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Abstract

This paper discusses the effect of organization information management environment (IME) maturity and alignment between business strategy and information systems strategic planning (ISSP) on ISSP success. A research model is formulated and tested using data collected from 49 organizations in China. Data shows that that the higher the information management environment maturity, the more success ISSP and the higher the alignment between business strategy and ISSP, the more success ISSP. Practical and theoretical implications are discussed.

Keywords: Information Systems Strategic Planning, Information Management Environment, Business Strategy

1. Introduction

Since 1980s, the issue of critical success factors for information system strategic planning (ISSP) have been studied extensively. For example, ISSP methods and implementation process and complexity have been identified and analyzed by some researchers (Doherty 1999; Earl 1993; Gottschalk 1999; Hartono et al. 2003; Min et al. 1999; and Sabherwal 1999). Although a number of research models and frameworks had been proposed in the past, it is not clear if these models and frameworks are applicable in organizations in China.

The answer to the question above depends on the maturity of the information management environment. In China, even in its early stage of enterprise IT application, many realized that the lack of top management support and participation was one of the main reasons why IT application failed in organizations. Hence, some called for "top management engineering" when comes to implementing enterprise IT applications. However, two questions still remain: how to gain top management support and participation in ISSP process? How to effectively align business strategy with ISSP so as

to make ISSP Within academic journals in China, there seem to be lack of theoretical discussions about the two issues. Similarly, there seems to be little publications that discuss and analyze the relationship between information management environment and ISSP success. The purpose of this study is to examine the effect of information management environment and ISSP and business strategy alignment on ISSP success.

2. Research Model and Research Hypothesis

The research model for this study is depicted in Figure 1. As shown, the model suggests that the degree of ISSP success is determined by two factors: organizational information management environment (IME) and the degree of ISSP and business strategy alignment.

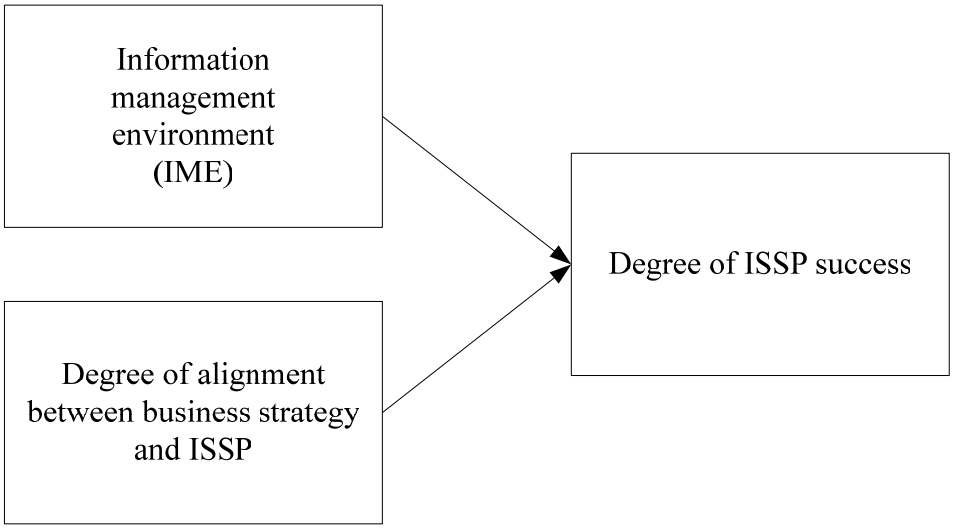


Figure 1 Research Model

2.1 Information Management Environment (IME)

IME refers to the organizational environment for IT/IS management. As observed by many, IT application in organizations generally goes through various stages, from inception to maturity. Nolan's information systems development stage theory provides the theoretical foundation for evaluation of information management environment maturity (Nolan 1973, 1979). Some scholars further proposed the measurement techniques and parameters based on Nolan's model. For example, Benbasat (1984) summarized and proposed 19 criteria for measuring maturity. They include such criteria as the degree and the scope of IS application in business, level of senior management knowledge and involvement in IS. Later, Marimi and Konsynski (1996) proposed that IT application maturity in organization should be measured from the perspective of

