

How to Promote Adoption of Complex E-Services Innovation? An Institutional Factor Perspective

Chieh-Min Chou¹ & Yung-Yu Shih²

¹ Graduate Institute of Management of Technology, Feng Chia University, Taichung, Taiwan

² Department of Business Administration, NanFang College of Sun Yat-Sen University, Guangzhou, China

Correspondence: Chieh-Min Chou, Graduate Institute of Management of Technology, Feng Chia University, 100, Wen-Hwa Rd., Taichung 40724, Taiwan, ROC. E-mail: cmchou.fcu@gmail.com

Received: June 27, 2014

Accepted: September 2, 2014

Online Published: September 25, 2014

doi:10.5539/ibr.v7n10p1

URL: <http://dx.doi.org/10.5539/ibr.v7n10p1>

Abstract

By leveraging advanced information and communication technologies to provide innovative services through Internet, manufacturing service companies successfully integrate and coordinate the value chain activities to cost-effectively produce quality products for global customers. However, those complex electronic service (e-service) innovations usually are not necessarily adopted soon by customers as expected, which leads to slower investment returns and lower online service level. This study tried to understand the relationship between industry institutional factors and adoption intention of e-service innovation, and consider the moderating effect of e-service complexity. A survey included 263 respondent companies was conducted to collect empirical data from semiconductor industry. Research results shown that three institutional factors (technology standardization, propagating institution and institutional pressure) all have positive influence on the e-service innovation adoption intention. The e-service complexity has negative influence on the adoption intention and negatively moderates the effect of institutional pressure and propagating institution, while positively moderates technology standardization effect. Institutional factors can be useful strategic tools for promoting e-service innovation diffusion but need to consider innovation complexity. With the findings, this study contributes to academic understandings and provides several managerial implications for practitioners.

Keywords: e-service innovation, innovation adoption, institutional factor, innovation complexity

1. Introduction

As the industry becomes more and more disintegrated for seeking the benefits of specialty, the interactions among industrial organizations, especially in the supply chain ecosystem, are getting frequent and complicated. Recently, Taiwanese high-tech manufacturing service companies had been seizing the great opportunity of global outsourcing to successfully win business and serve worldwide customers through their flexible and efficient production capability. However, to integrate the supply chain activities as a whole to deliver completed product and service value to end market in the virtual value network, those firms need to reduce the cost and improve the quality of communication in the inter-organizational collaboration, therefore firms started to leverage the Internet technology for providing information services in an “online” or even “cloud” manner. This phenomenon, so called “e-service innovation”, is prevalent in many industries and gradually accepted as one of the major types of service delivery (Chatterjee & Segars, 2001). Although most of focal firms provide their customers with e-services, those innovations are not necessarily diffusing soon among the customers as expected, since not all customer firms will or are able to adopt those e-service innovations.

Traditional studies on innovation adoption were mainly subject to individual level. Recent studies shown that the institutional environment factors will influence the actions taken by organization in specific institutions context. Considering the adoption of inter-firm e-service innovation is a kind of organizational action, and it sometimes deeply involve firm’s strategic decision and resource commitment, this study tries to identify the critical factors of e-service innovation adoption from an institutional perspective. By collecting empirical data from a Taiwan semiconductor manufacturing company and its worldwide customers, this research intends to clarify the effects of institutional factors on e-service innovation adoption intention and the direct and moderating effects of e-service complexity. Based on the research results, this study contributes to academic understanding and provides several managerial implications for how to promote inter-firm e-service innovation from an institutional

factor perspective.

2. Theoretical Background

2.1 Inter-Firm E-Services

Inter-firm e-services are meant by the services delivered to customers through the Internet and other electronic channels (Laudon & Traver, 2011). Based on information and communication technologies, e-services are used for interchanging business information and facilitating collaborative activities between firms. E-services are not only including inter-firm information systems integration, but also concerning organizational issues such as collaborative commerce, inter-organization process coordination, and partner relationship management. For different research purposes and viewpoints, a variety of names were used to label inter-firm e-services. Mayer-Guell (2001) defined Business-to-Business E-commerce as “the buying and selling of goods and services among businesses via the Internet.” In this perspective, transaction is the focal point of inter-firm e-services. Some authors took points from the view of supply chain integration. Frohlich (2002) used “e-integration” to describe the Internet-based supply chain integration with upstream suppliers and downstream customers. Liu et al. (2010) defined the Internet-enabled supply chain management systems as the technical enabler of the orchestration of value chain operations across firm boundaries. The concept of inter-organization process coordination is the center of such viewpoint. Other researchers emphasized the functionalities of e-services and were interested in understanding how can such “e-business applications” help firms on strengthening their capabilities (Macher et al., 2002; Vakharia, 2002).

