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Organizational Factors' Effects on the Success of E-Learning Systems and Organizational Benefits: An Empirical Study in Taiwan



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Abstract

E-learning development for enterprises is still in its infancy in that scholars are still working on identifying the critical success factors for e-learning in organizational contexts. This study presents a framework considering how organizational factors affect the quality and service of e-learning systems and how these factors influence organizational benefits in the view of IS success model and resource-based theory. A questionnaire survey of 120 Taiwanese companies was performed to validate the framework. The results show that top management support, information security policy, and institutional policy are positively related to system quality, while top management support, organizational learning culture, and institutional policy are positively related to system service. Additionally, system service is significantly related to organizational benefits. Our model provides two novel aspects of e-learning study. Firstly, we extend IS success model by incorporating four organizational factors as antecedences influencing system quality and system service. Secondly, the model is framed and examined on an organizational level, which provides a top-down view for managers when designing and implementing e-learning systems in the organizational context.

Keywords: E-learning system; top management support; organizational learning culture; information security policy; institutional policy; organizational benefits

Introduction

The e-learning system (ELS), which is an information system (IS), is often associated with human resources and can be seen as a strategic tool for organizations. The benefits to introduce ELS include (a) higher employee satisfaction, (b) better opportunities for career growth and flexible learning for employees, (c) increased innovation, (d) better operation-

al efficiency, and (e) cost savings (Cukusic, Alfirevic, Granic, & Garaca, 2010; Lai & Liou, 2010). These benefits help organizations obtain outstanding employees, more efficient business procedures, and lower costs. However, e-learning development for enterprises is still in its infancy and two research streams have been studied. One stream focused on case studies which presented the processes and implications of introducing various ELS to enterprises, such as Telenor (Netteland, 2009), Virgin Atlantic Airways (Carruth, 2007), BT Dials (Overton, 2007), Lucent (Gold, 2003), and Kodak (Gold, 2003). These studies demonstrated the difficulties enterprises encountered and how these difficulties were tackled. Another stream focused on identifying the CSFs for enterprises. For example, McPherson and Nunes (2006) conducted a focus group and revealed 66 CSFs divided into four clusters: leadership, structure and culture, design, technology and delivery. Sela and Sivan (2009) conducted twelve semistructured interviews and categorized CSFs into "must-have" and "nice-to-have." The former included useful and easy to use tools, marketing, management support, right organizational culture, and a real need for organizations. The latter included time to learn, support, mandatory learning, and incentives. These studies highlighted the key issues as a guideline when designing and implementing ELS.

However, these up-to-date studies only proposed scattered factors instead of an intact framework to depict how organizational factors affect ELS success and organizational benefits. Altarawneh (2011) reported that organizational issues account for 70% of ELS implementation problems. These organizational issues are insufficient funds to develop ELS (83%), a lack of ELS strategies and politics (67%), a lack of clear, accessible communication channels (51%), a lack of interest regarding e-learning education (49%) and a human resource strategy (43%). Additionally, studies exploring the critical success factors of implementing ELS in organizations reported that organizational factors are important for ELS success, such as business process redesign, learning culture (Chen & Hsiang, 2007; Sela & Sivan, 2009), manager support (Sela & Sivan, 2009; Elliott & Clayton, 2009), and policy set up and enforcement (Admiraal & Lockhorst, 2009). It can be concluded that ELS success depends on the support of other participants in organizations, such as the human resources, finance, and technology divisions. Thus, organizational factors cannot be ignored when considering the sustainability of ELS (Netteland, 2009). Additionally, scholars (e.g., Lai & Liou, 2010) have reported that ELS improves an organization's profitability and productivity, which implies that ELS success has positive effects on organizational benefits. Therefore, we assume that organizational factors affect ELS success, and ELS influences organizational benefits.

By revealing the relationships among organizational factors, ELS, and organizational benefits, the results of such empirical study are capable of supporting educationalists and practitioners to evaluate and construct ELS at both organizational and strategic levels. Therefore, the aims of this study are

1. to identify the factors affecting organizational benefits in the context of enterprises, and

2. to develop and empirically examine the proposed framework and provide support for managers to improve ELS and organizational benefits.

The rest of this paper is organized as follows: We begin by identifying the factors affecting organizational benefits based on the information system success model and resource-based theory. Then we present the proposed model and hypotheses. The research methodology section describes the methods of collecting questionnaires. Results of the data analysis by partial-least-squares (PLS) are presented next along with a discussion of our findings. We conclude by considering the implications for managers and future researchers.

Theoretical Background

Information System Success Model (ISSM)

The IS success model (ISSM) by DeLone and McLean (1992) is one of the most widely cited. Scholars have applied this model to examining various IS contexts, such as knowledge management (Kulkarni, Ravindran, & Freeze, 2006, 20077) and e-commerce (Garrity, Glassberg, Kim, Sanders, & Shin, 2005). Their model provides a scheme for classifying the numerous IS success factors and suggests causal relationships between the categories. The updated ISSM (DeLone & McLean, 2003) claimed that information quality, system quality, and service quality are the antecedents influencing organizational benefits. Information quality captures IS content issues, such as personalization, completeness, relevance, ease of understanding, and security. System quality measures IS performance: usability, availability, reliability, adaptability, and response time. Service quality evaluates the overall support for users by the department. These three quality measures affect users' satisfaction and in turn influence organizational benefits.