planning, control, organization, and alignment. Compared with Benbasat's criteria, Marimi and Konsynski's model presented a broader view of enterprise IT application. In fact, their model examined the maturity issue from two aspects: organizational IT/IS management (including IS strategic planning, control, and organization) and IT/IS application (including IT and business alignment). In addition, other scholars (Luftman 2000; Calhoun and Lederer 1990) suggested that IS user's proficiency and satisfaction, i.e., relationship between IT/IS and users, should be included in the measurement of IT application maturity. In summary, we believe that maturity of organizational information management environment should be measured from the following aspects: 1) organizational information management practice; 2) the degree of IT/IS application in organizations; and 3) the relationship between IT/IS and users. Organizational information management environment includes such issues as the existence of dedicated/special IT/IS department, the level of top management support, the existence of short term and long term IT/IS planning, and the control and evaluation of IT/IS implementation. The IT/IS application deals with the scope and the depth of IT/IS application within an organization, the level and the degree of data integration and information sharing among different information systems in the organization. The relationship between IT/IS and users includes users' knowledge, proficiency, utilization, and satisfaction of IT/IS.

2.2 Business Strategy and ISSP Alignment

As indicated in many studies, aligning ISSP with business strategy will increase ISSP success. Organization needs not only to align its strategy with its infrastructure but also to align its business strategy with strategic information systems planning (Calhoun and Lederer 1990; Henderson and Venkatraman 1993; Sidhartha et al., 1990). For example, Sidhartha et al. (1990) discussed the issue of alignment between MIS strategy and corporate competitive strategy from content and process perspectives. Teo and King (1999) examined the relationship between organizational performance and the alignment of IS planning (ISP) and business planning (BP). They found that ISP-BP alignment is an important performance indicator. The results of these studies showed that the alignment between ISSP and business strategy is a complex issue. Proper measurement of alignment is needed. As such, some efforts were made to develop such measurement (see Lederer and Mendelow 1989; Luftman 2000; Reich and Benbasat 1996). Based on the previous studies and the Chinese organization characteristics, we propose to measure ISSP and business strategy alignment from the following four aspects: 1) goals and objectives alignment; 2) common understanding; 3) planning process alignment; and 4) collaborative relationship. Goals and objectives alignment refers to the degree of coherence or alignment between ISSP goals and business strategic goals. Common understanding refers to the mutual understanding of each other's business and practice between ISSP planners and other business managers during ISSP process, the degree of communication and coordination between ISSP planner and others within the organization. Planning process alignment refers to the impact of business strategy on ISSP process. It includes the degree of integration between ISSP and business strategy, the depth of analysis of business strategy during ISSP process, the depth of analysis of the relationship between ISSP and business strategy, and the analysis of IT development

and trend and the assessment of IT/IS potential business impacts. Collaborative relationship refers to the support and impact of business and business strategy on ISSP. The relationship also reflects the role and the importance of ISSP within an organization.

2.3 ISSP Success

To measure ISSP success requires examination of multiple dimensions. In the past, many scholars proposed a number of methods to measure ISSP success (Doherty et al. 1993; Earl 1993; Segars 1998). Based on previous studies and the reality and the past IT application experiences in Chinese organizations, we proposed the following six aspects: 1) goal achievement; 2) satisfaction; 3) alignment; 4) business analysis; 5) collaboration; and 6) capability. Goal achievement refers to the measurement of the actual goal fulfillment as compared to original plans such as the utilization of information resources and realization of competitive advantage using IT. Satisfaction refers to user's satisfaction with regard to ISSP's process, objectives, implementation, and information resource management. Alignment refers to top management's recognition of the importance of IT/IS in business strategy as well as the reflection of information systems strategy in top management's strategic intent. Business analysis refers to the analysis of business processes, analysis and description of business department and division's information requirement during the formulation of ISSP. Collaboration refers to how well ISSP planner coordinates with departments and divisions of an organization during the process of ISSP formulation. Capability refers to the extent of enhancement of ISSP planner's capability and aptitude through the ISSP process.

