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A FRAMEWORK FOR USERS’ SATISFACTION OF INFORMATION SYSTEMS IN E-GOVERNMENT

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Abstract

Governments around the world are actively promoting electronic government (e-Government) initiatives to provide fast, convenient and innovative services. Most previous studies focus mainly on discussing the affecting factors of public’s satisfaction toward information services provided by their government in the context of voluntary adoption. In order to effectively enable and provide e-Government service, most government agencies have been urged to use specific information systems (IS) to implement functions for information and records management. Under such mandated IS deployment, the interaction among regulatory body, government agency and end-users critically shapes the deployment of system. However, few researches examined the technology adoption in mandatory setting. The purpose of this study is to propose a model for user’s satisfaction in e-Government and clarify the relationship among strategy formulation, social influence, perceived performance, and end-users’ satisfaction of IS in government agency through empirical investigation. The empirical findings suggest that strategy formulation is the antecedent of users’ satisfaction in using IS through the effect of organizational resources and individual performance.

Keywords: E-Government, Information Systems, Strategy Formulation.
1 INTRODUCTION

Information systems (IS) have been shown to be important for government administration among different agencies or functional areas (Chen, Chen, Huang & Ching, 2006). Government agencies often organize their services and operations into programs that may be changed in response to a host of factors, including information technologies implementations (Walker, 2001). The most typical assumption of research in consumers’ behavior is that they are voluntary (Brown & Venkatesh, 2005). Prior IS researches have been conducted primarily in environments of voluntary adoption, the applicability of previous findings to the mandatory usage context is unclear (Chan, Thong, Venkatesh, Brown, Hu & Tam, 2010). The relationships in traditional IS acceptance models could be different in the context of electronic government (e-Government) (Brown, Massey, Montoya-Weiss & Burkman, 2002). While prior studies have recognized the distinction between voluntary and mandatory technology adoption, there are few researches that have systematically examined technology adoption in the e-Government context. Therefore, the relative importance of determinants of user acceptance, such as perceived usefulness and functionality, may differ in an e-Government setting. Further, some researchers have noted that user satisfaction, rather than behavioral intention, is a more appropriate dependent variable in mandated environments (Brown, Venkatesh, Kuruzovich & Massey, 2008).

Makino and Beamish (1998) observed that a significant number of other types such as partnership between agencies had limited understanding. Although examples of collaborative arrangements are becoming increasingly common, our understanding of their operation and management does not reflect their expanding roles in government agencies. The strategic partnership performs well if there exits broad community or societal consensus in the value of the policy goals. Public agencies have turned to strategic planning to enhance government performance and accountability (Kim, 2002). The important but distinct components of an agency’s management system and the way it functions and interacts with other agencies must align with its strategic intent, as far as possible (Scott, 2003). This study aims to ascertain the causal relationship among strategic partnership, social norm, resources, individual perception, and satisfaction of IS usage in e-government. The purpose of this study is to, under the context of mandated deployment of information systems by e-Government, develop an IS satisfaction model and explore the relationships among regulation policy at the national level, social influence at the organizational level, perceived performance at the individual level, and end-users' satisfaction toward government agencies.

2 CONCEPTUAL MODEL AND HYPOTHESES DEVELOPMENT

Regardless of their IS implementation strategy, agencies must comply with related policies and guidelines from regulation agency, i.e. regulator. In this study, IS implementation in e-Government context is defined specifically as the extent to which the regulator’s IS regulation policy is recommended by agencies and an agency’s reaction strategy is regulated by regulator to meet mandated rules and requirements. From previous review, proposed model of this study with social influence process and cognitive instrument process for evaluating users’ satisfaction is depicted in Figure 1. On the basis of Tallon and Kraemer (1999) and Kearns and Lederer’s (2003) model, the alignment between regulator and agencies could be classified into two parts: regulator participates in IS implementation of government agencies (strategic regulation) and government agencies participate in national IS policy legislating of regulator (strategic reaction). An appropriate commitment of resources in government agencies will affect users’ perceived performance and system functionality, and then improve users’ satisfaction. This study assessed individual agency’s participation in IS policy legislating of the regulator for records, analyzed IS implementation in agencies, and examined the relationship among mandatory implementation of IS at national level, social norm and resources at organizational level, and perceived performance and functionality at individual level with associated
outcome. This model enables us to examine the outcomes associated with each individual satisfaction in social influence process and cognitive instrument process.