Traditional IS is product-oriented and its evaluation focuses on system performance, which directly influences users' satisfaction with the system. For example, data inaccuracy and slow response time may quickly dissatisfy users. However, IS also plays a service role (Pitt, Watson, & Kavan, 1995). In an ELS context, ELS service provides services like staff training (Carruth, 2007), new information updating (Overton, 2007), flexible queries (Morch, Engen, & Asand, 2004), and skill and career updating (O'Brien & Hall, 2004). As to information quality, the information produced by ELS can be course materials, personal learning schedules, and outcomes, which can be seen as a segment of ELS service. Thus, the idea of information quality overlaps service quality, that is, the concept of information quality can be covered by service quality. This leads to our conclusion that both system quality and service quality should be incorporated in our model.

The three issues should be noticed for applying ISSM to our study. Firstly, the assumption of ISSM is that the users volunteer to use the system (Freeze, Alshare, Lane, & Wen, 2010). Nevertheless employees in enterprises are required to use ELS. That is, whether employees are pleased or not, they must study through ELS. From an organizational viewpoint, users' satisfaction could be noticeable but whether employees possess the indispensable skills and apply these skills to create benefits is more important. Another issue is that ISSM mainly focuses on an individual level instead of an organizational level. When designing ELS, managers' lenses must focus on organizational and strategic levels (Chen & Hsiang, 2007), such

as how to reduce costs and create competitive advantage. Therefore, the organization would benefit from managers' decision-making if ISSM is interpreted on an organizational level. The third issue is that ISSM emphasizes the importance of information quality, system quality, and service quality but shows no clues about what antecedents affect them. These antecedents could be critical when designing and implementing ELS. Revealing these factors would contribute significantly to managers' decision-making. Based on the discussion above, we apply ISSM on an organizational level and investigate organizational antecedents which affect system quality and service quality based on resource-based theory.

Resource-Based Theory

Resource-based theory (Barney, 1991) is used to provide a theoretical foundation to explore the antecedents which affect system quality and service. This theory suggests that organizational resources which are costly or hard to imitate help organizations retrieve competitive advantage. One resource-based research stream has considered the functional capabilities of IS as the source of competitive advantage (e.g., Bharadwaj, 2000). Another perspective has focused on how resources are channelled and utilized to bring competitive advantage (e.g., Ravichandran & Lertwongsatien, 2005). However, both streams agree that resource availability determines IS capabilities and further affects organizational performance (Ray, Muhanna, & Barney, 2005).

Powell and Dent-Micallef (1997) categorized organizational resources as human, business, and technology. Human resource relates to people and ambiance of organizations, including culture, communication, consensus, CEO commitment, and strategy integration. Business resource relates to process and policy, including supplier relationship, training, process, and performance benchmarks. Technology resource includes computer hardware and software. For our study, technology resource can be incorporated by system quality, thus we applied the two dimensions to our model: human and business resources.

In order to explore the organizational factors to form the framework, we analyzed past studies that conducted interviews, case studies, and focus groups to explore a variety of CSFs for ELS. Four factors were summarized to fit the two dimensions. Organizational learning culture (McPherson & Nunes, 2006; Chen & Hsiang, 2007; Admiraal & Lockhorst, 2009; Sela & Sivan, 2009) and senior management support (McPherson & Nunes, 2006; Sela & Sivan, 2009; Elliott & Clayton, 2009) were classified as human dimension while institutional policy (Chen & Hsiang, 2007; Admiraal & Lockhorst, 2009) and information security policy (McPherson & Nunes, 2006; Elliott & Clayton, 2009) were classified as business dimension. The four factors provide a lens explaining the critical resources possessed by organizations and how they could impact ELS capabilities.

Research Framework and Hypotheses

Figure 1 shows the proposed framework which presents linkages among the four organizational factors, system quality and service, and organizational benefits. System quality and system service intermediate the impacts from organizational factors to organizational ben-

efits. Organizational benefits evaluate the advantages brought by ELS. The following sections discuss each construct and build the hypotheses.