Considering the definition of business-to-business e-commerce put the focus on transactions; e-integration of supply chain mainly concerned about logistics process integration, and e-business application centered on business capabilities are all too narrow to appropriately describe the concept of “inter-firm e-services,” this study adopted a construct of “e-services” proposed by Georgakopoulos et al. (2002), where the e-service was defined as “teams of applications and humans (participation electronically) that work together to provide a service or a product” in the inter-firm context. Cloud computing is another e-service trend now is emerging in industry. Different types of cloud computing, e.g. Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS), provide customer with a variety of value and risk such as information property ownership, privacy and security policy.

Although Internet technologies are getting mature and give firms confidence of providing inter-firm e-services through technology innovations, the adopting rate of customer firms seems not so synchronous. When a firm invests resources to invent innovative e-services for their customers, it may become an important issue to speed up the diffusion of such innovation among the customer firms for harvesting the returns on the investment.

2.2 Adoption of Innovation

Diffusion of Innovation (DOI) Model describes the processes and components of an innovation being adopted autonomously by individuals (Rogers, 1995). This model provides a theory base to explain how the characteristics of innovation, the adopter characteristics, and the opinion leaders and change agents influence the diffusion of innovations. DOI model suggests that the diffusion process starts slowly among pioneering adopters, reaches take-off stage as a growing community of adopters is established and the effects of peer influence arise, and levels off as the population of potential adopters becomes exhausted, thus leading to an S-shaped cumulative adoption curve (Fichman, 2000). Lots of studies were supported the appropriation of diffusion of innovation model in information systems field (Brancheau & Wetherbe, 1990; Eneh, 2010). However, those evidences were mainly on the simpler innovations and the individual adopters (Fichman, 2000). Therefore, it applies less well to more complex innovations and to the adoption in and by organizations (Attewell, 1992).

To analyze the adoption of innovation at organization level, researchers need to realize the absence of a general theory and the necessity of developing a tailored theoretical perspective to specific innovations and/or particular adoption context. Markus (1987) introduced the “critical mass” effects when organizations adopted innovative communication technologies. Attewell (1992) discussed the influences which arising from some institutions for lowering knowledge barriers on complex organizational technologies adoption by organizations. By investigating the information systems innovations, Swanson (1994) included the IS unit characteristics into the classical model, classified the IT innovation types, and postulated differential effects of the same variables depending on IT innovation type. Those models revised the classical one for better fitting the specific research problem and context. Fichman (2000) argued that even if the diffusion of complex technology innovations are slow at the early stage because of complexity, expense, and compatibility, these characteristics can be moderated by the actions of institutions that seek to propagate those innovations. Those institutions include R&D laboratories, government agencies, technology vendors, consulting firms and user groups. Based on previous

researches (Attewell, 1992; Fichman, 2000; Swanson & Ramiller, 1997), institutional propagating factors include promotion, advertising, pricing, technology simplification, technology sponsorship, subsidies, reputation, and industry competitiveness. Regarding the organization's actions, include adoption of e-service innovations, will be significantly influenced by propagating institutions.

The performance of information systems usually deeply rely on the information technology standard for the security and interconnectivity concerns (Li, 2004). For avoiding the technological lockout effects, firms will seriously consider not to use a private or closed technology standard if they need to adopt a necessary innovation (Schilling, 1998). Technological characteristics, such as networking protocol, are significantly influence the adoption of innovation (Kim & Song, 2009). In information technology field, most of open technology standards are developed and directed by official or industrial institutions (for example, the IEEE's WiFi standard workgroup). Therefore, this study considered the technology standardization as a kind of institutional factor affecting the adoption intention of e-service innovation.

2.3 Institutional Theory of Organization

According to institutional theory, an organization must satisfy its stakeholders to obtain the legitimacy for survival in competition environment. For earning the legitimacy, the organization's behaviors have to comply with the common shared value and norm of the stakeholders. Those common shared value and norm are presented on culture, politics, legal system, and industrial convention to constitute the institutional environment. The organization's behavior that comply with the institutions will be regarded as trustworthy and increase the legitimacy, so the organization tends to behave as the institution confined (Ashforth & Gibbs, 1990; Sharma et al., 2012).

Since the organization's actions will be dominated by institutional environment, there is a tendency of organization to imitate the more successful organizations because they have the higher legitimacy. Such organization behavior was known as "organizational isomorphism." The notion that isomorphism, both structural and procedural, will earn legitimacy for the organization is widely supported in research (Dacin, 1997; Deephouse, 1996). Although institutional theorists have done a lot of work on organizational problem, IS researchers still have few studies considering the institutional influence when investigating techno-social phenomenon (Liu et al., 2010). Orlikowski and Barley (2001) argued that IS researchers usually ignore the institutional factors in research problem domain, and it risks promoting an overly rational and technologically or economically determined view.