2.4 Research Hypothesis

The purpose of this study is to understand, by examining the reality of organizations in China in their IT applications, the relationship between information management environment, ISSP and business alignment, and ISSP success. Measurement instrument was designed and developed to measure the following variables: information management environment maturity, ISSP and business strategy alignment, and ISSP success. Based on the research model and previous studies, the following two hypotheses are proposed. Hypothesis 1states that the higher the information management maturity, the more successful the ISSP. Hypothesis 2 states that the higher the alignment between business strategy and ISSP, the more successful the ISSP.

3. Research Method

The current study adopts the survey method, through questionnaire, for data collection. Due to the lack of existing measurement instruments, we developed a new questionnaire to measure information management environment maturity, the alignment between business strategy and information systems strategic planning, and the degree of success of ISSP. The questionnaire consists of three parts. Part 1 is designed to collect the general information of the organizations. Part 2 is designed to collect data on organization's information management environment. Part 3 is designed to measure ISSP and business alignment and ISSP success. It consists of two sections. Section 1 includes questions on

how ISSP is organized and managed with an organization. Section 2 includes questions on ISSP success.

3.1 Independent Variable: IME Maturity, Business Strategy and ISSP Alignment

Questions relating to information management environment (IME) maturity were developed based on organizational information management practice, the degree of IT/IS application in organizations, and the relationship between IT/IS and users. A total of eight questions were included. Specifically, information management practice is measured by the following items: 1) if the organization has dedicated information management (IM) department; 2) to whom does the IM department report; 3) if the organization has formerly performed evaluation of IT application. The degree of IT/IS application in organization is measured by the degree of IT/IS application in various business functions (such as finance, human resources, supply chain management, customer relationship management) and the degree of information sharing and integration between business functions. The relationship between IT/IS and users is measured by users' proficiency in using IT/IS and their satisfaction of using IT/IS.

Questions relating to business strategy and ISSP alignment were developed based four aspects: goals and objectives alignment, common understanding, planning process alignment, and collaborative relationship. A total of eight questions were included. For instance, the following items were included in the measurement of this construct: 1) long term goal of ISSP and the business strategy as well as the role of IT/IS in supporting business strategy; 2) top management's knowledge of IT and IT/IS personnel's business knowledge; 3) assessments of environment, the relationship between IT/IS and business strategy, and the future trends in IT and its potential impact on business; 4) the role and the relative importance of IT in business.

3.2 Dependent Variable: ISSP Success

ISSP success is measured by using two categories of questions: performance of IT application planning and implementation and the enhancement of ISSP capability. A total of ten questions were included in the first category. Respondents were asked to rate (from very poor to excellent) the degree of success in the following aspects with regard to ISSP process: the achievement of goals and objectives; satisfaction of the planning process and implementation; satisfaction of resource utilization; understanding of top management's strategic intent; top management's view of IT in business strategy; recognition of business opportunity of IT; recognition of business requirements of business functions; description of business processes; prevention of duplication of IS developments; and effective allocation of IS resources. A total of five questions were included in the second category. Respondents were asked to rate (from very poor to excellent) the impact of ISSP on the following capabilities: recognition of key problem areas; recognition of new business process capability; ability to align IS strategy with business strategy; ability to

understand business and business requirements; and the ability to facilitate collaboration among various groups.

3.3 Control

Although many organizations implemented ISSP in their IT application practice, however, no all organizations apply ISSP process in the same depth. Some use designated ISSP team and established steering committee, some use only designated ISSP team with no steering committee created, and yet still some use neither designated ISSP team nor steering committee. Questions were included in Part 3 to collect data about if the organizations used designated team and/or steering committee during ISSP process.