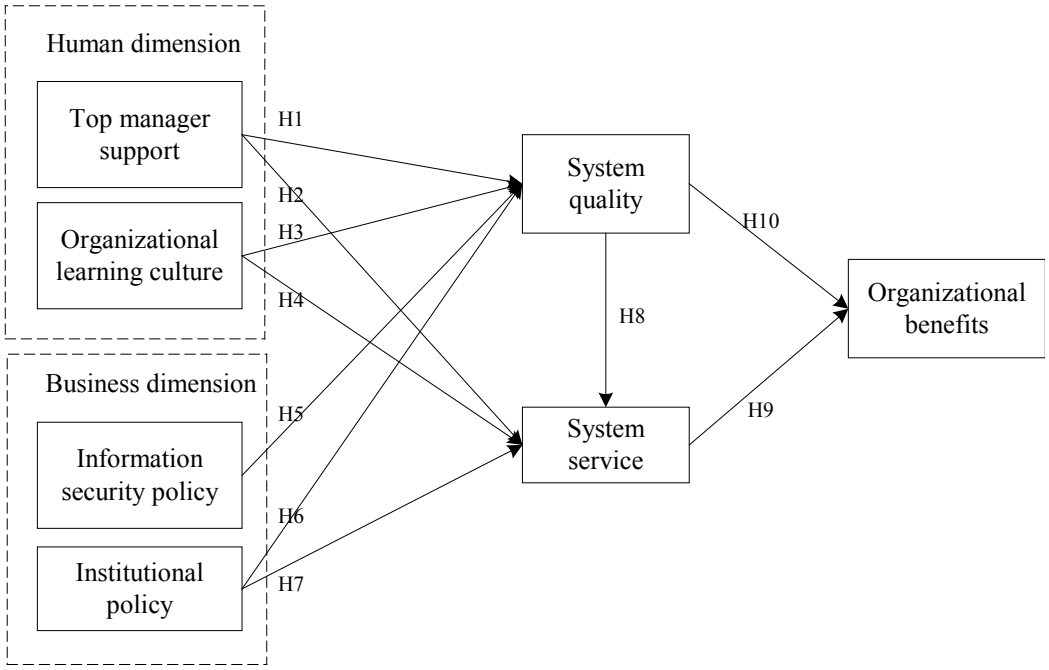

Figure 1. The framework of this study.

Top Management Support (TMS)

TMS is defined as the involvement and participation of top-level leaders. Mintzberg (1971) stated that managers are specialists who perform a particular set of specialized managerial roles that consist of three dimensions: interpersonal roles (figurehead, leader, and liaison), informational roles (monitor, disseminator, and spokesman), and decisional roles (entrepreneur, disturbance handler, resource allocator, and negotiator). Among them, decisional roles are critical for identifying business needs, allocating resources and negotiating conflicts between divisions, and ensuring that ELS is exploited in a planned and strategic manner. The full support of top managers ensures richer resources, better communication between different departments, and superior decision-making (Sela & Sivan, 2009; Elliott & Clayton, 2009).

We hypothesize that TMS is positively related to system quality and system service. TMS is one of the important factors to IT success (Sohal, Moss, & Ng, 2001) and positively influences the performance of IS development projects (Lu, Zhao, & Han, 2008). With TMS, the commitment of financial and technological resources improves system function and reliability, which promotes better system quality (Wang & Chen, 2006). Additionally, these resources also guarantee better services. For example, an excellent help desk service can reduce users' anxiety and a well-designed ELS can provide better information quality, definite learning direction, and career advice. TMS can also lower users' resistance and ensure the proper implementation of ELS (Thong, Chee-Sing, & Raman, 2001; Lu et al., 2008).

Therefore, the following hypotheses are proposed.

Hypothesis 1: Top management support is positively related to system quality.

Hypothesis 2: Top management support is positively related to system service.

Organizational Learning Culture (OLC)

OLC is a set of norms and values concerning the functioning of an organization that support systematic and in-depth methods of generating knowledge or achieving higher level strategy through phases of information acquisition, information interpretation, and changes to employees' behavior and cognition (Škerlavaj, Štemberger, Škrinjar, & Dimovski, 2007). In the e-learning context, OLC focuses on the value of an atmosphere of knowledge creation and sharing, mutual help, and the achievement of organizational goals.

When designing and implementing ELS solutions, adapting OLC to the solutions is crucial to avoid potential conflict (McPherson & Nunes, 2006). OLC joins content, technologists, experts, and employees to construct an e-learning environment. Škerlavaj et al. (2007) reported that OLC has a positive direct impact on nonfinancial performance (performance from the employees, customers, and suppliers) and a positive indirect impact on financial performance through employee performance. They concluded that cultivating an environment where employees can and should continually learn and share their knowledge is crucial to the competitive advantage of organizations. Chou (2003) explained that OLC moderates the influence of ELS on organizational learning, which implies that OLC acts with ELS to accumulate organizational knowledge.

Strong OLC ensures employees overcome their differences and head toward organizational goals (Martins & Treblanche, 2003), so user resistance can be reduced and better communication can be achieved (Khan, 2005). Therefore, the planning and implementation of ELS can be controlled, allowing better system quality (Cukusic, et al., 2010). Thus, Hypothesis 3 is proposed.

Hypothesis 3: Organizational learning culture is positively related to system quality.

