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Proceedings of the 4th International Conference on Information Systems Management and Evaluation

**RMIT University Vietnam
Ho Chi Minh City
Vietnam
13-14 May 2013**



**Edited by
Dr Blooma John , Dr Mathews Nkhoma
and Dr Nelson Leung
RMIT University, Ho Chi Minh City, Vietnam**

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ICIME 2013**

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Evaluating Strategic Information Systems Planning (Sisp) Performance Among Malaysian Government Agencies Using Organizational Learning-Based Model

Fazidah Abu Bakar¹, Mohd Adam Suhaimi² and Husnayati Hussin²

¹Tax Analysis Division, Ministry of Finance, Putrajaya, Malaysia

²Kulliyah of Information & Communication Technology (KICT), International Islamic University, Kuala Lumpur, Malaysia

fazidah.abubakar@treasury.gov.my

adam@iium.edu.my

husnayati@iium.edu.my

Abstract: Previous strategic information systems planning (SISP) studies have highlighted that an ideal SISP practice should emphasise on organisational learning (OL) in their SISP approach. Surprisingly, studies focusing on the extent of OL and its contextual factors are lacking. This study aims to develop and validate a model for evaluating SISP performance in the Malaysian government agencies from OL perspective. For this purpose, an SISP performance model was developed based on the absorptive capacity theory where SISP is viewed as a learning process instead of planning process. The theoretical assumption is that the quality of SISP contextual factors will influence the extent of SISP learning which eventually will influence the SISP success. The contextual factors are SISP climate, consultant expertise and CIO capability. Meanwhile, the SISP learning factors comprise of shared ICT/business knowledge and SISP process effectiveness with SISP success as the SISP performance measurement. 706 questionnaires were sent to 234 selected government agencies in Malaysia. Only 27% of the government officers responded to the questionnaire meets the criteria of this study. Measurements were initially validated using SPSS. Subsequent confirmation on the measurements and structural validity were done by adopting the Structural Equation Modeling (SEM) analyses using AMOS. The results of this study demonstrated that the hypothesised SISP performance model adequately fits the sample data which assumed the model is acceptable. Generally, the findings of this study indicated that higher level of SISP climate, consultant expertise and CIO capability positively influence the extent of SISP learning factors and later influence the SISP success. In determining the SISP success, this study revealed that it is crucial for the Malaysian government agencies to identify appropriate SISP team members based on their knowledge, skill and attitude to promote conducive SISP learning climate for effective SISP decision making.

Keywords: SISP, government agencies, SISP performance, organizational learning, absorptive capacity model

1. Introduction

The advancement in Information Technology (IT) and complexity of Internet technology have influenced the Strategic Information System Planning (SISP) to consider 'fitting' the identified strategies with the environmental uncertainty, culture, experience and skill of the organization (Doherty, Marples, & Suhaimi, 1999; Clark, Clark, Gambill, & Fielder, 2000; Lee & Bai, 2003; Duhan, 2007). Newkirk & Lederer (2006) describe uncertainty as the lack of information on how to develop the IS plans. In order to reduce uncertainty, Otim et al. (2009) suggest that through organisational learning (OL), organisation can acquire more information from the environment. Few researchers like Lee & Bai (2003), Duhan (2007) and Otim et al. (2009) recognise the applicability of OL in the current environment and call for more research on SISP from OL perspective. In addition, difficulties of adapting to these considerations explain why SISP remains the top managerial concerns among practitioners (Teo & Ang, 2000; Luftman & Ben-Zvi, 2010). Based on the current scenario, some studies suggested organisation should view SISP as a learning process rather than a planning process (Huysman, Fischer, & Heng, 1994; Reponen, 1998; Wang & Tai, 2003). Surprisingly, empirical studies on the extent of OL and its antecedents in SISP are lacking. Therefore, a new SISP performance model need to be developed where the focus is more on the capability of the organisation to adapt and learn from any environmental uncertainty for continuous improvement.