Regulations are promulgated to guide government agencies’ operations procedures or requirements for satisfactory compliance (Relyea, 2000; Hu, Hsu, Hu & Chen, 2010). The regulator has the power to set clear guidance for government agencies regarding the need to give high quality of IS to users and citizens. When regulating agency has frequent contact with other agencies, national IS strategy developed by regulator is more likely to be phrased in practical terms and reflects reality which might lead to enlarged alignment between regulator and agencies.

When a regulator invites agencies to involve in national IS policy legislation committee to obtain direct knowledge about reality, IS policy is more likely to utilize the strategic capability of IS and meet the requirement of agencies. Such rule and regulation specify essential IS management activities of agencies. When agencies assist the formulation of national IS policy, they are more likely to understand IS objectives of e-Government and to link their IS implementation strategy closely with e-Government strategy resulting in the alignment between regulator and agencies (Jones, Taylor & Spencer, 1995). Government agencies’ attendance at IS policy legislation meetings may lead to increased assimilation of technology and knowledge for themselves and other agencies, and may strengthen alignment (Andreau & Ciborra, 1996). Regular access to regulator may increase the ability of agencies to profound knowledge about strategic usage of IS and share knowledge about emerging opportunities from IS deployment. Agencies’ participation in legislation for national IS policy fosters the understanding of policy and commitment. Agencies can benefit from IS for achieving their objectives by closely observing the relevant regulatory requirements which is good for consensus of IS management in agencies. Social norm is the degree to which an individual perceives that important others believe he or she should use the IS. Therefore, the participation of executing agencies in legislating for national IS policy positively affects their social norm on IS users.

By working closely with other government agencies, a regulator is better positioned to influence and reflect the appropriate use of IS explicitly in the e-Government plan (Kearns & Lederer, 2003). Agencies’ participation in legislation for national IS policy can propose their reality and make the policy feasible or operational. Mutual participation between regulator and agencies provide for suitable operation of IS and promote involved resources for IS deployment. Thus, this study proposes the following hypotheses:

**Hypothesis H$_{1}$:** The participation of executing agencies in legislating for national IS policy positively affects their social norm on IS users.

**Hypothesis H$_{2}$:** The participation of executing agencies in legislating for national IS policy positively affects their involved resources acquisition for developing IS.
A regulator’s participation in an agency’s IS implementation strategy fosters an appreciation for what is meaningful and relevant, and promotes the combining of the agencies’ goal with IS regulation. Besides, participation of a high-level business manager in strategic IS planning is positively and strongly good for associated IS management (Kearns, 2006). Therefore, regulator’s understanding of IS opportunities within agencies may break the barriers to policy-implementation collaboration. Therefore, consensus on IS management in agency which comes from the communication between regulator and agencies renders common norm and policy in deploying IS. The social norm on IS users will then become stronger than before.

Direct participation of regulating agency in agencies’ IS specification leads to a high level of comprehensiveness and thus superior knowledge of related staffs in agencies. Such increased understanding of regulation rules may be expected to lead to the improvement of IS deployment. Good interaction between business manager and IS manager enables the successful exploitation of IS (Feeny, Edwards & Simpson, 1992) and reflects on the commitment and resources for IS development. The regulator’s participation in IS implementation of executing agencies positively affects their resources acquisition for deploying IS. Thus, this study proposes the following hypotheses:

Hypothesis $H_3$: The regulator’s participation in IS implementation of executing agencies positively affects their social norm on IS users.

Hypothesis $H_4$: The regulator’s participation in IS implementation of executing agencies positively affects their resources acquisition for deploying IS.

