How Citizens Accept E-Government Service: A Comparison of Four Theoretical Models

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Abstract: E-government offers unprecedented opportunities for innovating and transforming the way public service is delivered. To ensure successful e-government, it is necessary to understand how citizens accept new technology and receive services from e-government. In the context of e-government acceptance, this paper introduces and tests three well-known theoretical models-SERVQUAL, the American Customer Service Index, and the technology acceptance model-adapted from the service quality and technology acceptance literature. In addition, a new process model of e-government acceptance is synthesized and proposed. Using structural equation modeling methods, empirical fit tests are carried out to evaluate the potential and explanation power of four theoretical e-government acceptance models. The results show that each model has a high potential for explaining e-government acceptance processes by citizen. Fitted theoretical models imply that the key ingredients for successful e-government are service quality, ease of use, and usefulness, which strongly suggests that for successful e-government, citizen focused e-government is crucial. E-government is a moving target, and the results hint at strategic directions for e-government development.

Keywords: e-government, Public e-Service, Technology Acceptance

Korea has a perfect environment for e-government through the construction and diffusion of the information superhighway. Korea's attempt to lay the foundation for an information society started during the early 1980s, and the Framework Act on Informatization Promotion, enacted in 1995, catalyzed the drive for information technology (IT) and e-government in Korea. The term "e-government" was first adopted in Korea in 1996 as part of the Basic Plan for Information Society Promotion, which accelerated the informatization of departmental processes. Eleven e-government projects set up in 2000 were carried out to complete informatization and civil service

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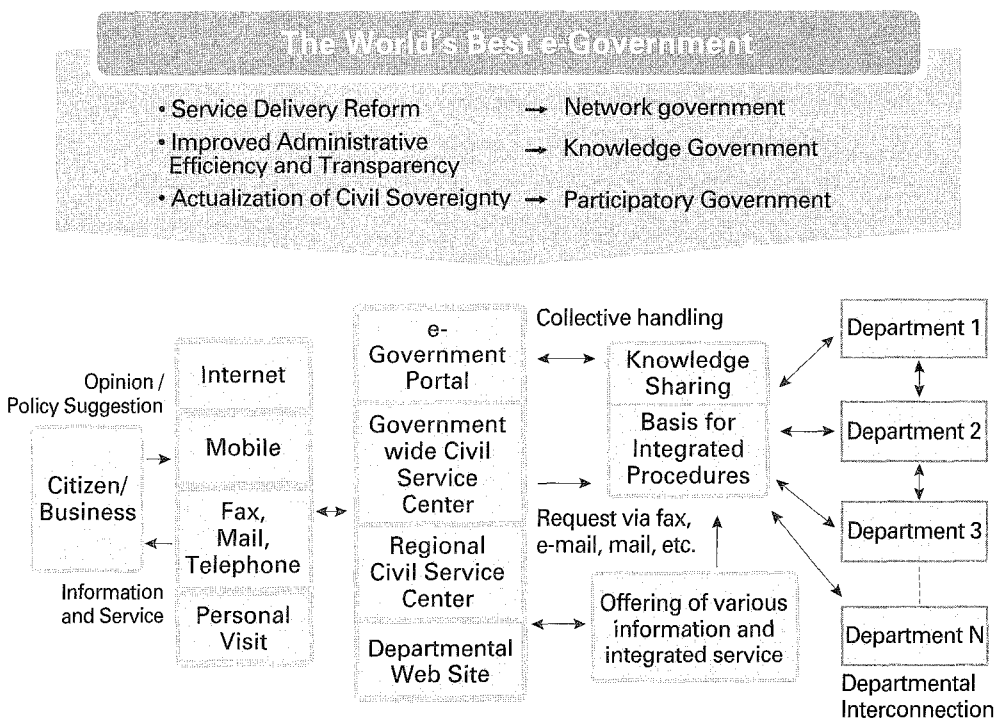
reforms on a government-wide basis. As a result of all-out efforts at informatization, Korean e-government was first opened in 2002 and currently offers a single online e-government window (Korea E-Government Working Committee, 2003).