Institutional theory claims that the institutional environment provides norms for organizational structures, practices and operations. According to these norms, the environment is gradually developing rule-like social expectations which direct the behaviors of industrial organizations. Hence, when a firm is deciding whether or not to adopt an e-service innovation, the institutional expectations and factors will affect the intention (Zsidisin et al., 2005). The institutional expectations and influent factors can be categorized into three types of institutional pressures: mimetic pressure, coercive pressure and normative pressure (Liu et al., 2010). Mimetic pressure comes from a firm's perception of competitor's success actions (DiMaggio & Powell, 1983). The firm will benchmark how competitors operated and then to imitate these successful firms by adopting the same practice. Coercive pressure is meant by the pressure arises from political influences exerted by the powerful firms on which the focal firm relies (Teo et al., 2003). Usually an industrial dominant company, like Wal-Mart, can utilize the coercive pressure on those product companies that highly depend on its sales channel to accept innovative application of information systems (Premkumara, 2000). Normative pressure is defined as the pressure that originates from collective viewpoints among specific social contexts of what forms legitimate organizational behavior (Heugens & Lander, 2009). The shared norms among the industrial organizations will influence the behavior decision made by the firms hence the normative pressure is going to interference the adoption intention of e-service innovation as well.

Considering the diffusion of inter-firm e-service innovations is a techno-social question and the unit of analysis is organization, this study will adopt the suggestion of Orlikowski and Barley (2001) to include the institutional factors in research model. This study will empirically test the hypotheses on the impacts of institutional factors on the adoption intention of inter-firm e-service innovations.

3. Research Model

This study takes a broader prospective to define inter-firm e-services, which can be referred to any electronic delivery or interchange of services and information among firms. It probably is supply chain information integration, collaborative virtual design team, self-help online customer services, or other service delivered via electronic channel. In most cases, those e-services are quite complex either in process coordination or

technologies used to implement it. As discussed in previous literature review, factors such as technology standardization, propagating institutions (e.g. promotion, advertising, pricing, technology support and reputation) and institutional pressures can have significant impacts on the adoption of complex innovations (Liu et al., 2010; Fichman, 2000). This study draws hypotheses from the institutional factors and innovation characteristic for testing the direct and moderating effects on e-service innovation adoption.

As we discussed in previous section, information system performance highly depends on the information technology standard for the security and interconnectivity concerns. When a firm is considering the technological lockout effects after adopting a new e-service innovation, a private or closed technology standard could be a critical negative factor when making the decision. In information technology field, most of open technology standards are developed and directed by official or industrial institutions. Firms adopt open or standardized technology enabled e-service innovation can reduce the risk of technological lockout, thereby to increase the willingness to utilize. In most cases, inter-firm e-services innovation requires customer firms to open networking connection for integrating or interchanging the information resources. It might increase the risk of information leakage or attack by external hackers from information security viewpoint. Customer firms with standard information security policy usually have higher control on external networking connection. Therefore, this study considered the technology standardization as a kind of institutional factor affecting the adoption intention of e-service innovation.

H1. Higher technology standardization will increase the adoption intention of e-service innovation.

Previous researches indicated the decision of adopting innovation would be influenced by different types of propagating institutions. If a firm heavily promoted its e-services innovation to customer firms, it will probably positively influence on the adoption intention. To consider the complexity of e-services innovation will discourage customers to adopt it, a firm can provide customer with technical support or training programs on implementation and usage to speed up the diffusion. In addition, a goodwill or reputation of a firm can help it to win the trust and favorable impression from customers thereby to increase the adoption intention on the e-service innovation, therefore:

H2. Stronger propagating institutions will increase the adoption intention of e-service innovation.

Institutional mimetic pressure is prevalent in industrial environment around organizations. The image of success held by the firm adopting innovation will reinforce such pressure (Haveman, 1993). In addition, complex technological innovation usually requires more organizational knowledge and absorptive capacity hence the firms will imitate the success innovation adopter with consideration of mitigating the information searching cost and risk of adoption (Fichman & Kemerer, 1997).

Institutional coercive pressure refers to the formal and informal pressure exerted by a number of external organizations on the organization to adopt some of the organizational action (DiMaggio & Powell, 1983). Many e-services and innovative use is also possible from the mandatory institutional pressure. For example, Dell Computer requires its manufacturing vendor partners using electronic supply chain services innovation and the government requires companies to adopt the new International Financial Reporting Standards (IFRS) accounting principles arising from new information demand service innovation.