OLC is a powerful aid to knowledge management and organizational change, owing to its potential for affecting individual behaviors and organizational outcomes. The former includes employees' information-sharing behaviors and the ability to exploit technology and knowledge, while the latter includes innovativeness and competitive advantage (Lai, Lin, Lin, Wang, & Huang, 2009; Škerlavaj, Song, & Lee, 2010; Liao & Wu, 2010). To make e-learning effective, continuously adjusting the functions and strategies in line with the business environment is important for the sustainability of ELS. OLC improves an organization's ability to apply and adapt e-learning to cope with its predicaments. For example, Lucent Technologies (Gold, 2003), a communications network provider, needed to integrate over 12 systems across different countries to consolidate them into a single and standardized ELS. The adaptation of different cultures, different languages, and business procedures was the key to the integration task. The organizational culture of Lucent, which

promoted sharing, respect, and synergy, helped individuals give up a certain amount of freedom and individuality. In turn Lucent's ELS provided satisfactory service for customers and staff. In sum, OLC promotes information integrity, information-sharing behavior, and the allocation of more labor and budget to ELS projects. More resources also create better help service by reducing the obstacles to promoting ELS. Therefore, Hypothesis 4 is proposed.

Hypothesis 4: Organizational learning culture is positively related to system service.

Information Security Policy (ISP)

Information security is an interdisciplinary field encompassing aspects of organization, management, and technology (Werlinger, Hawkey, & Beznosov, 2009). Most efforts in this field have been traditionally dedicated to technical or managerial issues. As the role of information security shifts from a supporter to a value creator, it faces more challenges due to the increasingly sophisticated threats to information safety. McPherson and Nunes (2006) conducted research using a focus group and reported that interviewees identified ISP as one of the CSFs of ELS. ELS may contain confidential information that is important for business operations, such as patent documents and customers' information. Organizations obtain benefits from protecting them. These benefits include enhancing organizations' reputation, increasing customer trust, and sustaining business resiliency (Opstal, 2007; Nyanchama, 2005). Conversely, failure to establish ISP can disrupt business operations and deteriorate organizational reputation and competitiveness as well as that of its customers (Fratto, 2009).

Information security measures include access control and information privacy (Khan, 2005), and they should be enacted as policy. For example, Kodak's (Gold, 2003) enterprise-wide ELS delivered digital learning to 50,000 employees in 57 countries. Some courses contained classified information that might damage the company's competitive advantage, reputation, and customers' trust if leaked. Therefore, to protect the system from outside hackers and internal employees who might unwittingly download and install malicious software, only authorized people were allowed to access the Internet by inputting codes. Even those with Internet access authorization were restricted by firewalls from downloading files, programs, email attachments, and plug-ins.

In sum, ISP ensures the confidentiality, integrity, availability, and better control of information assets. It also responds promptly to and recovers quickly from information security attacks (Hagen, Albrechtsen, & Johnsen 2011), allowing for a more stable ELS with better system quality. Thus, Hypothesis 5 is proposed as below.

Hypothesis 5: Information security policy is positively related to system quality.

Institutional Policy (ITP)

ITP refers to the organization's commitments, goals, and values and how these can be transmitted and achieved. It facilitates the rapid diffusion of e-learning within organizations (Nichols, 2008) and is a driving force in the ground-level activities that move orga-

nizations forward (Rossiter, 2007). ITP can be categorised into three levels: senior-level formal support, e-learning structures, and institution-wide systems (Czerniewicz & Brown, 2009). The first relates to senior managers' commitments in terms of support and resource allocation. The latter two relate to e-learning course content, delivery, evaluation method, and computer systems. ITP which should be publicized in written format creates a legal norm for everyone to follow and establishes a predictive environment in which to work. Those supportive, flexible, non-restrictive policies benefit effective e-learning and foster organizational innovation.

From a resource-based view, ITP is enacted through the resources of organizations. Adequate resources ensure that organizations can construct e-learning structures and systems (Marshall & Mitchell, 2005). Without sufficient monetary and expert support, satisfactory system quality is rarely achieved. Thus, Hypothesis 6 is proposed.

Hypothesis 6: Institutional policy is positively related to system quality.

ITP affects both the professional development of employees and the strategic adjustment of organizations (Admiraal & Lockhorst, 2009). In the initial stage of implementing ELS, organizations need to provide incentives that motivate employees to use ELS (Schreurs, Gelan, & Sammour, 2011), such as rewards, promotion, or personal growth. In the latter stage, competency assessment helps employees improve their learning skills and direct organizations to renovate functions, courses, and strategies. Thus, with the guidance of an appropriate ITP, a climate of consensus of learning and sharing can be formed, and the functions of ELS can be enhanced to meet employees' needs. And in turn system service can be improved. Hypothesis 7 is proposed.

Hypothesis 7: Institutional policy is positively related to system service.

System Quality, System Service, and Organizational Benefits

Usefulness and ease of use are compulsory for ELS (Sela & Sivan, 2009) and system quality is positively related to service quality (Kettinger, Park, & Smith, 2008). According to the TAM (technology acceptance model), an easy-to-use system gives users a greater perception of usefulness and promotes a positive attitude toward the system, which implies that a system with better quality (such as better response time, reliability, and accuracy) can deliver better services. Additionally, according to ISSM, system quality may affect organizational benefits. Thus, Hypothesis 8 and 9 are proposed.

Hypothesis 8: System quality is positively related to system service.

Hypothesis 9: System quality is positively related to organizational benefits.