In spite of high acclaim for Korean e-government internationally, Korean e-government has made little impact on government reform because it has not focused on improving work procedures and public service processes, and old practices have not been changed, as e-service is still based on the old offline environment. In 2003, the Presidential Committee on Government Innovation and Decentralization identified enhancing effective e-government as a key national strategic task to reform administration and the civil service, and subsequently, the E-Government Working Committee announced the visions and principles for e-government and participatory government, depicted in Figure 1 (Korea Ministry of Information and Communication, 2004).

As Figure 1 illustrates, e-service delivery to citizens and businesses plays a crucial role in innovating and transforming the way the public sector does business, making it more efficient and effective. To be successful, public-sector e-service delivery should be driven by the use and needs that citizens request, and e-government should respond effectively to citizen preferences and make investment decisions on the basis of citi-

Figure 1. Korean E-Government Vision



zens' responses (Accenture, 2001; Baum & Di Maio, 2000; Deloitte Research, 2001; Gouscos, Mentzas, & Georgiadis, 2001; NPR, 1993; World Markets Research Centre, 2001). In this respect, Korean e-government focuses on improving the quality of public-sector e-service delivery. However, the actual performance and the perceived service quality of Korean e-government still have not met citizens' high expectations (Korea E-Government Working Committee, 2003). This high expectation-low performance gap has resulted in a poor satisfaction level and exerts a bad influence on current e-government use and intent to reuse in future-what may be called *e-government acceptance by citizens*.

Successful e-government should ensure that citizens make use of online services easily, effectively, and satisfactorily, to the extent that these services gain acceptance as a part of routine life. In framing best practices for e-government service, it is necessary to understand how citizens accept e-government services. Understanding the process models and factors that affect e-government acceptance is vital to enhancing effective e-government. This paper focuses on the factors that affect e-government acceptance by citizens and the ways in which citizens accept e-government. To that end, this paper introduces three well-known and tested theoretical models-namely, SERVQUAL (Parasuraman, Berry, & Zeithaml, 1993), the American Customer Service Index (Fornell, Johnson, Anderson, Cha, & Bryant 1996), and the technology acceptance model (Davis, 1989)-adapted from the service quality and technology acceptance literature. In addition, I propose a new process model for e-government acceptance. In the context of e-government acceptance, I empirically test four theoretical models to gauge their potential and explanatory power.

THEORETICAL MODELS

Service Quality (SERVQUAL)

The construct of service quality is hard to define and measure because of its elusive nature and high level of abstraction (Parasuraman, Berry, & Zeithaml, 1994). Service quality is a form of attitude resulting from an overall, long-run evaluation of a service provided and based on a comparison of expectations with actual performance (Gronroos, 1990). Satisfaction, a related construct, is a transaction-specific measure (Bitner, 1990; Parasuraman, Zeithaml, & Berry, 1988).

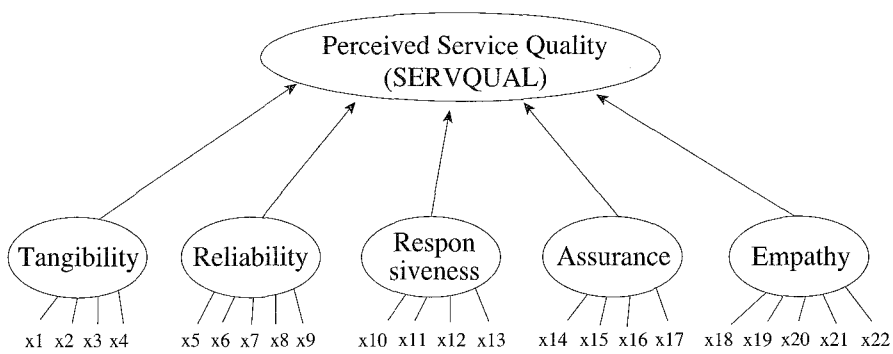
The conceptualization and operationalization of service quality, so called SERVQUAL was first proposed by Parasuraman et al. (1988). The SERVQUAL scale is based on the theory that perceived service quality is the difference between cus-

tomer expectations about the service provided and the actual evaluated performance (Parasuraman, Zeithaml, & Berry, 1985). This expectations-performance gap as the basis for measuring service quality was developed by Cronin and Taylor (1992) into a simple performance-based measure of service quality, known as SERVPERF. Cronin and Taylor examined the potential causal relationships among service quality, customer satisfaction, and purchase intention and concluded that service quality is an antecedent of customer satisfaction; customer satisfaction has a significant effect on purchase intention; and service quality has less effect on purchase intention than does customer satisfaction.