Several studies have emphasized the importance of social influence process on IS use in general (e.g., Venkatesh & Davis, 2000). Bock et al. (2005) considered that trustful organization climates is a kind of critical institution structure which is social context factor embodied with social influence process. Social norm represents the interpersonal considerations of technology use. While social norm is not expected to have a direct effect on attitude or satisfaction in prior technology adoption research, some researchers suggested that individuals may gain satisfaction by conformity based on identification (French & Raven, 2001). IS success generally reflects an effective relationship between business managers and IS managers. Perceived performance is the degree to which an individual believes that using the IS will help him or her attain goals regarding job performance. Given that perceived performance is considered to be an attitude, this study expects social norm to have a positive impact on the perceived performance. This relationship is expected to hold in an e-government context, as the effect of social norm is found to be stronger in mandatory settings due to individuals’ tendency to comply with pressure from a higher authority (Venkatesh et al., 2003).

IS Users in agencies are likely to perceive the relevance of IS to their tasks if it is chosen and implemented in accordance with the associated regulations or guidelines. In addition, agencies use IS to streamline processes, improve performance, or reduce costs. By integrating IS and its management process, an agency can provide superior transparency to service recipients, internal or external, and at the same time creates auditable trails for control purposes (Thurston, 1997). Such integration allows agencies to adjust their operation and workflow to properly meet the related regulations; as a result, agencies consider that IS is relevant to their tasks and services. Furthermore, if an agency greatly relies on IS to accomplish its objectives, the agency has to ensure the design of the IS satisfactorily meet all the regulatory requirements specified by the regulator in order to streamline or improve its data exchange process and the associated operations in an effective and efficient way. When implementing an IS, agencies motivated to comply with the incumbent regulations are more likely to perceive an IS to be functional than otherwise. Thus, this study proposes the following hypotheses:

Hypothesis $H_5$: Social norm in government agencies positively affects user’s perceived performance on IS.

Hypothesis $H_6$: Social norm in government agencies positively affects user’s perceived functionality on IS.
If the operation of an IS in agency is reasonable to an individual’s knowledge or behavioral style, he or she can use it with minimal change and, from a cost-benefit perspective, perceive good performance. In contrast, it is unlikely that one will perceive the various advantages of using IS if its usage is incompatible with one’s lifestyle (Moore & Benbasat, 1991). The long-term success of records management requires government agencies to allocate resources and actually use the system in addition to maintaining the records and adequately supports their functions or services (Griffin, 2004). Perceived functionality is the extent to which a person perceives that using the system will enhance his or her job performance. Also, perceptions of performance of an innovation are a function of the fit between the innovation and one’s existing practices and preferred lifestyle (Karahanna, Agarwal & Angst, 2006). When implementing IS is mandatory in e-Government setting, the fit between the IS and one’s existing practices is especially important because the adoption of IS urges users follow predefined procedures and functionality to use the IS. Thus, this study proposes the following hypotheses:

Hypothesis H7: Resources acquisition in government agencies positively affects user’s perceived performance on IS.

Hypothesis H8: Resources acquisition in government agencies positively affects user’s perceived functionality on IS.

It is central to understand the driving force of users’ satisfaction to IS and to adapt the services to fulfill consumers’ motives for using it. Perceived performance is the most common technological attribute that contribute to positive user attitudes and user satisfaction in consumer contexts (Brown et al., 2008; Venkatesh et al., 2003) including mandated setting (Brown et al., 2002). When the use of the technology is mandatory, perceived performance serves to encourage positive attitudes toward and user satisfaction with its usage by enhancing efficiency and minimizing effort respectively. Thus, this study proposes the following hypothesis:

Hypothesis H9: Users’ perceived performance on IS positively affects their satisfaction to IS.

An IS can deliver the timely information and related functionality regarding users’ task in IS usage. DeLone and McLean (2003) argued that IS success perceived by user with a positive experience in using a system will be transformed into a perception of usefulness and satisfaction. Moreover, this perception causes users to assess the functional value of a system, thereby leading to increased satisfaction associated with usage. Therefore, users are likely to use the system via increased functional utility and satisfaction associated with usage (Oliver, 1997). Thus, this study proposes the following hypothesis:

Hypothesis H10: Perceived IS functionality positively affects user’s satisfaction to IS.