ELS service is positively related to service value and users' satisfaction (Kettinger et al., 2008; Cenfetelli & Bassellier, 2009). Users' satisfaction is positively related to the intention to use the system (Garrity et al., 2005) and in turn affects individual performance and organizational performance (Garrity & Sanders, 1998). Sustaining users' intentions to use

ELS is a key to achieve organizational goals. Therefore, we assume that providing better services can improve users' satisfaction and prolong the intention to use ELS, which increases organizational benefits. Therefore, Hypothesis 10 is proposed.

Hypothesis 10: System service is positively related to organizational benefits.

Research Methodology

Measurement Development

Seven constructs were evaluated: information security policy, top management support, organizational learning culture, institutional policy, system quality, service quality, and organizational benefits. Measurement items derived from past studies were reworded to relate specifically to ELS in the organizational context. The review and refinement of the items by two MIS professors secured content validity. A pilot test was conducted; questionnaires were sent to 30 companies that had introduced ELS and 20 companies responded. Measurement items were then revised according to their responses and are shown in the Appendix.

Subjects

Our analytic unit was organization instead of individual; thus, we collected only one questionnaire for each organization to represent the idea of that organization. These questionnaires were analyzed to validate our model to present a generalized result. We obtained the initial target companies which currently were using ELS to support their business from e-learning conferences and friends. Then we contacted the senior managers individually, like CEOs or ELS managers who were estimated as having adequate knowledge of the organizational learning culture, policy setting, ELS performance, and organizational benefits. Only one questionnaire was sent to the person we contacted and he/she was asked to fill in the questionnaire or forward it to someone who was eligible and willing to participate. To increase the sample size, we adopted a snowball sampling method which requested the participants' favor of providing both other companies they knew that were using ELS and possible participants. As a result, we distributed the questionnaires to 136 Taiwanese companies and a total of 120 companies/participants responded, giving a final response rate of 88.2%. These 120 questionnaires represented the ideas from 120 companies. We used the data to validate the model and the result was able to present a general schema of how these factors affect organizational benefit in an organizational view.

Data Analysis and Results

Measurement Validity

Partial-least-squares (PLS) was used to construct the path coefficients for the model. Compared to structural equation modeling, PLS is more suited to the early stages of theory

development and smaller sample sizes (Henseler, Ringle, & Sinkovics, 2009). Thus, SmartPLS 2.0 was used to perform measurement validity and structural modeling.

Construct validity was evaluated by convergent validity and discriminant validity. According to Henseler et al. (2009) both validities can be confirmed if the indicators fit these conditions: (a) a factor loading has a higher correlation with another latent variable than with its respective latent variable; (b) the average variance extracted (AVE) is higher than 0.5; (c) the composite reliability (CR) must be greater than 0.6; and (d) the square root of each construct's AVE is larger than its correlations with other constructs. All indicator factor loadings were well loaded on their constructs; their own loadings were much higher than the cross-loadings with other constructs (see Table 1). The reliability was evaluated using Cronbach's alpha and the values were all above 0.70 (see Table 2), which indicates a reliable measurement instrument. The AVE values were all above 0.50 and CR values were all above 0.83 (see Table 2). The square roots of AVE values were greater than the correlations between any pairs of constructs located in their horizontal lines and vertical columns, proving that the AVE values for the seven constructs were higher than the variance due to measurement error. Thus, each construct was verified as distinct and the test of discriminant validity was successful.

Table 1

Results of Validity – Cross Loadings

Items	TMS[d]	OLC[a]	ISP[b]	ITP[c]	SQL[e]	SSV[f]	OGB[g]
TMS1	0.66	0.30	0.32	0.11	0.09	0.16	0.32
TMS2	0.69	0.20	0.36	0.16	0.05	0.08	0.22
TMS3	0.89	0.31	0.43	0.25	0.17	0.35	0.36
TMS4	0.84	0.35	0.24	0.32	0.24	0.25	0.41
TMS5	0.92	0.42	0.41	0.31	0.24	0.32	0.34
OLC1	0.51	0.84	0.40	0.28	0.58	0.60	0.46
OLC2	0.40	0.93	0.37	0.42	0.65	0.71	0.53
OLC3	0.36	0.89	0.43	0.34	0.60	0.67	0.51
OLC4	0.41	0.88	0.47	0.51	0.64	0.53	0.50
OLC5	0.05	0.84	0.29	0.56	0.84	0.68	0.62
OLC6	0.31	0.82	0.18	0.61	0.78	0.59	0.73
ISP1	0.27	0.10	0.61	0.28	0.22	0.21	0.47
ISP2	0.27	0.36	0.75	0.17	0.32	0.41	0.10
ISP3	0.32	0.23	0.85	0.02	0.20	0.36	0.14
ISP4	0.42	0.44	0.64	0.18	0.39	0.50	0.28
ISP5	0.15	0.23	0.63	0.23	0.23	0.20	0.32
ISP6	0.03	0.12	0.43	0.30	0.15	0.04	0.04
ITP1	0.30	0.04	0.21	0.54	0.18	0.21	0.49
ITP2	0.17	0.36	0.35	0.89	0.67	0.60	0.60
ITP3	0.05	0.23	0.11	0.75	0.42	0.20	0.32
ITP4	0.39	0.69	0.17	0.87	0.69	0.62	0.61
SQL1	0.18	0.85	0.32	0.51	0.86	0.79	0.61
SQL2	0.13	0.78	0.33	0.52	0.87	0.73	0.65
SQL3	0.10	0.55	0.23	0.58	0.84	0.67	0.55
SQL4	0.33	0.67	0.43	0.66	0.86	0.67	0.73
SQL5	0.02	0.49	0.36	0.63	0.83	0.73	0.66
SSV1	0.23	0.57	0.37	0.50	0.77	0.87	0.66
SSV2	0.34	0.67	0.50	0.47	0.65	0.83	0.57
SSV3	0.27	0.54	0.35	0.62	0.70	0.88	0.60
SSV4	0.19	0.59	0.32	0.52	0.75	0.92	0.73
OGP1	0.19	0.53	0.32	0.44	0.59	0.71	0.82
OGP2	0.03	0.34	0.02	0.53	0.58	0.58	0.71
OGP3	0.39	0.44	0.21	0.46	0.49	0.29	0.66
OGP4	0.49	0.47	0.44	0.57	0.58	0.51	0.76
OGP5	0.17	0.49	0.10	0.52	0.73	0.72	0.82