Institutional normative pressure is applied the relevant substantive organization and other organizations directly or indirectly linked relationship so that they can learn practice from each other to reduce costs and increase benefits. Thereby they will gradually produce similar values and ideas with each other, and they are considered over time logical way and ideas between groups would be formed and jointly follow the norms (Burt, 1987). The more often shared between groups and practice these specifications, which will be self-reinforcing in its rightful place among populations, and therefore will not follow the norms of the organization or group of individuals produce behavioral stress. If an enterprise can adopt innovative e-services into a customer base that is essentially universally accepted norms, then the institution will regulate the pressure using the customer's willingness to have a significant impact on innovation adoption.

H3. Larger institutional pressure will increase the adoption intention of e-service innovation.

In spite of the focus on the institutional factors, characteristic of innovation is also important factor to the adoption of innovations. Rogers (1995) defines several intrinsic characteristics of innovations, i.e. relative advantage, trialability, compatibility, complexity and observability, which influence an individual's decision to adopt or reject an innovation. Since the unit of analysis is firm and the e-service innovation in business to business environment is specific to industrial context and needs, this study is interested in understanding the direct and moderating effects of innovation complexity on the adoption intention because B2B e-service

innovation is usually regarded very complex (Macher et al., 2002). Hence, we develop two hypotheses below:

H4. More complex e-service innovation will decrease the adoption intention.

H5a. The complexity of e-service innovation will moderate the relationship between technology standardization and adoption intention.

H5b. The complexity of e-service innovation will moderate the relationship between propagating institution and adoption intention.

H5c. The complexity of e-service innovation will moderate the relationship between institutional pressure and adoption intention.

The complete research model is presented in figure 1.

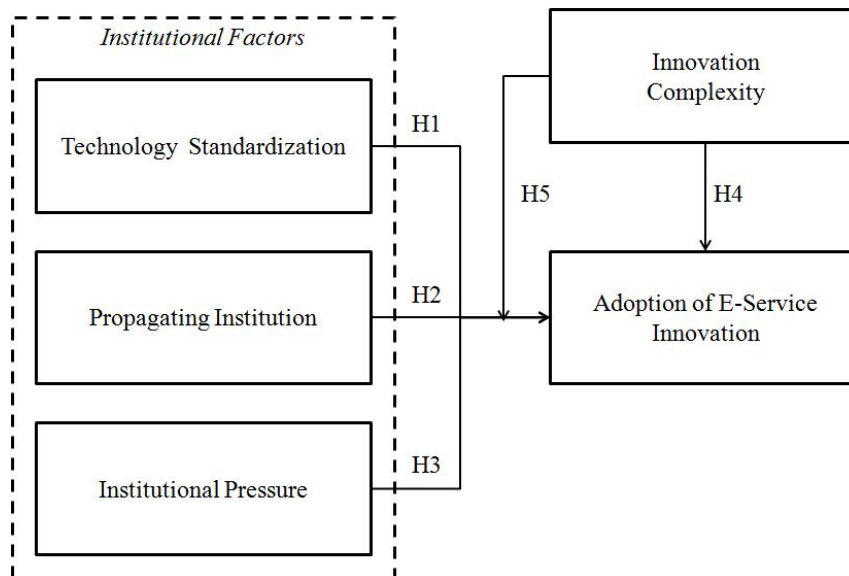


Figure 1. Research model

4. Research Method and Data Analysis

In order to test the research hypotheses, this study used mail and online survey methods to collect data from a Taiwanese semiconductor manufacturing service company's customers, which are mainly IC design houses and integrated device manufacturers. After two rounds of pretests with 15 industrial experts, we finalized the questionnaire and sent it (by electronic or traditional mail) to participating companies which are the potential users of the semiconductor manufacturing service company's e-service innovation. Based on the customer contact list provided by the cooperative company, total 437 companies were invited to fill in this survey of which 297 responded. The informants of responded companies all hold managerial or higher positions. Among the respondent data, 34 observations were discarded because of missing values and invalid responses, which made the final sample size for the analysis 263. Of the respondents, 25.5% of the responses were from the Asia-Pacific region, excluding Japan; 12% were from Europe; 14.4% were from Japan; and 48.1% were from North America.

4.1 Instrument Validation and Descriptive Statistics

For instrument validation, a confirmatory factor analysis was performed to assess convergent and discriminate validity. The factor loadings of all measurement items ranged from 0.62 to 0.93, which indicates that convergent validity is moderately acceptable (the details of the validation information are given in Table 1). We also assessed construct reliability by calculating composite reliability to respective latent variables as suggested by Segars (1997). The estimates of composite reliability of latent variables ranged from 0.87 to 0.91, significantly higher than the threshold of 0.7 suggested by Jořreskog and Sořrbom (1989). The Cronbach's α of all the latent variables exceeded 0.7, which is the threshold suggested by Sharma (1996).

