
Performance expectancy	Usefulness Improved Work Productivity Easy Work Process Usefulness of Evidence	V. Venkatesh, M.G. Morris and G.B. Davis (2003)
Effort expectancy	Adaptability Easy Cognition of Use Work Applicable Convenience Easy Learning Based Technology Availability	V. Venkatesh, M.G. Morris and G.B. Davis (2003)
Social influence	Recommended Intention Extent of Convenience Awareness Awareness of Availability Use Intention and Desire Popular Generality	V. Venkatesh, M.G. Morris and G.B. Davis (2003)
Facilitating Conditions	Organizational support Retention of knowledge Business Support Compatibility of Business processing style	V. Venkatesh, M.G. Morris and G.B. Davis (2003)
Task Characteristics	Accuracy of business promotion Repeatability of proposal task Management of SW business Share of business information	Tao Zhou, Yaobin Lu and Bin Wang(2010) Goodhue & Thompson(1995)
Technology Characteristics	Function of proposal task Function of business mgmt. Function of User Interface Prompt real-time service	Tao Zhou, Yaobin Lu and Bin Wang(2010) Goodhue & Thompson(1995)
Task Technology Fit	Adequacy of proposal task Adequacy of business Mgmt. Adequacy of internet business environment Adequacy of e-procurement service	Tao Zhou, Yaobin Lu and Bin Wang(2010) Goodhue & Thompson(1995) Dishaw & Strong(1999)

Partnership	Expectancy of resource sharing interdependence degree of trust cooperation of information business	Khan, K.B(1996)
Security	Safety of Internet Security Safety of Information Infringement Safety for Data Leakage Work Performance Safety	S. H. Jeon, N. L. Park and J. J. Lee (2011)
Job Crafting Competency	Increase of structural business support Decrease of negative business support Increase of social business support Increase of challenging task requirement	Tims, M., and Bakker, A.B (2010)
Behavioral Intention	Use Intention Level Unconscious Use Awareness Future Use Planning Expendability Acceptance Level	V. Venkatesh, M.G. Morris and G.B. Davis (2003)

#### 4.4. Data Analysis Results and Hypothesis Testing

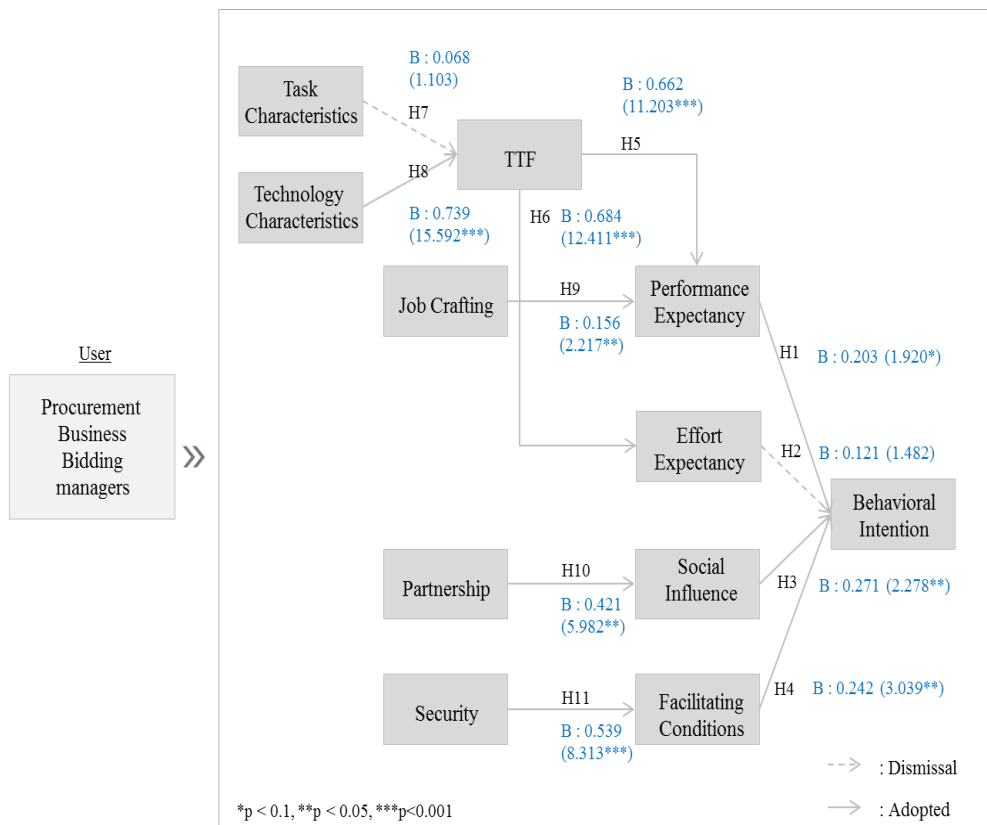


Figure 3. Analysis Results of PLS

Data were collected from the trained bidding managers of procurement businesses, and a positive analysis was performed. The results, organized based on the research hypotheses, are summarized below. The analysis results, summarized using a structural equation model using bidding managers of procurement businesses as the subjects, are shown in Figure 3.