The SERVQUAL scale was originally conceived by Parasuraman et al. (1985) to include 10 determinants of service quality: reliability, responsibility, competence, access, courtesy, communication, credibility, security, understanding, and tangibility. In 1988, Parasuraman et al. developed the original idea into SERVQUAL, which includes five subcomponents: tangibility, reliability, responsiveness, assurance, and empathy.

Based on focus group research, Parasuraman et al. derived the 22-item scale depicted in Figure 2 and derived five service quality subcomponents from factor analysis. SERVQUAL and SERVPERF (the performance-based alternative to the SERVQUAL measures), have subsequently been tested in the literature, and their validity seems to be well supported (Parasuraman et al., 1993; Pitt, Watson, and Kavan, 1995).

Figure 2. SERVQUAL



American Customer Satisfaction Index

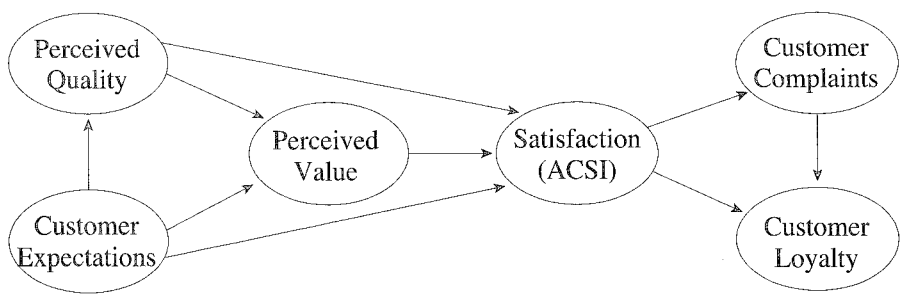
The American Customer Satisfaction Index (ACSI) is a leading indicator of customer satisfaction that is used to evaluate firms, industries, economic sectors, and

national economies (Fornell, 1992; Fornell et al., 1996). The ACSI was first introduced in 1994 by the National Quality Research Center at the University of Michigan, which interviews about 80,000 Americans annually and asks about their satisfaction with the goods and services they have consumed. It provides uniform and comparable measures for firm-level customer satisfaction indices for each company in the sample and weights these firm-level indices to estimate industry, sector, and national indices.

The ACSI uses a multiple-indicator approach to measure overall customer satisfaction as a latent variable, and the ACSI is embedded in the system of cause-and-effect relationships among ACSI antecedents and consequences, as shown in Figure 3 (Fornell et al., 1996). The ACSI is the centerpiece in a chain of relationships running from antecedents (perceived quality, customer expectations, and perceived value) to consequences (customer complaints and customer loyalty).

Perceived quality in the ACSI model represents customer evaluations of the quality of their recent consumption experiences; it is measured by customization level and reliability. "Customer expectations" refers to a customer's anticipation of the quality prior to his or her consumption experience, which may includes nonexperiential information from advertising and word-of-mouth and forecasts of future quality. Perceived value represents the price-relative quality. In most cases, customers are very sensitive to price on their first purchase and tend to be less sensitive on repeat purchases. "Customer complaints" denotes the percentage of respondents who actually complained to a company and had negative relation with customer satisfaction. Customer loyalty represents the intention to repurchase in the future at various price points, and this is a critical factor in a company's profitability. Each arrow in the ACSI model represents the strength of the cause-and-effect relationship between two constructs and is estimated from survey and modeling methodology. From the fitted ACSI model for a specific organization, one can conjecture which factors have the most significant impact on customer loyalty, which subsequently affects profitability. The ACSI methodology has been widely researched and validated in the related literature.