Table 1. Factor structure matrix of loadings and cross-loadings

Scale Items	ADT	TES	PGI	INP	CPX
adt1	0.82	0.38	0.38	0.41	-0.47
adt2	0.89	0.44	0.21	0.46	-0.38
adt3	0.86	0.46	0.25	0.41	-0.38
tes1	0.43	0.88	0.18	0.45	-0.26
tes2	0.44	0.88	0.18	0.52	-0.27
tes3	0.40	0.81	0.15	0.50	-0.29
pgi1	0.12	0.06	0.62	0.04	-0.19
pgi2	0.23	0.14	0.77	0.10	-0.16
pgi3	0.32	0.17	0.92	0.16	-0.13
pgi4	0.32	0.22	0.90	0.23	-0.17
inp1	0.46	0.52	0.18	0.89	-0.43
inp2	0.42	0.53	0.19	0.90	-0.40
inp3	0.42	0.45	0.11	0.84	-0.54
cpx1	-0.31	-0.17	-0.17	-0.28	0.74
cpx2	-0.45	-0.33	-0.16	-0.53	0.93
cpx3	-0.47	-0.29	-0.17	-0.50	0.93

Nevertheless, composite reliability cannot reflect the extent to which variance is captured by the constructs. Therefore, an average variance extracted (AVE) estimate is adopted to acquire this information. Fornell and Larcker (1981) suggested that an acceptable AVE estimate should be higher than 0.5 for a construct's measure. In this study, all AVE estimates, with ranged from 0.64 to 0.77, were above this cut-off value (detailed information of measurement reliability and validity are shown in Table 2).

Table 2. Cronbach's α , AVE, composite reliability, and correlation matrix

	Cronbach's α	AVE	CR	ADT	TES	PGI	INP	CPX
ADT	0.81	0.73	0.89	0.86				
TES	0.82	0.74	0.89	0.50	0.86			
PGI	0.77	0.64	0.87	0.33	0.20	0.80		
INP	0.85	0.77	0.91	0.50	0.57	0.19	0.88	
CPX	0.83	0.75	0.90	-0.48	-0.32	-0.19	-0.52	0.87

Note. Square of root of AVE for each construct is shown in the diagonal of the correlation matrix. ADT: Adoption Intention; TES: Technology Standardization; PGI: Propagating Institution; INP: Institutional Pressure; CPX: Innovation Complexity.

4.2 Hypotheses Test

The study employed the partial least squares (PLS) method to test the research hypotheses using open source software Visual PLS 1.04b1 (Fu, 2006). Because this study considers the moderating effects of e-service innovation complexity, and the product-indicator approach of covariance-based structural equation modeling might be problematic (Chen et al., 2013), we used PLS for the testing of moderating effects like other previous information systems studies (Limayem et al., 2007). The test results show that all institutional factors have significant positive effects on e-service innovation adoption intention (ADT) at the significant level 0.05. Technology Standard (TES) has the largest path coefficient 0.261, which followed by the Institutional Pressure (INP) with the path coefficient 0.231 and the factor Propagating Institutions (PGI) has the smallest path coefficient 0.172. Not surprisingly, the complexity of e-service innovation (CPX) has significant negative influence on e-service innovation adoption intention. The path coefficient of CPX is -0.314 which exhibits the

characteristic of e-service innovation itself significantly influence the adoption intention as DOI theorem expected. Based on the model test, the research hypotheses H1, H2, H3, and H4 are supported.

Regarding the moderating effect of e-service innovation complexity on the effect of institutional factors on adoption intention, this study used three product indicators to measure the moderating effects of e-service innovation complexity on Technology Standardization, Propagating Institutions and Institutional Pressure. All the three interaction effects of innovation complexity with institutional factors are significant. Complexity negatively moderates the effect of Propagating Institutions factor and Institutional Pressure factor on e-service adoption intention. That means when the e-service becomes more complex, the influence of these two institutional factors is going to be decreased. On the other hand, the more complex the e-service is the higher influence of Technology Standardization factor places on adoption intention, which can be evidenced by the positive coefficient of the interaction effect between Complexity and Technology Standardization. Hence, the hypothesis H5a, H5b and H5c are supported by this study. The R² of the model is 0.414; therefore, the overall institutional factors and e-service innovation complexity can explain 41.4% variance of the adoption intention (the model test results are shown in Figure 2).