The main objective of this study is to investigate whether the SISP performance model can be evaluated using organisational learning-based model. The research question is how the SISP contextual factors, the extent of OL and SISP performance inter-related with each other in SISP? The paper is organised to give background on SISP from OL perspective, Absorptive Capacity Theory, the research model and hypotheses, research methodology, reliability and validity, model and hypotheses testing, discussion of findings and conclusion.

2. SISP from OL perspective

OL can be defined as the capacity or process within an organisation to maintain or improve performance based on experience, knowledge and understanding (Fiol & Lyles, 1985; Dibella, Nevis, & Gould, 1996). SISP process when viewed as a learning process such that past experiences, knowledge, procedures and routines were referred by the organisation for decision making. Both Huysman et al (1994) and Baker (1995) view that the implications of SISP from OL perspective will impact on the various actors in planning process and the organisation of the process itself, in addition to the SISP performance. The organisation that had greater experience with SISP and in a more mature IT/IS stage had better SISP success (Grover & Segars, 2005). Earl (1993) describes the occurrence of OL in SISP is reflected from the IS strategies that seemed to emerge from organisational activities, such as “sense and response” or “rational and adapt” to changes in business strategies in interactive manner and broad organisational participation. Therefore, the theoretical perspective of OL provides an appropriate underlying description of the current SISP scenario that enables the investigation of the linkage between the extent of what has been learned from SISP experience and SISP success. By doing so, it will assist the organisation to evaluate the capability of its organisational knowledge (mean) in order to sustain competitive advantage (end).

3. Absorptive capacity theory

In their conceptual paper, Huysman et al. (1994) suggested the ideas on learning experiences can best be explained by the notion of organisation’s absorptive capacity developed by Cohen & Levinthal (1990). It defines as the ability of the organisation to identify and value, assimilate and exploit external information for commercial use (Cohen & Levinthal, 1990). However, based on the notion of absorptive capacity from Cohen & Levinthal (1990), Zahra & George (2002) reconceptualised it as a set of organisational routines and processes by which organisations acquire, assimilate, transform and exploit knowledge to produce a dynamic organisational capability which reflected from Potential absorptive capacity (PACAP) and Realized absorptive capacity (RACAP). Activation triggers, social integration mechanism and regimes of appropriability are the moderators that have potential influence on the level of absorptive capacity.