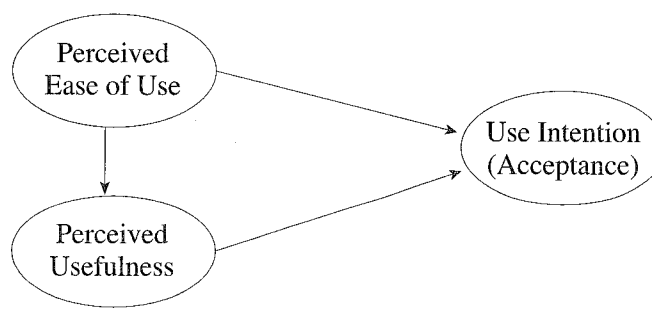
Figure 3. American Customer Satisfaction Index



Technology Acceptance Model

The technology acceptance model (TAM) is a well-accepted information systems theory that models the way users accept and use a new technology. The TAM was first proposed by Davis (1989) and Davis, Bagozzi, and Warshaw (1989) to explain users' acceptance of a newly introduced information technology as an innovation. The TAM is based on innovation diffusion theory (Rogers, 1983), Fishbein and Ajzen's (1975) theory of reasoned action, and Ajzen's (1985) theory of planned behavior, all of which try to explain the causal relationships among individual beliefs, attitudes, intentions, and behaviors. Following the latter two frameworks, the TAM argues that IT acceptance-or the intention to use IT-is mostly influenced by the perceived ease of use and perceived usefulness, as depicted in Figure 4. According to Davis (1989), perceived ease of use is the degree to which a person believes that using a particular system will be free of effort, and perceived usefulness is the degree to which a person believes that using a particular system will enhance his or her job performance.

Figure 4. Technology Acceptance Model



One of underlying assumptions of the TAM is that when someone forms an intention to act, he or she is free to act without limitation. In the real world, however, there are many constraints that limit one's freedom to act. On this issue and the role of perceived ease of use and usefulness, Bagozzi, Davis, and Warshaw (1992) have stated that because new technologies such as personal computers are complex and an element of uncertainty exists in the minds of decision makers with respect to their successful adoption, people form attitudes and intentions about their ability to use the new technology prior to initiating efforts directed at use. Attitudes toward usage and intentions to use may be ill formed or lacking in conviction, or they may occur only after preliminary strivings to learn to use the technology. Thus, actual use may not be a direct or immediate consequence of such attitudes and intentions.

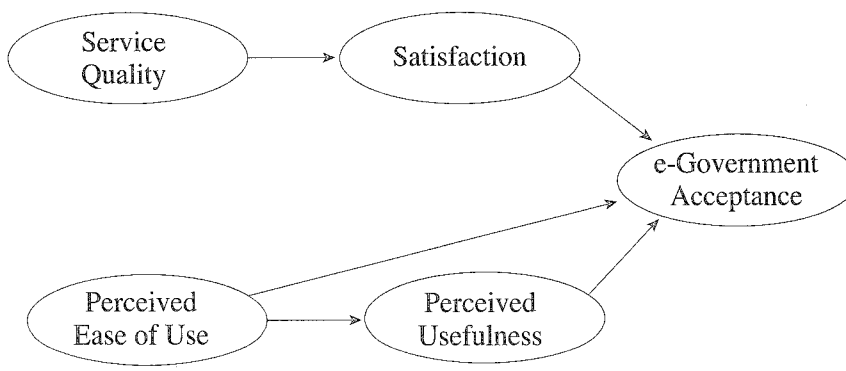
In the related literature, the TAM has been widely tested and validated by researchers

to provide empirical evidence on the relationships between ease of use, usefulness, and system use.

RESEARCH MODEL AND METHODOLOGY

I propose a research model for e-government acceptance. The proposed research model, shown in Figure 5, is an extended and synthesized model based on the SERVQUAL, ACSI, and TAM frameworks. The causal relationships running from service quality to satisfaction to e-government acceptance are derived from the ACSI framework. Service quality is constructed from five major subcomponents of SERVQUAL: tangibility, reliability, responsiveness, assurance, and empathy. The causal links among perceived ease of use, perceived usefulness, and e-government acceptance are derived from the TAM framework.

Figure 5. Proposed Research Model for E-Government Acceptance



The validity of the proposed research model is empirically tested, together with the modified SERVQUAL, ACSI, and TAM models, in the context of e-government acceptance. To carry out empirical fit tests for four theoretical models for e-government acceptance, I administered 500 questionnaires and collected 327 valid responses from college and graduate school students.

The measures for perceived ease of use and perceived usefulness are adapted from Davis (1989). The operationalization of service quality is based on the 22-item scale from the SERVQUAL model (Parasuraman et al., 1988). Satisfaction, a transaction-specific measure, is measured by the overall evaluation and users' recommendation intensity for the e-government service. Acceptance is the individual's intention to use e-government, is measured by the overall intention to use and repeated use in future.