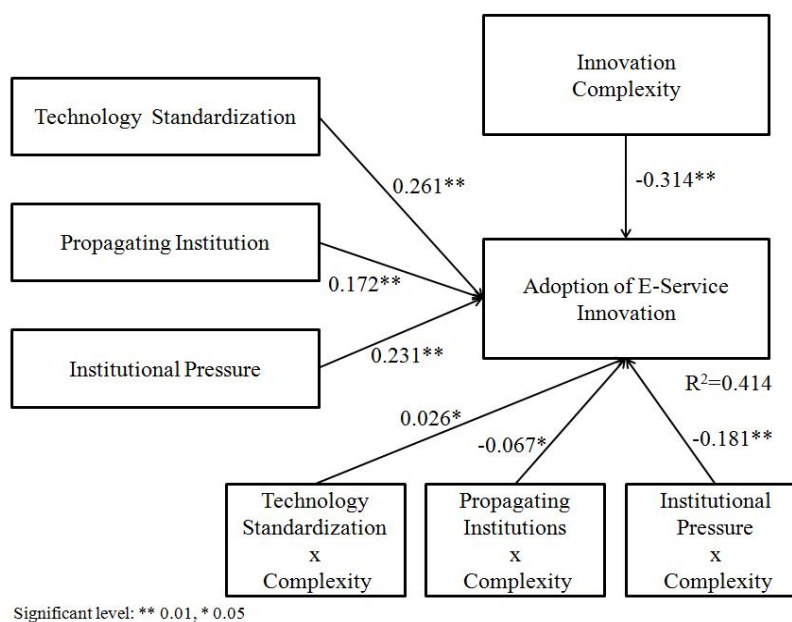


Figure 2. Model test results

5. Conclusion

Facing the keen and cruel competitions, firms are always seeking low cost, high quality ways to deliver their services and products to their customers. The fact is especially true to the firms in industrial value chain ecosystem due to today's business competition has already become a "chain-to-chain" rather than "firm-to-firm" competition. As the Internet technologies are getting mature, the potential of new information and communication technologies to transform business models, organizational structures, processes and the inter-firm relationship is now universally acknowledged (Chatterjee & Segars, 2001). More and more firms serve their customers through Internet or other electronic channels. The innovations of "e-services" are also dramatically growing and account for big portion of firm's services. Despite the firms started to innovate e-services to serve their customers, the factors affecting adoption intention are still not well understood.

Classical innovation diffusion model explains the adoption of innovation at individual level that is limited in explaining the e-service adoption behavior at firm level. Institutional theory has been well supported by empirical validation on the explanation power of the organizational actions, and identified the influences of institutional factors on innovation adoption as well. This study tries to understand the relationship between the institutional factors and the adoption intention of e-services innovation in semiconductor industry settings. With carefully designing the research architecture and collecting empirical data to test the hypotheses that draws from the related theories, this study found technology standardization, propagating institution and institutional

pressure are all have significant positive influence on the e-service innovation adoption intention, while the complexity of the e-service has significant negative influence on the adoption intention. In addition, the complexity of e-service innovation also has significant negative moderating effect on the effect of institutional pressure on adoption intention. The moderating effect of e-service innovation complexity is not significant on the influential path from technology standardization and propagating institution to the adoption intention.

Several theoretical implications can be drawn from these results. To our knowledge, moderating effect of innovation complexity on the relationships between institutional factors and the adoption intention of e-service innovation has not been discussed in prior studies. The results of this study are a starting point for relevant research and establish basic understandings of innovation adoption in inter-firm e-service. This study also expanded on the model proposed by Liu et al. (2010), which only examined the effects of institutional pressures on eSCM adoption.

This study also has implications for practitioners and business managers. First, for the firm which likes to promote customers to adopt its e-service innovation, it should make sure the e-services are implemented with standard technologies for reducing the technological lockout effect risk of customers. This probably because customers enjoy the value provided by the e-service innovation but still would like to preserve the flexibility on choosing supply chain partners. Second, the e-service innovation firms can leverage the institutional pressures among the customers-in-competition to promote the innovation adoption and diffusion. Third, to establish propagating institutions for promoting the e-service innovation or strengthening the firm's reputation, or providing customers with complete training program and technological support are all helpful to increase the adoption intention of e-service innovation. Finally, not surprising, the complexity of e-service innovation will deter customer's adoption intention so that a firm should simplify the user interface and operation process of the e-service. Besides, because complexity of e-service innovation will negatively moderate the effect of institutional pressures, a firm should make the e-service complexity as low as possible when leveraging the institutional pressures to promote the e-service innovation. Since the moderating effects of e-service complexity are not significant on the other two institutional factors, it seems a reasonable strategy to set high priority to establish technology standardization and propagating institution when a firm wants to promote a e-service innovation.