3 METHOD

3.1 Measurement development and data collection

On the basis of the proposed research framework, this study first identifies the specific constructs to be examined and then operationalizes them by relevant measures from prior researches. Several domain experts review a preliminary questionnaire and provide their evaluative feedback. The e-Government policy in Taiwan claims that all agencies need to implement electronic records management systems (ERMS) for the fulfilment of the Information Freedom Act. Layne and Lee (2001) argued that agencies in different levels act similarly when using similar systems. Therefore, this study uses central government as the target sample. The survey packet, consisting of a cover letter describing the objective, data management plan and the questionnaire of this study, was sent to central
government agencies via postal mail to records management staffs who understand the implementation and current practice of ERMS within the agency. Since the constructs investigated in this study are latent variables that can’t be directly observed, such variables were measured with a six-point Likert-type scale, with the anchors being “strongly disagree” and “strongly agree”.

3.2 Data analysis

After receiving survey questionnaires, this study prepared the data bank and used SPSS 18.0 for statistical analysis. Reliability refers to how reliable the assessment tools are, and measures the stability and consistency of results. This study used the Cronbach’s $\alpha$, the most widely used in social science, to measure reliability. According to Nunnally and Bernstein (1994), reliability estimation greater than 0.7 indicated that the research dimensions are reliable. Validity determines whether measurements can effectively measure what the researcher wishes to determine. Content validity refers to the scope of the topic that the measurement tools can cover, and its key is in the processes followed in developing measurement tools. Construct validity is the extent to which realistic circumstances are reflected. Construct validity is further divided into convergent validity and discriminate validity. Convergent validity is the relevance between questions in the same dimension, which must remain high when measured with different methods. Discriminate validity is the relevance of questions in different dimensions, which must remain low when measured with the same methods. The content of the survey questionnaire used in this study were drawn from scales developed by scholars in this field, and therefore with a certain degree of content validity. In addition, the contents of the questionnaire were fully discussed with field experts to ensure the validity of this study. Correlations between factors were analyzed. Hierarchical regression was used to explore relationship between variables.

4 RESULT

A total of 978 questionnaires were received, of which there are 916 effective ones. In terms of government agencies, the majority was level-4 agencies (58.2%), followed by level-3 agencies (36.2%), level-2 agencies (4.9%) and level-1 agencies (0.7%). Statistics of the measures in the research framework are presented in Table 1
After data collected, factor analysis and Cronbach’s α was used to evaluate the construct validity and reliability of each construct. The loadings on hypothesized factors are significant and substantial (all factor loadings exceeding 0.75). The assessment of convergent validity is supported by the CFA model. Thus, convergent validity holds. Additionally, this study also computes average variance extracted (AVE) to confirm discriminate validity (Fornell and Larcker 1981). When the AVE value is larger than the square phi-correlation, the questionnaire has the high discriminate validity (Burton, Lichtenstein, Netemeyer and Garretson 1998; Batra and Sinha 2000). The AVE values for every variable demonstrate that this study has discriminate validity.

The quality of measurement efforts by investigating reliability, convergent validity, discriminate validity and construct validity were also determined. This study assesses reliability for all items in a construct by calculating composite reliability (CR). All composite reliability values in this study are larger than 0.70, indicating an acceptable fit to data (Fornell and Larcker 1981). Table 2 presents the analysis of the reliability of variables in the research model.
Table 2. Reliability of Variables