Though not reported in this paper, the validity and reliability of instruments are fully investigated with a confirmatory factor analysis, and there seems to be no idiosyncrasy in the instruments.

ANALYSIS

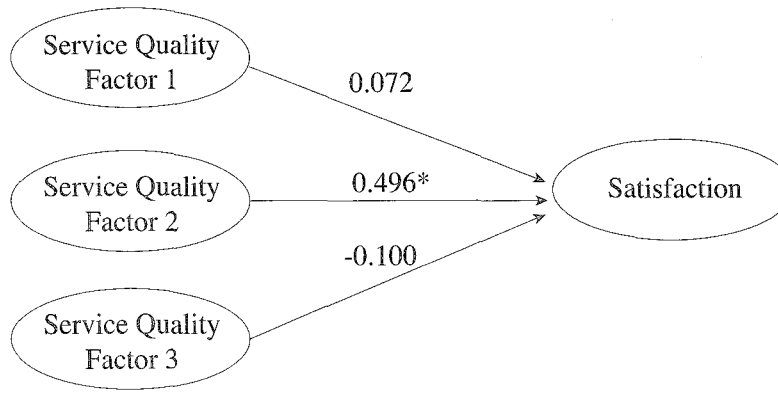
The analysis is based on structural equation modeling methods using LISREL, which considers the causal relationships among several constructs simultaneously. Figures 6-10 summarize the results of the structural model analyses with estimated path-linking coefficients and model fitness indices, as measured by the chi-square statistic and the measurement models of adjusted goodness of fit.

There are no absolute criteria for assessing model fitness. Because the chi-square statistic is sensitive to sample size and distribution, it is recommended that other fit indices be considered simultaneously (Fornell, 1992; Hayduk, 1987; Kerlinger, 1986). In general, when chi-square statistics are unsatisfactory, the following conditions are desired for well-fitted models The LISREL general fit index (GFI) should be greater than 0.9, the adjusted fit index (AGFI) should be greater than 0.8, and root mean squared error of approximation (RMSEA) should be less than 0.1 (Hayduk, 1987). In terms of these criteria, all tested models depicted in Figures 6-10 show satisfactory fit indices and chi-square statistics, with a minimum $\chi^2 = 154.440$ ($p = .000$) for the TAM and a maximum $\chi^2 = 1495.410$ ($p = .000$) for the proposed model. In terms of χ^2 and other fit indices (GFI, AGFI, and RMSEA), the fitted TAM model depicted in Figure 8 shows the best overall fit. Because all models show satisfactory fit indices, each model considered in this paper is a potential candidate for explaining the e-government acceptance process.

Figure 6 shows a fitted SERVQUAL model with three service-quality determinants in the e-government satisfaction context. The original SERVQUAL framework (Parasuraman et al., 1985) was designed with 10 service-quality determinants (reliability, responsibility, competence, access, courtesy, communication, credibility, security, understanding, and tangibility), and it was further developed by Parasuraman et al. (1988) to include five subcomponents (tangibility, reliability, responsiveness, assurance, and empathy), as shown in Figure 2. In our study, three service-quality subcomponents are derived from a factor analysis of 22 item scales adapted from Parasuraman et al. (1988).

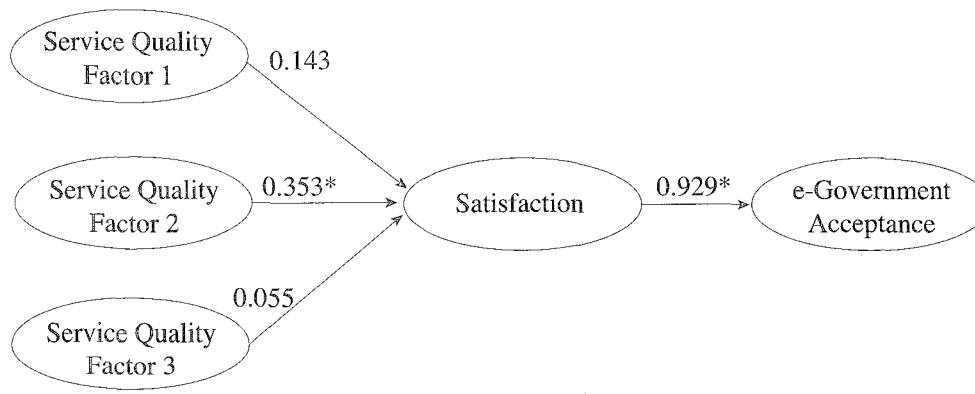
Figure 7 presents a modified and fitted ACSI model in our context. The original ACSI (Fornell et al., 1996) model, depicted in Figure 3, is further simplified in the context of e-government acceptance. The fitted model shows a strong causal relationship between satisfaction and acceptance with path coefficient ($p < .05$), hinting that