This study has certain limitations although steps were taken during both hypotheses development and data collection. First, although the industry-specific path analysis was executed with a global sample size, specific cultural factors were not included in this study, and should be taken into account when applying the research results. Second, this study employed a cross-sectional design to examine the relationships between consumer's intention of e-service adoption and institutional factors, and so all hypothetical causal relationships can only be regarded as inferred rather than proven. Given the above limitations, further research should be cautious when explaining and applying the research results.

References

- Ashforth, B., & Gibbs, B. (1990). The double edge of organizational legitimation. *Organization Science*, 1(2), 177–194. <http://dx.doi.org/10.1287/orsc.1.2.177>
- Attewell, P. (1992). Technology diffusion and organizational learning: The case of business computing. *Organization Science*, 3(1), 1–19. <http://dx.doi.org/10.1287/orsc.3.1.1>
- Brancheau, J., & Wetherbe, J. (1990). The adoption of spreadsheet software: Testing innovation diffusion theory in the context of end-user computing. *Information Systems Research*, 1(2), 115–143. <http://dx.doi.org/10.1287/isre.1.2.115>
- Burt, R. (1987). Social contagion and innovation: Cohesion versus structural equivalence. *American Journal of Sociology*, 92(6), 1287–1335. <http://dx.doi.org/10.1086/228667>
- Chatterjee, D., & Segars, A. (2001). Transformation of the enterprise through e-business: An overview of contemporary practices and trends. *Report to the Advanced Practices Council of the Society for Information Management*.
- Chen, G., Yang, S., & Tang, S. (2013). Sense of virtual community and knowledge contribution in a P3 virtual community motivation and experience. *Internet Research*, 23(1), 4–26. <http://dx.doi.org/10.1108/10662241311295755>
- Dacin, M. (1997). Isomorphism in context: The power and prescription of institutional norms. *Academy of Management Journal*, 40(1), 46–81. <http://dx.doi.org/10.2307/257020>

- Deephouse, D. (1996). Does isomorphism legitimate? *Academy of Management Journal*, 39(4), 1024–1039. <http://dx.doi.org/10.2307/256722>
- DiMaggio, P., & Powell, W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147–160. <http://dx.doi.org/10.2307/2095101>
- Eneh, O. (2010). Technology transfer, adoption and integration: A review. *Journal of Applied Sciences*, 10(16), 1814–1819. <http://dx.doi.org/10.3923/jas.2010.1814.1819>
- Fichman, R. (2000). The diffusion and assimilation of information technology innovations. *Framing the domains of IT management*. Pinnaflex Educational Resources, Ohio.
- Fichman, R., & Kemerer, C. (1997). The assimilation of software process innovations: An organizational learning perspective. *Management Science*, 43(10), 1345–1363. <http://dx.doi.org/10.1287/mnsc.43.10.1345>
- Fornell, C., & Larcker, D. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 28(1), 39–51. <http://dx.doi.org/10.2307/3151312>
- Frohlich, D. (2002). e-Integration in the supply chain: Barriers and performance. *Decision Sciences*, 33(4), 537–556. <http://dx.doi.org/10.1111/j.1540-5915.2002.tb01655.x>
- Fu, J. (2006). *VisualPLS 1.04b1*. Retrieved from <http://www2.kuas.edu.tw/prof/fred/vpls/index.html>
- Georgakopoulos, D., Schuster, H., Cichocki, A., & Baker, D. (2002). Process-based e-service composition for modeling and automating zero latency supply chains. *Information Systems Frontiers*, 4(1), 33–54. <http://dx.doi.org/10.1023/A:1015330421974>
- Haveman, H. (1993). Follow the leader: Mimetic isomorphism and entry into new markets. *Administrative Science Quarterly*, 38(4), 593–627. <http://dx.doi.org/10.2307/2393338>
- Heugens, P., & Lander, M. (2009). Structure! Agency! (and other quarrels): A meta-analysis of institutional theories of organization. *Academy of Management Journal*, 52(1), 61–85. <http://dx.doi.org/10.5465/AMJ.2009.36461835>
- Jöreskog, K., & Sörbom, D. (1989). *LISREL 7 User's Reference Guide*. Scientific Software, IL.
- Kim, S., & Song, Y. (2009). Determinants influencing individuals' likelihood of adopting and actual use of blueberry. *Journal of Applied Sciences*, 9(20), 3662–3671. <http://dx.doi.org/10.3923/jas.2009.3662.3671>
- Laudon, K., & Traver, C. (2011). *E-Commerce: Business, Technology, Society*. England: Pearson.
- Li, X. (2004). Informational cascades in IT adoption. *Communications of the ACM*, 47(4), 93–97. <http://dx.doi.org/10.1145/975817.975824>
- Limayem, M., Hirt, S., & Cheung, C. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly*, 31(4), 705–737. <http://www.jstor.org/stable/25148817>
- Liu, H., Ke, W., Wei, K., Gu, J., & Chen, H. (2010). The role of institutional pressures and organizational culture in the firm's intention to adopt internet-enabled supply chain management systems. *Journal of Operations Management*, 28(5), 372–384. <http://dx.doi.org/10.1016/j.jom.2009.11.010>
- Macher, J., Mowery, D., & Simcoe, T. (2002). e-Business and disintegration of the semiconductor industry value chain. *Industry and Innovation*, 9(3), 155–181. <http://dx.doi.org/10.1080/1366271022000034444>
- Markus, M. (1987). Toward a “critical mass” theory of interactive media: Universal access, interdependence and diffusion. *Communication Research*, 15(5), 491–511. <http://dx.doi.org/10.1177/009365087014005003>
- Mayer-Guell, A. (2001). Business-to-business electronic commerce: The new economy's challenge to traditional American business values. *Management Communication Quarterly*, 14(4), 644–652. <http://dx.doi.org/10.1177/0893318901144008>
- Orlikowski, W., & Barley, S. (2001). Technology and institutions: What can research on information technology and research on organizations learn from each other? *MIS Quarterly*, 25(2), 145–165. <http://dx.doi.org/10.2307/3250927>
- Premkumara, G. (2000). Interorganization systems and supply chain management: An information processing perspective. *Information System Management*, 17(3), 1–14. <http://dx.doi.org/10.1201/1078/43192.17.3.20000601/31241.8>
- Rogers, E. M. (1995). *Diffusion of Innovations*. NY: Free Press.
- Schilling, M. A. (1998). Technological Lockout: An Integrative Model of the Economic and Strategic Factors