4. Research model and hypotheses

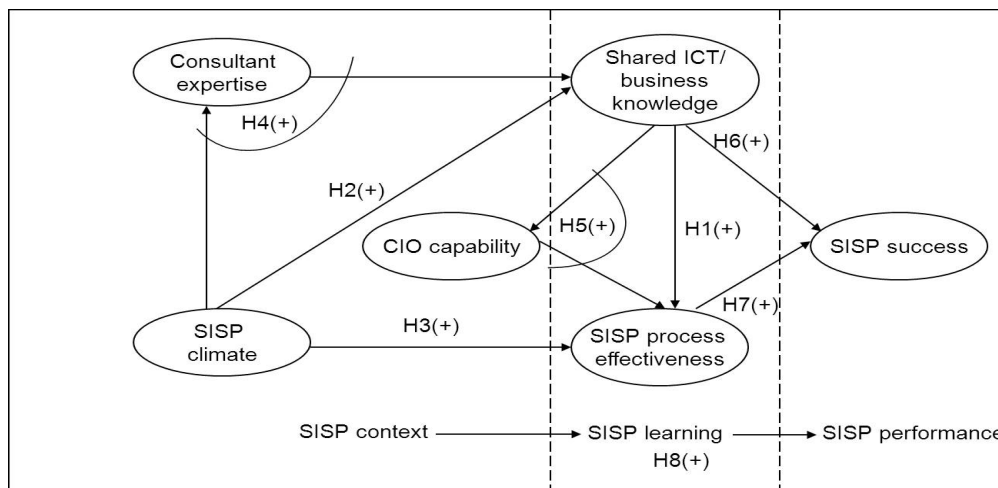


Figure 1: Research model and hypotheses

The conceptual framework based on Absorptive Capacity Model as presented in **Figure 1** provides the underlying assumption that the quality of SISP context influences the extent of the SISP learning which later affects the SISP performance. It is usually assumed that the quality of organizational climate affects the level of knowledge capacity absorbed which later influenced organizational performance (Mikkelsen & Grønhaug, 1999). Absorptive capacity theory when applied to the domain of SISP suggests that the experiences during SISP which involves social interactions, policies, procedures and structures have affected the organisation cognitively and behaviourally; which later influence the SISP performance. In other words, the organisation’s ability to effectively carry out SISP (OL has occurred) is dependent on the development of a variety of SISP context related to knowledge and processes that bind together various SISP team members namely the top management, the business managers, the IT manager (Mentzas, 1997; Pearson & Saunders, 2006) and external consultants in some agencies (Teo et al., 1997; Chi et al, 2005). Implications of SISP from OL will impact the

actors with shared ICT/business knowledge and will also impact the SISP process itself in terms of SISP process effectiveness. Therefore,

H1: Higher level of shared ICT/business knowledge will positively influence the SISP process effectiveness;

H2: Higher level of SISP climate will positively influence the shared ICT/business knowledge;

H3: Higher level of SISP climate will positively influence the SISP process effectiveness; and

H4: Higher level of consultant expertise will positively mediate the effect of SISP climate on the shared ICT/business knowledge

Prior studies also have indicated that the Chief Information Officer's (CIO) role in SISP also affects the SISP process (Bai & Lee, 2003; Pai, 2006). Good ICT/business relationships with free communication flow will develop trust and promote knowledge sharing behaviour among SISP members for better SISP process (Teo & Ang, 2001; Bai & Lee, 2003; Lee & Pai, 2003; Pai, 2006). Thus,

H5: Higher level of CIO capability will positively mediate the effect of shared ICT/business knowledge on SISP process effectiveness.

Evidence from the works of Kearns & Lederer (2004) indicated that SISP helps the knowledge creation for both business and ICT managers where Reich & Benbasat (2000) study concluded that only shared ICT/business knowledge will influence SISP performance in terms of attaining long term alignment of IS and business objectives. Similarly, SISP also assists the knowledge utilisation reflected from SISP process effectiveness. Related SISP studies from Segars & Grover (1998), Kunnathur & Shi (2001), Lee & Pai (2003) have concluded that SISP process effectiveness is vital to SISP success. Therefore,

H6: Higher level of shared ICT/business knowledge will positively influence the SISP success; and

H7: Higher level of SISP process effectiveness will positively influence the SISP success

Empirical studies from Mikkelsen & Grønhaug (1999), Droge et al.(2003), Tippins & Sohi (2003) and Jantunen (2005) have consistently highlighted the mediating role of knowledge elements in influencing the performance of the organisation especially to sustain competitive advantage over other organisations. Similarly, in the context of SISP with the rapid change in business and ICT environment, it is hypothesized that

H8: SISP learning fully mediates the effect of SISP context on SISP performance

5. Research methodology

To empirically test the research model, a sample is selected from 382 Malaysian government agencies which comprises of federal agencies, secretary of state offices and local authorities as listed under Public Service Department (JPA, 2008) and also the recipients of the government circulars. Quota sampling approach based on the sample size decision table from Krejcie & Morgan (1970) is applied to determine the appropriate representation of the various agency levels. In addition, the multiple respondents approach is used where both views from business and ICT managers are gathered in order to reduce sampling bias. The questionnaires were pretested and piloted before the execution of the actual survey via mail. .

Measurement items used in this study were adapted from previously validated measure or were developed on the basis of a literature review mainly from SISP, IT management and IT outsourcing literature as listed in the Appendix. All items were measured using a seven-point Likert-type scale.