Figure 6. Fitted SERVQUAL Model for E-Government Satisfaction



* $p < .05$
$\chi^2 = 656.161$ ($p = .000$), GFI = .839, AGFI = .800, RMSEA = .083

Figure 7. Fitted ACSI Model for E-Government Acceptance



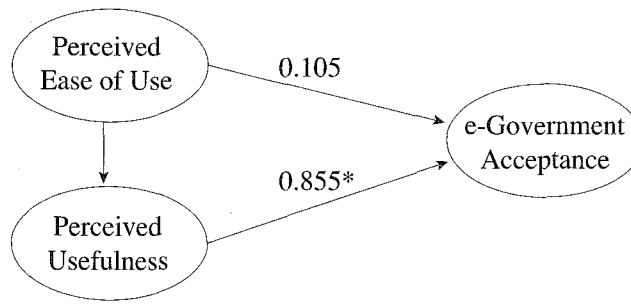
* $p < .05$
$\chi^2 = 742.601$ ($p = .000$), GFI = .833, AGFI = .796, RMSEA = .079

perceived satisfaction plays a major role in e-government acceptance, as expected.

Figure 8 shows a fitted TAM model (Davis, 1989) in the e-government acceptance context. As expected from the TAM literature, e-government acceptance is significantly influenced by perceived usefulness ($p < .05$), which is subsequently affected by perceived ease of use ($p < .05$). Perceived ease of use is not significantly related to e-government acceptance ($p > .1$). However, perceived ease of use still indirectly influences e-government acceptance through that mediation factor of perceived usefulness. Because most TAM-related research reports a direct link between perceived ease of

use and IT acceptance, our result is somewhat unexpected. One conjecture is that, because of the relative monopolistic nature of public service and e-government, the dynamics among perceived ease of use, perceived usefulness, and e-government acceptance may be somewhat different from the usual TAM research context, in which a specific IT is assumed to be substitutable for a more competitive alternative IT. As this issue is beyond the scope of this paper, it will not be further investigated here and is left to future study.

Figure 8. Fitted TAM for E-Government Acceptance



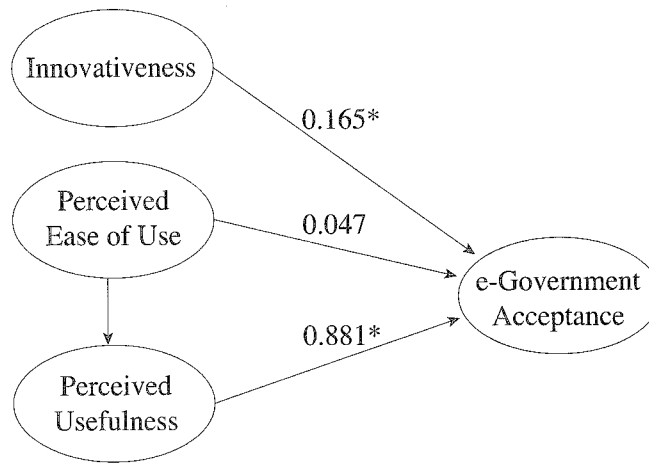
$^{*}p < .05$

$\chi^2 = 154.440$ ($p = .000$), GFI = .922, AGFI = .875, RMSEA = .092

In addition to the three theoretical models mentioned, an extended TAM with individual innovativeness as an antecedent of e-government acceptance is introduced in Figure 9. This new construct is derived from adaption-innovation theory (Kirton, 1976, 2005), which states that people differ in the cognitive styles in which they are creative, solve problems, and make decisions. These style differences lie on a normally distributed continuum ranging from high adaption to high innovation. The key to the distinction is that more adaptive individuals prefer their problems to be associated with more structure-and this structure to be consensually agreed-compared to more innovative individuals. More innovative individuals are comfortable solving problems with less structure and are less concerned that the structure be consensually agreed than are the more adaptive. Previous research has found that more innovative individuals tend to accept new and somewhat innovative information technology more positively (Foxall & Hackett, 1992; Miller , Couger, & Higgins, 1993). The analysis summarized in Figure 9 shows a similar result.