[a]Organizational Learning Culture, [b]Information Security Policy, [c]Institutional Policy, [d]Top Management Support, [e]System Quality, [f]System Service, [g]Organizational Benefits

Table 2

AVE, Square Root of AVE, Alpha, CR, and Correlations

	TMS	OLC	ISP	ITP	SQL	SSV	OGB	Alpha	CR	AVE
TMS	*0.71*[a]							0.85	0.83	0.50
OLC	0.41	*0.71*[a]						0.85	0.85	0.51
ISP	0.41	0.42	*0.74*[a]					0.86	0.87	0.55
ITP	0.31	0.53	0.29	*0.75*[a]				0.85	0.84	0.57
SQL	0.23	0.64	0.42	0.71	*0.76*[a]			0.81	0.83	0.57
SSV	0.32	0.70	0.50	0.62	0.79	*0.80*[a]		0.90	0.88	0.64
OGB	0.42	0.65	0.35	0.68	0.70	0.72	*0.76*[a]	0.88	0.87	0.57

[a]Square root of AVE

PLS Path Modeling and Hypotheses Testing

The hypotheses were then examined by the path coefficients of the model shown in Figure 2. As expected, Hypothesis 1 and 2 were supported, which implies that TMS was associated with system quality and system service. OLC was positively related to system service but not system quality, showing that Hypothesis 3 was supported but Hypothesis 4 was not. Hypothesis 5, 6, and 7 were supported, proving that ISP and ITP were positively related to system quality, and ITP was positively related to system service. System quality was proved to be positively related to system service but not to organizational benefits, and system service was positively related to organizational benefits. These results confirmed Hypothesis 8 and 9 were supported but Hypothesis 10 was not. Table 3 summarizes the significant direct/indirect/total effects of variables on organizational benefits. Analysis of Table 3 indicated that ITP and OLC had stronger impacts, TMS had a moderate impact, and ISP had a weak impact on organizational benefits individually. Also, system service served as an important mediator for the indirect relationships between other variables and organizational benefits.

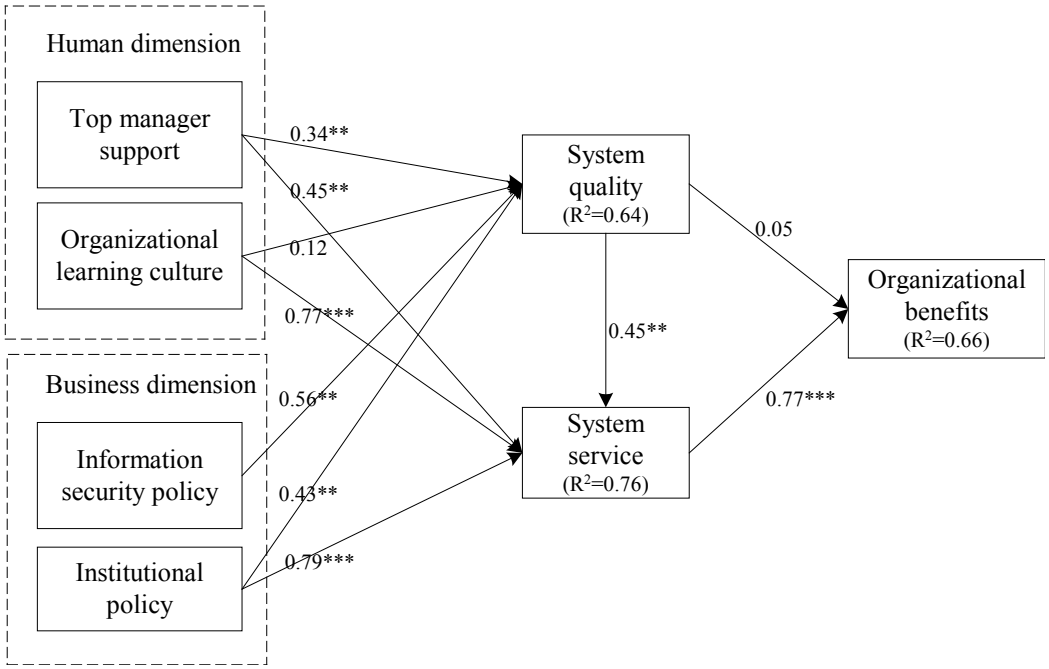

Figure 2. PLS path model (**p < 0.05, ***p < 0.01)