Of the 706 distributed, 309 completed and usable questionnaires were returned, representing a response rate of 43.8 percent from 160 government agencies. All respondents were business managers, ICT managers, CIOs where more than 50 per cent have working experience of more than 5 years in current agency. 92.3 percent of the respondents from federal agencies, while both respondents from secretary of state office and local authorities are at 3.9 percent each. Overall, 60.8 percent respondents are from ICT division and 39.2 percent respondents from other than ICT division. A comparative analysis of two descriptive variables (current position grade, and years of service in current agency) was conducted in order to see if respondents have significantly different characteristics from non-respondents. The Mann-Whitney test results provide evidence that there was no response bias problem in the sample (p-values are 0.517 and 0.449). However, only 27 percent (153 responses) from 43.8 percent responses met the criteria of this study which indicated involvement of CIO and external consultant in their SISP activities.

6. Reliability and validity

To empirically assess the construct reliability and validity, this study conducted the reliability analysis and exploratory factor analysis (EFA) using SPSS v16. The result of items performance using EFA by applying 'principal factor analysis' with 'direct oblimin' rotation indicated that 75 percent of the total variance explained with all items showed factor loadings greater than 0.35. The reliability analysis on all constructs indicated the items measuring respective construct clustered together as a set with reliability estimate value (Cronbach alpha) ranging from 0.81 to 0.96 which is greater than the recommended threshold of 0.70 (Hair et al., 2006).

In order to determine further construct validity and goodness fit of the specified research model against the sample data, Structural Equation Modeling (SEM) technique is applied by using confirmatory factor analysis (CFA) in AMOS v16 as the statistical tool. By using statistical models in SEM, the main objective is to determine whether the specified model is valid rather than to find a suitable model (Gefen et al., 2000; Byrne, 2001; Hair et al., 2006). Following the two steps approach as recommended by Anderson & Gerbing (1988), the measurement model is evaluated first then followed by structural model given that the measurement model are acceptably fit the data. For a measurement model to have sufficiently good model fit, the chi-square value normalized by degrees of freedom (χ^2/df) should not exceed 3 (Bagozzi and Yi, 1988), Comparative Fit Index (CFI) and Tucker Lewis Fit Index (TLI) (Hair et al., 2006) should exceed 0.9, and the Root Mean Square Error of Approximation (RMSEA) should not exceed 0.10 (Hair et al., 2006).

The measurement properties resulted from CFA are reported in Table 1. The composite reliability assessed the internal consistency of the scales. From Table 1, the composite reliability of all constructs exceeded the benchmark of 0.6 as recommended by Bagozzi and Yi (1988). Additionally, convergent validity refers to the extent to which multiple measures of a construct agree with one another. Bagozzi and Yi (1988) suggest that weak evidence of convergent validity exists when item factor loading is significant. Factor loading exceeds 0.5 is acceptable with value exceeding 0.7 shows strong evidence of convergent validity.

From AMOS outputs, parameter estimates for convergent validity namely standardized factor loadings should exceed 0.5, t-value should exceed ± 1.96 at p-level < 0.05 and composite reliability should exceed 0.6 (Hair et al., 2006). From Table 1, the factor loading for all items exceeds the recommended level of 0.5, factor loadings are statistically significant at p 0.05 and composite reliability exceeds 0.6. Therefore, all scales for construct reliability and validity were met.

Table 1: CFA results

Construct	Standardised factor loading	Critical ratio (t-value)	Squared multiple correlation	Composite reliability	Average variance extracted
SISP Climate				0.74	0.54
TMI	0.71	7.07	0.51		
IntraAC	0.90	---	0.82		
InterAC	0.54	6.61	0.30		
Shared ICT/Business Knowledge				0.79	0.66
MIK	0.81	---	0.66		
MBK	0.81	7.49	0.65		
Consultant expertise				0.95	0.78
CCR3	0.83	---	0.69		
CCR4	0.85	13.15	0.72		
CCO1	0.92	15.08	0.85		
CCO2	0.94	15.08	0.88		
CCO3	0.87	13.78	0.76		
CCO4	0.89	14.32	0.80		
CIO capability				0.94	0.75