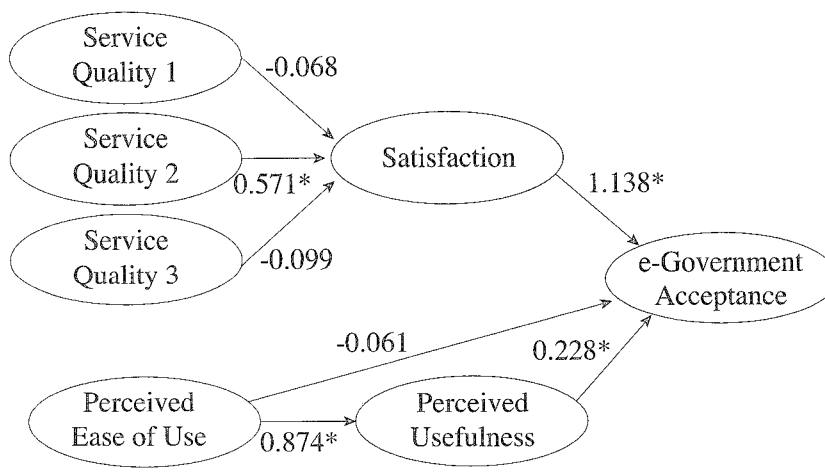
Figure 10 shows a fitted research model that is synthesized from SERVQUAL, ACSI, and TAM. The causal relationships running from service quality to satisfaction to e-government acceptance in one stream and from perceived ease of use to perceived

Figure 9. Fitted Extended TAM with Individual Innovativeness



* $p < .05$
$\chi^2 = 219.654$ ($p = .000$), GFI = .915, AGFI = .876, RMSEA = .079

Figure 10. Fitted Proposed Model for E-Government Acceptance



* $p < .05$
$\chi^2 = 1495.410$ ($p = .000$), GFI = .796, AGFI = .764, RMSEA = .0.70

usefulness to e-government acceptance in another stream are well captured in the fitted research model. In terms of chi-square statistic and other fit indices (GFI, AGFI, and RMSEA), all of the theoretical models considered in this paper have a high potential for explaining the e-government acceptance process.

CONCLUSION

E-government offers unprecedented opportunities for innovating and transforming public-sector service processes in order to make them more efficient and effective. To ensure successful e-government, we need to understand the way citizens accept new technologies and receive services from e-government. This study has aimed to explain the process of e-government acceptance by citizens. Three theoretical models-SERVQUAL, ACSI, and TAM-were adapted from the service quality and technology acceptance literature and modified in the context of e-government acceptance. In addition, a new process model for e-government acceptance was proposed. Empirical fit tests for these models were carried out, and the results show that each model considered has a high potential for explaining e-government acceptance by citizens.

Our empirical results, summarized in Figures 6-10, imply that the key ingredients for successful e-government acceptance are high service quality, which, in turn, influences satisfaction, perceived ease of use, and perceived usefulness of e-government. Although this result may seem obvious, rigorous empirical tests are rare in e-government literature, whereas innumerous empirical studies are being carried out in the literature on service quality, innovation, and IT acceptance in the private-sector context. Most results from our study coincide with previous research from the service quality and IT acceptance literature. However, our fitted TAM model shows no direct link between perceived ease of use and IT acceptance, which is somewhat contrary to the general conclusion derived from the TAM literature. In typical TAM research, an underlying assumption is that the specific IT under study is substitutable for a more competitive alternative IT. In our study context, e-government is not substitutable because of the monopolistic nature of public service and e-government. Thus, we conjecture that the dynamics among perceived ease of use, perceived usefulness, and e-government acceptance may be somewhat different from the usual TAM research context. As this issue is beyond the scope of this paper, it is left to future study.