- Driving Technology Success and Failure. *The Academy of Management Review*, 23(2), 267–284. <http://dx.doi.org/10.5465/AMR.1998.533226>.
- Segars, A. H. (1997). Assessing the unidimensionality of measurement: a paradigm and illustration within the context of information systems research. *Omega*, 25(1), 107–21. [http://dx.doi.org/10.1016/S0305-0483\(96\)00051-5](http://dx.doi.org/10.1016/S0305-0483(96)00051-5)
- Sharma, G., Bao, X., & Wang, Q. (2012). Public attitude, service delivery and bureaucratic reform in e-government: A conceptual framework. *Information Technology Journal*, 11(11), 1544–1552. <http://dx.doi.org/10.3923/itj.2012.1544.1552>
- Sharma, S. (1996). *Applied Multivariate Techniques*. NY: John Wiley & Sons Inc.
- Swanson, E. (1994). Information systems innovations among organizations. *Management Science*, 40(9), 1069–1092. <http://dx.doi.org/10.1287/mnsc.40.9.1069>
- Swanson, E., & Ramiller, N. (1997). The organizing vision in information systems innovation. *Organization Science*, 8(5), 458–474. <http://dx.doi.org/10.1287/orsc.8.5.458>
- Teo, H., Wei, K., & Benbasat, I. (2003). Predicting intention to adopt interorganizational linkages: An institutional perspective. *MIS Quarterly*, 27(1), 19–49. <http://www.jstor.org/stable/30036518>
- Vakharia, A. (2002). e-Business and supply chain management. *Decision Sciences*, 33(4), 495–504. <http://dx.doi.org/10.1111/j.1540-5915.2002.tb01653.x>
- Zsidisin, G., Melnyk, S., & Ragatz, G. (2005). An institutional theory perspective of business continuity planning for purchasing and supply management. *International Journal of Production Research*, 43(16), 3401–3420. <http://dx.doi.org/10.1080/00207540500095613>

Appendix

Appendix 1. Measurement items

Construct	Indicator	Measurement Items
Adoption	adt1	My company is contemplating to adopt this e-service in a year's time
Intention	adt2	My company is likely to adopt this e-service in a year's time
	adt3	My company is expecting to adopt this e-service in a year's time
Propagating Institution	inp1	The supplier has a formal promotion program to introduce this e-service
	inp2	The supplier has a technical support group to resolve my problem for using this e-service
	inp3	The supplier has a good reputation on delivering this e-service
	inp4	The supplier has a formal training program for using this e-service
Technology Standardization	tes1	This e-service is implemented by industrial standard networking protocol
	tes2	This e-service is implemented by industrial standard security architecture
	tes3	This e-service is implemented by industrial standard application development architecture
Institutional Pressure	inp1	Our main customers that matter to us believe that we should use this e-service
	inp2	This e-service has been widely adopted by our competitors currently
	inp3	Our main competitors that have adopted this e-service are more competitive
Innovation complexity	cpx1	I am satisfied with the brand product/service
	cpx2	I would re-purchase the brand product/service
	cpx3	The brand product/service is of the highest quality

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).