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measurement</th>
<th>Loading</th>
<th>Cronbach’s α</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Regulation</td>
<td>Agency’s advices for regulation</td>
<td>0.96</td>
<td>0.97</td>
<td>0.96</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>Agency’s for policy</td>
<td>0.97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic Reaction</td>
<td>NAA Advices for implementation</td>
<td>0.97</td>
<td>0.96</td>
<td>0.95</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>NAA Advices for specification</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Norm</td>
<td>Influence to use</td>
<td>0.93</td>
<td>0.92</td>
<td>0.88</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>Importance to use</td>
<td>0.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources Acquisition</td>
<td>Requisite resources</td>
<td>0.86</td>
<td>0.88</td>
<td>0.92</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>Requisite knowledge</td>
<td>0.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Performance</td>
<td>Perceived quickness</td>
<td>0.94</td>
<td>0.92</td>
<td>0.92</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>Perceived productivity</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Functionality</td>
<td>Easy operation</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sufficient function</td>
<td>0.92</td>
<td>0.95</td>
<td>0.95</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>Job effectiveness</td>
<td>0.94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction to IS</td>
<td>Satisfied information</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfied IS</td>
<td>0.89</td>
<td>0.88</td>
<td>0.89</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Satisfied interface</td>
<td>0.91</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents the matrix of correlation between factors in measurement model. SR1 denotes Strategic Regulation; SR2 denotes Strategic Reaction; SN denotes Social Norm; RA denotes Resources Acquisition; PP denotes Perceived Performance; PF denotes Perceived Functionality; and SAT denotes Satisfaction. Diagonal elements are square root of AVEs and off-diagonal elements are correlations. All constructs are positively related and, while some have strong correlations, all are well below the suggested cutoff of 0.90 (Bagozzi & Phillips, 1991). The highest correlation between the exogenous constructs was 0.52. The square root of the average variance extracted (AVE) for each measure exceeds correlations between the factor and other factors, thus suggests discriminant validity. To further test for multi-collinearity among the exogenous factors, this study computed variance inflation factors (VIFs) and they were found to be around 3 and less than the conservative threshold of 5, thus suggested that multi-collinearity was not a major issue in this study.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>SR1</th>
<th>SR2</th>
<th>SN</th>
<th>RES</th>
<th>PP</th>
<th>PF</th>
<th>SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR1</td>
<td>3.35</td>
<td>1.27</td>
<td>.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR2</td>
<td>4.15</td>
<td>1.17</td>
<td>.52**</td>
<td>.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>3.99</td>
<td>1.15</td>
<td>.25**</td>
<td>.28**</td>
<td>.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RA</td>
<td>3.48</td>
<td>1.18</td>
<td>.26**</td>
<td>.25**</td>
<td>.31**</td>
<td>.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>4.68</td>
<td>0.80</td>
<td>.22**</td>
<td>.26**</td>
<td>.49**</td>
<td>.30**</td>
<td>.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF</td>
<td>4.61</td>
<td>0.84</td>
<td>.10**</td>
<td>.18**</td>
<td>.23**</td>
<td>.31**</td>
<td>.36**</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>SAT</td>
<td>4.56</td>
<td>0.80</td>
<td>.13**</td>
<td>.26**</td>
<td>.29**</td>
<td>.25**</td>
<td>.43**</td>
<td>.39**</td>
<td>.85</td>
</tr>
</tbody>
</table>

Note: Values on diagonal are square root of AVE. *:p<0.05; **:p<0.01
The regression results of proposed model are depicted in Figure 2.

![Model Results Diagram]

**Figure 2. Model Results**

### 5 CONCLUSIONS

This study tries to clarify the influence between regulating agency and executing agencies on the organizational management and users’ satisfaction under mandatory context. Complementary to previous researches, this study developed a three-level framework of IS satisfaction under mandatory settings. In e-Government, electronic records management systems are mandatory to users for official documents, records, and archives management. The antecedents of satisfaction to IS were divided by three levels: regulation and reaction, social norm and resources acquisition, and performance and functionality. The findings reveal that strategy formulation in government agencies affects social norm and resources which directly affect perceived performance and functionality, and ultimately affect the satisfaction of end users in using IS.

Regarding regulation process, agency proposes comments on the formulation of national IS policy and afterward get suggestions from regulating agency on the design specification of IS in agency. The results show that the support from regulator demonstrates more effect on social norm than the resources acquisition. More support from regulator fosters consensus on IS management.

Furthermore, perceived performance has greater effect on user satisfaction than perceived functionality. It is similar to the evidence from the technology acceptance model (TAM) that usefulness to users demonstrates more power than easiness to use in the accepting new technology. Furthermore, social norm has greater effect on perceived performance than resources. In mandatory setting, all official staffs have to follow the rules and laws in agency. Therefore, IS users in agency tend to accomplish their tasks through social norm and formal procedures. However, resources demonstrate greater effect on perceived functionality than social norm. Organization which collects sufficient resources and knowledge will make IS functions well. Further study could investigate the regulating effect on other contextual factors of government agencies in related topics.

### Reference