Table 3

Direct/Indirect/Total Effects of Variables on Organizational Benefits

Factors	Direct effect	Indirect effect	Total effect
Top management support		0.47	0.47
Organizational learning culture		0.59	0.59
Information security policy		0.19	0.19
Institutional policy		0.75	0.75
System quality		0.35	0.35
System service	0.77		0.77

Discussion and Implication

The empirical results indicated the relationships between the four organizational factors, system quality, system service, and organizational benefits. TMS, ISP, and ITP were positively related to system quality and accounted for 64% of the variance of system quality. These findings were consistent with past studies (e.g., Wang & Chen, 2006; Czerniewicz & Brown, 2009). From the observation of path coefficients, business dimension factors (ISP and ITP) contributed more than a human dimension factor (TMS), which implies that the establishment of process and policy is slightly more important than the ambiance of an organization in terms of upholding a high-quality ELS. The results also suggested that system quality depends not only on high-performance computer hardware and software but also the supports of managers, appropriate security policy, and the performance evaluation of

employees and ELS. TMS guarantees that adequate resources, such as budget and labor, are allocated to support ELS. ISP ensures the confidentiality, integrity, availability, and better control of information assets, which allows for a better system quality. ITP creates a legal norm to which employees must adhere. Its competency assessments not only help employees realize their learning performance but also help managers modify ELS structures and functions.

TMS, OLC, and ITP were positively related to system service. These findings were consistent with past studies (e.g., Škerlavaj et al., 2007; Lu et al., 2008; Škerlavaj et al., 2010). From the observation of path coefficients, business dimension factors (TMS and OLC) and a human dimension factor (ITP) contributed equally to system service, which implies that both the establishment of policy and the ambiance of organizations are important for improving service of ELS. ELS service quality is nurtured by the supports of managers, organizational learning culture, and the performance evaluation of employees and ELS. The support of managers is capable of reducing employees' resistance and improving help desk service to increase the users' satisfaction. OLC creates an atmosphere of sharing, respect, and synergy for both users and IT staff. The evaluation of ELS provides the chance to adjust system service in line with the change of working environment and processes.

System quality was proved to be significantly related to system service but insignificantly related to organizational benefits. System service was proved to be significantly related to organizational benefits. The results induced an implication: system service is a key index to organizational benefits. System quality for ELS is compulsory and fundamental. It could be critical at the initial stage of implementing ELS but diminish over time (Wu & Wang, 2006). System service provides a baseline judgment about whether system quality satisfies users and other organizational factors are available and successfully implemented. Thus, system service can be seen as a threshold to evaluate whether ELS creates benefits for organizations. Most IS development projects focus on building secure, fast, multifunctional, and stable systems but guarantee no organizational benefits. Therefore, ELS managers need to focus on designing service by carefully analyzing organizational needs and providing satisfactory service.

TMS had a moderate effect on organizational benefits. It is a prerequisite for ELS projects and is essential to sustain a steady development of ELS (Sela & Sivan, 2009; Elliott & Clayton, 2009). Senior managers should display their full support by attending every important meeting, contributing their opinions to the decision-making process, and arbitrating the conflicts between divisions. They also need to assure the availability of budgets for updating hardware and software and for faster Internet connectivity.

The two factors (ISP and ITP) related to policy were proved to significantly impact organizational benefits intermediated by system quality and system service. This result indicated the importance of policy establishment toward the success of ELS. ITP refers to the policy which realizes organizations' commitments, goals, and values while ISP refers to employees' behaviors to secure ELS stability and information assets. Both factors create a legal norm for employees to obey. The legal norm guides employees to make a concerted effort

to accomplish the organizational goals. However, ISP was found to have a weak impact on organizational benefits (see Table 3). Although organizations may suffer from the negative impact of information security accidents caused by loose control, rigid control may hinder information flow and knowledge sharing. Most ELS in participant companies may only provide online courses which cultivate skills for routines and fundamental jobs and may not contain much critical and confidential information. Thus the result was understandable. However, when ELS plays a vital role in training employees and supporting business, ISP may display its gravity.