3.4 Data Collection

A total of 200 organizations, those who reported that they have implemented IT/IS in the past, were randomly selected from the database of a professional survey organization that is associated with a well-know IT media organization in China and the Internet source. Multiple means were used for data collection. They include online survey, email, fax, and telephone interview. A total of 71 useable questionnaires were returned and completed (35.5% response rate). Of the 71 responses, 49 organizations (69%) reported that they have implemented ISSP process. The final data analysis and result is based on the data collected from these 49 organizations.

4. Results

4.1 Measurement

Table 1 through Table 3 shows the factor loadings for each main group of variables and their corresponding measurement items.

Table 4 shows correlations among items of IME maturity, business strategy-ISSP alignment, and ISSP success.

Table 1 Information Management Environment Maturity

IME Maturity		**Factor loading**
IT management	Who is responsible for IT application in your organization? (CEO, other senior managers, department heads, others)	0.328
	Has your organization ever conducted a formal evaluation of the effectiveness of IT application? (Yes, No), if yes, who did the appraisal? (internal IT department, internal independent department other than IT, external)	0.629

IT Application	IT application in the following business functions: (NA, 0, 1, 2, 3, 4, 5 – 0 being very low, 5 being very high) Strategic planning and decision, HR (performance appraisal), Finance, R&D, Production, Material supply and distribution, Procurement, Sales, marketing, and promotion, Customer service	0.735
	The degree of information sharing among the business departments (no sharing, some, majority, all)	0.793
IT and user relationships	The level of proficiency of users in using IT/IS (very low, low, average, above average, very high)	0.735
	User's satisfaction in using IT/IS	0.733

Table 2 Business Strategy-ISSP Alignment

Business Strategy-ISSP Alignment		**Factor loading**
Goals and objectives alignment	Use IT/IS to support organization's business objectives	0.469
	Use IT/IS to gain competitive advantages	0.655
Common understanding	Top management's IT/IS knowledge (none, some, some formal training, systematically trained, professional)	0.711
	IT/IS professional's knowledge of business (very low, low, average, above average, excellent)	0.634
Process alignment	During ISSP, did organization perform formal analysis of its business strategy?	0.876
	During ISSP, did organization perform formal analysis of the relationship between IT/IS and business strategy?	0.923
	During ISSP, did organization perform formal analysis of IT/IS trends and its potential impacts on enterprise development?	0.844
Collaborative relationship	What's the role of IT/IS in enterprise development? (Provide support current business processes; Influence and change current business processes; Support business strategy; Business strategy includes the overall IT/IS application in business; Organization has separate IS strategy)	0.475

Table 3 ISSP Success

ISSP Success		Factor loading	
		Performance	Capability
Goal achievement	ISSP goal achievement – goal achievement	0.823	
Satisfaction	Satisfaction of ISSP and its implementation	0.812	
	Satisfaction of ISSP resource allocation	0.805	
Alignment	Understanding of top management's strategic intent	0.754	
	Top management's understanding of the importance of IT/IS in business strategy	0.632	
	Recognition of IT/IS' business opportunity by ISSP	0.651	
Business analysis	Accuracy of the description of business requirements of various business departments by ISSP	0.812	
	Accuracy of the description of business processes by ISSP	0.786	
Collaboration	ISSP prevents IS efforts being duplicated	0.817	
	ISSP makes effective IS resource allocation	0.769	
Enhancement of capability	Recognition of key problem areas – problem recognition		0.788
	Recognition of new business processes – process recognition		0.914
	Ability to align IS strategy and business strategy - business and IT alignment		0.869
	Understanding of businesses and business information requirement - learning		0.797
	Ability to facilitate collaboration among various groups - collaboration		0.815

Table 4 Correlations Among Measurement Items (N=49)