Construct	Standardised factor loading	Critical ratio (t-value)	Squared multiple correlation	Composite reliability	Average variance extracted
CIOK1	0.82	15.33	0.68		
CIOK3	0.81	14.85	0.66		
CIOS1	0.94	---	0.89		
CIOS2	0.93	21.65	0.86		
CIOS3	0.83	15.50	0.68		
CIOS4	0.88	18.02	0.77		
SISP Process Effectiveness				0.90	0.66
FOR	0.91	12.29	0.82		
PAR	0.79	---	0.62		
COM	0.67	8.58	0.45		
CON	0.85	12.89	0.72		
SISP Success				0.94	0.69
SS1	0.81	18.50	0.65		
SS2	0.84	19.78	0.70		
SS3	0.87	21.58	0.76		
SS4	0.88	---	0.77		
SS5	0.87	21.64	0.76		
SS6	0.81	18.48	0.65		
SS7	0.81	18.76	0.66		
SS8	0.76	16.71	0.58		

7. Model and hypotheses testing

Similar to measurement model, the evaluation of structural model depends on the model adequacy based on the model fit indices and parameter estimates. However, the structural model is interested on how constructs relate to each other according to the hypothesized model. The model fit indices where normed χ^2 was 1.707, CFI was 0.91, TLI was 0.91 and RMSEA was 0.068 suggesting adequate model fit. In SEM, the direct effects are the relationships linking two constructs with a single arrow. Meanwhile, the indirect effects are the relationships that involve a sequence of relationships with at least one mediating construct involved (Kline, 2005; Hair et al., 2006). The size of indirect effect can be determined by multiplying the direct effects by each other where if exceeds 0.08 indicate the mediating effect exist (Hair et al, 2006). The summarized results on the hypothesized structural estimates are presented in Table 2. From the structural model evaluation, six hypothesised paths were statistically significant while two were non-significant. Unlike other hypotheses results are determined from the significance of their respective parameter estimates; the result of H8 depends on the outcome of all the hypotheses results. In addition, a new significant linkage is discovered from consultancy expertise to CIO capability.

Table 2: Summarised results on the hypothesized structural estimates

Hypothesis tested	Standardised path coefficient (sign)	Critical ratio (t-value)	Effect (size)	Result
H1: Higher level of shared ICT/business knowledge will positively influence the SISP process effectiveness	0.05 (+)	0.29 ^{ns}	Direct (0.05)	Not supported
H2: Higher level of SISP climate will positively influence the shared ICT/business knowledge	0.61 (+)	4.09***	Direct (0.61)	Supported
H3: Higher level of SISP climate will positively influence the SISP process effectiveness	0.66 (+)	3.55***	Direct (0.66)	Supported

Hypothesis tested	Standardised path coefficient (sign)	Critical ratio (t-value)	Effect (size)	Result
H4: Higher level of consultant expertise will positively mediate the effect of SISP climate on the shared ICT/business knowledge	0.68 (+)	5.76***	Indirect (0.14)	Supported
	0.21 (+)	1.98*		
H5: Higher level of CIO capability will positively mediate the effect of Shared ICT/business knowledge on SISP process effectiveness	0.52 (+)	4.72***	Indirect (0.10)	Supported
	0.20 (+)	2.00*		
H6: Higher level of shared ICT/business knowledge will positively influence the SISP success	0.15 (+)	1.59 ^{ns}	Direct (0.15)	Not supported
H7: Higher level of SISP process effectiveness will positively influence the SISP success	0.73 (+)	4.88***	Direct (0.73)	Supported
H8: SISP learning fully mediates the effect of SISP context on SISP performance	Significant H2, H3, H4, H5 and H7 linkages			Supported
Consultant Expertise positively influence the CIO Capability	0.26 (+)	2.69**	Direct (0.26)	New significant linkage

Note: *** Significant at $p < 0.001$ ($t > \pm 3.29$) * Significant at $p < 0.05$ ($t > \pm 1.96$)