Conclusion

The empirical results of this study provided considerable support for the proposed model. Eight of the 10 hypotheses were found to be significant, providing valuable insight into how organizational factors affect system quality, system service, and organizational benefits. The four organizational factors should be considered in aggregate when designing and implementing ELS. Organizations must establish goals and strategize in line with OLC. These strategies must be publicized in written documents such as ISP and ITP. Also, TMS ensures that enough resources are allocated and guarantees policy enforcement. Furthermore the four factors may have different weights at different stages. OLC should be considered comprehensively in the design phase and top managers should provide their full support in the implementation phase. ISP assures ELS security and ITP guides staff toward better learning outcomes and career paths while ELS is functioning.

Our framework created two new aspects for e-learning researchers and practitioners. Firstly, ISSM emphasized how IS affects users' satisfaction but the antecedences influencing system quality and system service were missing. Our model filled in this gap by incorporating four antecedences and empirically examined their relationships. For practitioners, these key factors helped managers focus on critical jobs to improve ELS performance and bring the maximum benefits for organizations. For researchers, we recommend extending our model by investigating more exogenous variables, such as leadership, strategy, and trust, and the interactions between these variables. Secondly, most studies which applied ISSM focused on an individual level (see Petter & McLean, 2009). Although users' satisfaction could be important, the support from the organization is the foundation to nurture ELS. Our model which was framed and examined at an organizational level provided managers a practical view to evaluate ELS. For example, conditions such as whether the board provides full support to implement ELS or whether ELS fits into the organizational culture need to be considered seriously before an ELS project commences. For scholars, our model illuminated a new research aspect of ISSM. Applying ISSM in an organizational context can provide a top-down view of IS projects and extend the applicability of ISSM.

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Appendix

Measurement Items, Factor Loading, Error, T-Value, SMC

Construct (source)	Measurement items	Factor loading	Error	t-value	SMC
Top management support (Thong et al., 1996)	For the issues regarding to e-learning system, our top managers always				
	TMS1: attend project meetings	0.57	0.49	5.57	0.52
	TMS2: provide necessary resources	0.60	0.28	11.96	0.60
	TMS3: involve in information analysis	0.66	0.62	10.25	0.67
	TMS4: involve in decision-making	0.64	0.44	6.39	0.68
	TMS5: involve in monitoring project	0.90	0.45	7.09	0.54
Organizational learning culture (Chou, 2003)	In my organization, employees are				
	OLC1: willing to share their knowledge and expertise	0.89	0.35	4.85	0.57
	OLC2: encouraged to share their knowledge or creativity	0.79	0.83	5.27	0.65
	OLC3: discussing their problems and difficulties with other colleagues	0.74	0.21	4.55	0.56
	OLC4: competing with the other members of the organization	0.59	0.71	10.56	0.77
	OLC5: exchanging their working practices each other	0.66	0.53	5.60	0.77
	OLC6: Our organization is trying to transfer to a learning organization	0.46	0.21	7.14	0.75
Information security policy (Hall et al., 2011)	I think our information security policy				
	ISP1: maintains appropriate protection of information assets	0.73	0.37	8.86	0.58
	ISP2: achieves security compliance with legislation or industry requirements	0.70	0.32	4.77	0.57
	ISP3: responds promptly to information security attacks	0.74	0.21	4.45	0.47
	ISP4: recovers quickly from system failure or interruption	0.87	0.16	9.41	0.56
	ISP5: keeps information security risks to a minimum	0.71	1.01	7.56	0.61
	ISP6: allows for better control of information assets	0.82	0.82	10.12	0.65

Construct (source)	Measurement items	Factor loading	Error	t-value	SMC
Institutional policy (Tao, 2008)	I feel our institutional policy regarding to e-learning				
	ITP1: effectively integrates resources	0.91	0.85	8.54	0.51
	ITP2: accelerates the diffusion of e-learning among employees	0.71	0.41	4.89	0.52
	ITP3: promotes information exchange between employees	0.89	0.81	4.49	0.59
	ITP4: treats e-learning as a long-term investment strategy	0.35	0.92	3.44	0.55
System quality (Delone & McLean, 2003)	I am satisfied with our e-learning system in terms of				
	SQL1: availability	0.55	0.42	6.49	0.75
	SQL 2: reliability	0.59	0.33	3.87	0.88
	SQL 3: response time	0.83	0.39	10.95	0.57
	SQL 4: usability	0.92	0.56	4.90	0.52
	SQL 5: adaptability	0.85	0.45	6.80	0.52
System service (Kettinger et al. (2008)	I think our e-learning system				
	SSV1: provides the services I need	0.88	0.72	17.49	0.75
	SSV2: provides prompt service	0.59	0.33	19.87	0.88
	SSV3: staff are helpful	0.83	0.19	10.95	0.67
	SSV4: staff respond to my requests quickly	0.92	0.24	11.90	0.62
Organizational benefits (Hall et al., 2011)	I feel after implementing e-learning system, it				
	OGB1: increases customer trust	0.75	0.72	10.49	0.75
	OGB2: prevents costly legal action from government agencies and stockholders	0.59	0.33	10.87	0.88
	OGB3: preserves public's perception of brand strength or organizational reputation	0.83	0.19	6.95	0.67
	OGB4: improves customer service	0.92	0.46	3.90	0.52
	OGB5: preserves market valuation	0.87	0.67	6.45	0.53