	A1	A2	A3	B1	B2	B3	B4	C1-1	C1-2	C1-3	C1-4	C1-5	C2
A1	1												
A2	.478(**)	1											
A3	0.279	.443(**)	1										
B1	0.152	.373(**)	.532(**)	1									
B2	.351(*)	.400(**)	0.263	0.098	1								
B3	.528(**)	.443(**)	.571(**)	.429(**)	.535(**)	1							
B4	0.208	0.196	0.215	0.104	.358(*)	.463(**)	1						
C1-1	0.237	.389(**)	.505(**)	.357(*)	0.232	.385(**)	0.234	1					
C1-2	0.177	.371(**)	.498(**)	.437(**)	0.146	.421(**)	0.274	.772(**)	1				
C1-3	0.128	.418(**)	.555(**)	.523(**)	0.250	.649(**)	.380(**)	.574(**)	.687(**)	1			
C1-4	0.214	.520(**)	.570(**)	.373(**)	.314(*)	.488(**)	0.251	.669(**)	.636(**)	.686(**)	1		
C1-5	0.089	.380(**)	.501(**)	.321(*)	0.230	.284(*)	0.124	.639(**)	.646(**)	.570(**)	.804(**)	1	
C2	0.148	.432(**)	0.238	.300(*)	.343(*)	.323(*)	.436(**)	.382(**)	.428(**)	.548(**)	.492(**)	.416(**)	1

IME Maturity

A1: IT Management; A2: IT application; A3: IS and user relationship

Business Strategy-ISSP Alignment

B1: goal and objective alignment; B2: understanding; B3: planning process alignment; B4: collaborative relationship

ISSP Success

C1-1: goal achievement; C1-2: satisfaction; C1-3: alignment; C1-4: analysis; C1-5: collaboration; C2: enhancement of capability

The questions were further factor analyzed. A confirmatory factor analysis results shows that all three factors show relatively high factor loadings. The measurement of ISSP success turned out to be represented by two factors: performance factor and capability enhancement factor. Performance factor reflects the level of goal achievement of ISSP, satisfaction, degree of alignment, analysis process, and collaboration. Capability enhancement factor reflects the ISSP planners' capability enhancement through participating ISSP process.

Table 5 presents the results of measurement instrument's reliability. As shown, the Cronbach's α for all three major variable measurements (information management environment maturity, business strategy-ISSP alignment, and ISSP success) are relatively high.

Table 5 Measurement Instrument Reliability (Cronbach α)

Factor	Cronbach α
Information management environment maturity	0.7797
Business strategy-ISSP alignment	0.8525
ISSP success	0.9393

4.2 ISSP Success and Organizational Type

As mentioned earlier, information management environment maturity consists of three aspects: information management, IT/IS application, and the relationship between user and IS. Information management includes ISSP, leadership, control, and evaluation. Based on factors relating to information management, for those organizations that have implemented ISSP process (a total of 49 in the sample), we grouped the sample into three types: Type 1 includes those organizations that have established both steering committee and an ISSP group (n=10); Type 2 includes those organizations that have created an ISSP group that but not the steering committee (n=11); Type 3 includes those that have neither (n=28). Table 6 shows the results of the comparisons among three types of organizations in six success measures.

Table 6 ISSP Success for Three Types of Organizations

ISSP success (means)	Type 1 n=10	Type 2 n=11	Type 3 n=28
Goal achievement	4.10	3.64	3.26
Satisfaction	3.65	3.45	3.20
Alignment	3.97	3.55	3.26
Business analysis	3.95	3.59	3.14
Collaboration	4.05	3.82	3.39

Capability enhancement	3.82	3.44	3.12

A t-test reveals that significant differences exit between Type 1 (with both steering committee and formal ISSP group) and Type 3 (with nether) in all six ISSP success dimensions (with $p < 0.01$ for all).

4.3 Hypothesis Testing

A further analysis using structural equation model (SEM) seems to be warranted in order to understand the relationships between information management environment (IME) maturity and ISSP success, business strategy-ISSP alignment and ISSP success. Using LISREL 8.72, we explored the relationships for both "IME maturity" and ISSP success and "alignment" and ISSP success. Figure 2 and 3 show the models and the results respectively.