** Significant at $p < 0.01$ ($t > \pm 2.58$) ^{ns} Non-significant

8. Discussion of findings

The underlying assumption of this study is that a conducive learning environment will positively influence the extent of learning which later improves performance. This study found strong empirical support for the extent of SISP learning factors fully mediate the effect of SISP contextual factors on SISP success. The outcome of this study is consistent with other knowledge-based view studies like Boynton et al. (1994), Droge et al. (2003), Tippins & Sohi (2003) and Andrawaina & Govindaraju (2008). In terms of role participation, this study is consistent with Pita et al.'s (2009) findings where consultants' involvement did not directly influence SISP performance. These findings imply that SISP process can be viewed as an interactive learning process where the past experience, knowledge, procedures, routines were referred by any agency for decision making are most likely to benefit its capabilities and SISP process itself in order to attain the agency's performance in a long run. In this case, a conducive SISP climate that promotes knowledge sharing among the various SISP team members either within the agency or between agencies is important including the top management involvement to encourage participation from relevant parties. Some agencies seek new insights and expertise from outside knowledge especially the external consultants to facilitate the ISP development. New knowledge is acquired based on the social interaction among the SISP team members which is assimilate with past knowledge and experience for better exploitation on the SISP decision making. The involvement of CIO facilitates the knowledge flow and in finalising the decisions in accordance with Lee & Pai (2003) and Pai (2006) study. Consequently the organisational performance is reflected from this experience. Moreover, from the structural model evaluation on the hypothesised model based on the absorptive capacity model by Zahra & George (2002) has demonstrated that the model is adequately fit the sample data. Therefore, it can be concluded that SISP performance model from OL based is successfully established.

9. Conclusion

Theoretically, this study adds new insights and understanding to existing body of SISP knowledge especially in SISP performance evaluation in the public sector. In addition, the establishment of the SISP performance model based on the absorptive capacity approach implies that the conceptualization of such theory can be further validated and applied in SISP literature.

Practically, using the questionnaires instrument developed in this study assists the organisations in assessing the status of SISP practice in their organisations for continuous improvement. It integrates the elements drawn from SISP environment, structure, process and performance. The policy makers may review these observations and incorporate them into forms of guidelines, standard procedures and directives for other agencies to emulate.

Generally, this study has empirically showed how the extent of OL influences the overall performance of SISP in organisations. By focusing the extent of the capabilities among SISP team members, accurate decision makings on SISP can be assured and eventually help the organisations to continuously improve SISP. In this case, the study revealed that it is crucial for the Malaysian government agencies to identify appropriate SISP team members based on their knowledge, skill and attitude to promote condusive learning climate for better knowledge exchange towards deriving effective SISP decision making in order to sustain strategic or competitive advantage.

Acknowledgements

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Appendix: List of variables

Variable	Description	No of items	Reference
Shared ICT/business knowledge	Ability of ICT & business managers to understand and be able to participate in the other's key processes and to respect each others' unique contribution and challenges	10	Boynton et al. (1994), Bassellier et al. (2003), Bassellier & Benbasat (2004)
SISP process effectiveness	Emergent pattern of planning process characteristics that organises activities for planning accomplishment	24	Segars & Grover (1998), Grover & Segars (2005)
SISP climate	Shared, enduring perception by SISP team members on salient aspects of SISP environment associated with SISP activities	20	Byrd et al. (1995), Nelson & Coopriider (1996), Basu et al. (2002), Bai & Lee (2003), Lee & Pai (2003), Nieminen (2005), Kearns (2006), Pai (2006)
Consultant expertise	The consultant's capability to understand the client's problem, identify and impart solution to client	8	Ko et al. (2005), Kakabadse & Louchart (2006)
CIO capability	The knowledge and interpersonal skill of the CIO in terms of the degree of strategic business and ICT knowledge and political savvy	8	Armstrong & Sambamurthy (1999), Smaltz et al. (2006)
SISP success	The extent of improvements in the organisation's capabilities to support IS strategic management combined with degree of fulfillment of SISP objectives and degree of SISP contribution to overall organisation performance	8	Tang & Tang (1996), Lederer & Sethi (1998), Segars & Grover (1998), Doherty et al. (1999), Seneviratne (1999)

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