In conclusion, the fitted theoretical models strongly imply that citizen-focused e-government is crucial for successful e-government. When citizens interact with e-government, they have their own way. Citizens have high expectations of public services, which must be easily accessible, easy to use, and of high value. This proposition is well captured and validated by our empirical analyses and fitted theoretical models. Successful e-government should ensure that citizens make use of services satisfactorily, to the extent that they become a part of routine life. Though this study is exploratory in nature and provides limited explanation, our empirical results hint at strategic directions for e-government development and open the door for future research on e-government acceptance by citizens.[1]

REFERENCES

Accenture. (2001). *Governments closing gap between political rhetoric and e-government reality*. Retrieved February 19, 2007, from www.accenture.com.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11-39). Heidelberg: Springer.

Bagozzi, R. P., Davis, F. D., & Warshaw, P. R. (1992). Development and test of a theory of technological learning and usage. *Human Relations*, 45(7), 660-686.

Baum, C. H., & Di Maio, A. (2000). Gartner's four phases of e-government model. Retrieved February 19, 2007, from www.gartner.com.

Bitner, M. J. (1990). Evaluating service encounters: The effects of physical surroundings and employee responses. *Journal of Marketing*, 54(2), 69-82.

Cronin, J., & Taylor, S. A. (1992). Measuring service quality: A reexamination and extension. *Journal of Marketing*, 56(3), 55-68.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.

Deloitte Research. (2001). *At the dawn of e-government: The citizen as customer*. Retrieved February 19, 2007, from http://www.egov.vic.gov.au/pdfs/e-government.pdf.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fornell, C. (1992). A National customer satisfaction barometer: The Swedish experience. *Journal of Marketing*, 56(1), 6-21.

Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J., & Bryant, B. E. (1996). The American Customer Satisfaction Index: Nature, purpose, and findings. *Journal of Marketing*, 60(4), 7-18.

Foxall, G. R., & Hackett, P. M. W. (1992). Cognitive style and extent of computer use in organizations: Relevance of sufficiency of originality, efficiency, and rule-conformity. *Perceptual and Motor Skills*, 74, 491-497.

Gouscos, D., Mentzas, G. & Georgiadis, P. (2001). Planning and implementing e-government service delivery: Achievements and learnings from on-line taxation in

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Greece. Paper presented a the 8th Panhellenic Conference on Informatics, .

Gronroos, C. (1990). *Service management and marketing: Managing the moments of truth in service competition*. Lexington, MA: Lexington Books.

Hayduk, L. A. (1987). *Structural equation modeling with LISREL: Essentials and advances*. Baltimore: Johns Hopkins University Press.

Kerlinger, F. N. (1986). *Foundations of behavioral research* (3rd ed.). New York: Holt, Rinehart and Winston.

Kirton, M. J. (1976). Adaptors and innovators: A description and measure. *Journal of Applied Psychology*, 61, 622-629.

Kirton, M. J. (2005). *Kirton Adaption Inventory (KAI) manual*. United Kingdom: KAI Distribution Centre.

Korea E-Government Working Committee. (2003). *E-government white paper*. Seoul: Author.

Korea Ministry of Information and Communication (2004). *2004 broadband IT Korea informatization white paper*. Seoul: Author.

Miller, W. C., Couger, J. D., & Higgins, L. F. (1993). *Comparing IS innovation styles profile to other occupations*. Paper presented at the 26th Hawaii International Conference on System Sciences.

National Performance Review (NPR). (1993). *Reengineering through information technology*. Washington, DC: U.S. Government Printing Office. Retrieved February 19, 2007, from http://govinfo.library.unt.edu/npr/library/reports/it.html.

Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1993). More on improving service quality measurement. *Journal of Retailing*, 69, 141-147.

Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1994). *Moving forward in service quality research: Measuring different customer-expectation levels, comparing alternative scales, and examining the performance-behavioral intentions link* (Report No. 94-114). Cambridge, MA: Marketing Science Institute.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49, 41-50.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL : A multiple-item scale for measuring consumer perception of service quality. *Journal of Retailing*, 64, 12-29.

Pitt, L. F., Watson, R. T., & Kavan, C. B. (1995). Service quality: A measure of information systems effectiveness. *MIS Quarterly*, 19, 173-187.

Rogers, E. M. (1983). *Diffusion of innovations*. New York: Free Press.

World Markets Research Centre. (2001). *Global e-government survey*. Retrieved from http://www.worldmarketsonline.com/e_gov_report.html.