First, for performance expectance and intention to use (UBI), the path coefficient ( $\beta$ ) is 0.203 ( $t=1.920$ ,  $p<0.1$ : adopted), which shows a significant influence. However, UTAUT's effort expectance ( $\beta=0.121$ ,  $t=0.1482$ ) has no significant influence on intention to use. Social influence ( $\beta=0.271$ ,  $t=2.278$   $p<0.05$ : adopted) and facilitating conditions ( $\beta=0.242$ ,  $t=3.039$   $p<0.05$ : adopted) had significant influences on intention to use.

The TTF model analysis results show that the task characteristics ( $\beta=0.068$ ,  $t=1.103$ ) of procurement business users had no influence on TTF. However, technological characteristics ( $\beta=0.739$ ,  $t=15.592$ ,  $p<0.001$ : adopted) had a significant influence on TTF. Moreover, TTF, an antecedent UTAUT factor, had an extremely significantly positive influence on performance expectance ( $\beta=0.662$ ,  $t=11.203$ ,  $p<0.001$ : adopted) and effort expectance ( $\beta =0.684$ ,  $t=12.411$ ,  $p<0.001$ : adopted).

Finally, we confirmed that job crafting capability ( $\beta=0.156$ ,  $t=2.217$ ,  $p<0.05$ : adopted), an antecedent UTAUT factor, had a significantly positive influence on the performance expectance of UTAUT and that partnership ( $\beta=0.421$ ,  $t=5.982$ ,  $p<0.001$ : adopted) had a significant influence on social influence. Security ( $\beta=0.539$ ,  $t=8.313$ ,  $p<0.00$ : adopted) was shown to have a significant influence on facilitating conditions.

**Table 3. Summary of Hypothesis Verification Results for Intention to Use e-Procurement Systems of Procurement Business Bidding Managers**

Hypothesis	Path Coefficient	Sample Mean (M)	Standard Deviation (STDEV)	t-statistics	P values	Adoption	
H1	PEE -> UBI	0.203*	0.206	0.106	1.920	0.055	Adopted
H2	EFE -> UBI	0.121	0.129	0.082	1.482	0.139	Dismissed
H3	SOI -> UBI	0.271**	0.270	0.119	2.278	0.023	Adopted
H4	FAC -> UBI	0.242**	0.234	0.080	3.039	0.002	Adopted
H5	TTF -> PEE	0.662***	0.660	0.059	11.203	0.000	Adopted

H6	TTF -> EFE	0.684***	0.686	0.055	12.411	0.000	Adopted
H7	TAC -> TTF	0.068	0.075	0.062	1.103	0.271	Dismissed
H8	TEC -> TTF	0.739***	0.736	0.047	15.592	0.000	Adopted
H9	JOB -> PEE	0.156**	0.162	0.070	2.217	0.027	Adopted
H10	PTS -> SOI	0.421***	0.430	0.070	5.982	0.000	Adopted
H11	SEC -> FAC	0.539***	0.544	0.065	8.313	0.000	Adopted

\*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.001

## 5. Conclusion

We presented a UTAUT expansion model after adding variables such as security, partnership, job crafting competence, and TTF by considering changes in software policies, including recent legal changes concerning public and government information businesses. We also derived study results on the intention to use e-Procurement systems of procurement business bidding managers.

First, we confirmed the usability of the UTAUT. We examined usage intention among potential users of each e-Procurement system group by employing performance expectance, effort expectance, social influence, and facilitating conditions as the key conceptual factors of the UTAUT. The path analysis results show that all variables (except effort expectance) had path coefficients ( $\beta$ ) at significant levels, indicating a significantly positive influence on procurement institutions.

Second, the TTF model, reflecting the task and technological characteristics from the perspective of users of e-Procurement systems, was combined with the UTAUT model. The combined model displayed greater explanatory power and insight than do studies that have analyzed user acceptance by employing only the UTAUT. This study offers significant results that are similar to those in [6].

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