As shown in Figure 2, with regard to information management environment maturity, the application of information systems' factor loading (0.66) is higher than that of information management (0.36) but less than that of IT and user relationship (0.68). With regard to the performance dimension of ISSP success, there is not much difference among the five criteria (with each factor loading ranging from 0.77 to 0.88). The data seem to confirm our claim that ISSP success is determined by many factors. At the same time, "business analysis" (with loading of 0.88), i.e., understanding business requirements and business processes, seems to be the most important factor among the five in determining ISSP success. With regard to capability enhancement, there seems to be no significant differences among the criteria (with factor loading ranging from 0.81 to 0.87). This may imply that these factors play equal important roles in ISSP planner's capability enhancement. The structural path coefficients between environment maturity and "performance" as well as "capability enhancement" are 0.87 and 0.59 respectively. This suggests that environment maturity has positive impact on both ISSP's performance and capability enhancement, i.e., the higher the information management environment maturity, the more ISSP success. Hence, hypothesis 1 is supported.

Figure 3 shows the impact of business strategy-ISSP alignment on ISSP success. As shown, with regard to business strategy-ISSP alignment, planning process shows relatively higher loading (0.75) compared with those of ISSP goal achievement and common and mutual understanding (both with 0.54). Collaborative relationship on the other hand shows very low loading (0.01). The low loading on "collaborative relationship" might be due to the relatively low reliable measurement and a single measurement item (Cronbach alpha = 0.475). With regard to "performance" aspect of ISSP success, our data show no significant differences among the five criteria (with each factor loading ranging from 0.79 to 0.87). Similarly, with regard to "enhancement of capability" aspect of ISSP success, the data show no significant differences among the five criteria (with each factor load ranging from 0.82 to 0.88). This again may imply that all factors play equally important roles in ISSP success, for both "performance" and "capability enhancement" aspects. The structural path coefficients between business-strategy-ISSP alignment and "performance" aspect of ISSP success and "capability

enhancement" aspect of ISSP success show factor loadings of 0.77 and 0.60 respectively. This signifies the positive relationship between business strategy-ISSP alignment and ISSP success. That is, the higher the business strategy-ISSP alignment, the higher the ISSP success. Hence, hypothesis 2 is verified.

5. Discussion and Limitation of the Study

Based on the data presented above, we can take a snap shot and draw some preliminary conclusion about information management practice in organizations in China. It seems that ISSP success is determined by two factors: organization's information management environment maturity and the alignment between business strategy and ISSP. Similarly, we can draw some guidelines, based on the findings of this study, for organizations and enterprises in China that wish to implement ISSP. Firstly, during ISSP process, an organization should align its ISSP goals and objectives with organization's business strategic goals and objectives in order to increase ISSP success. Secondly, during ISSP process, an organization should form a special ISSP department (e.g., steering committee and ISSP teams/groups) and should make sure that the members of ISSP and others in the organization to communicate and to collaborate well. Thirdly, during ISSP process, an organization should perform detailed analysis of external environment, business strategy, and the potential impact of IT/IS on business strategy, so as to increase ISSP success. Finally, since organization's information management environment maturity affects ISSP success, we suggest that organization follow a phased approach to implement ISSP. Prior to ISSP, an organization should first assess its information management environment to get a clear picture of which phase of its information management and IT application is. To assure ISSP success, an organization should then based on the result of the assessment, decide if the environment is mature enough to start ISSP.

However, we must be aware that the results of the study are limited by its small sample size and the reliability and validity of the measurement instrument. Interpretation and conclusion drawn based on the study must be taken with caution. Future study must be carried out in order to gather data from larger sample. In addition, this model used in this study is relatively simple.

The issues relating to information systems strategic planning, business strategy, and IT implementations in organizations are complex and dynamic in nature. Many factors, such as organizational culture, ownerships, size and age of the organizations, IT development stages, can affect the success of ISSP. The information management environment maturity, alignment between ISSP and business strategy, and ISSP success are also very complex issues in terms of conceptualization, i.e., the measurement of the constructs. To understand the complex nature of the issue, an in depth study seems to be warranted. Further studies are needed to further develop the measurement instrument. A different research design and method, such as case study, might provide a deeper understanding of the issues.

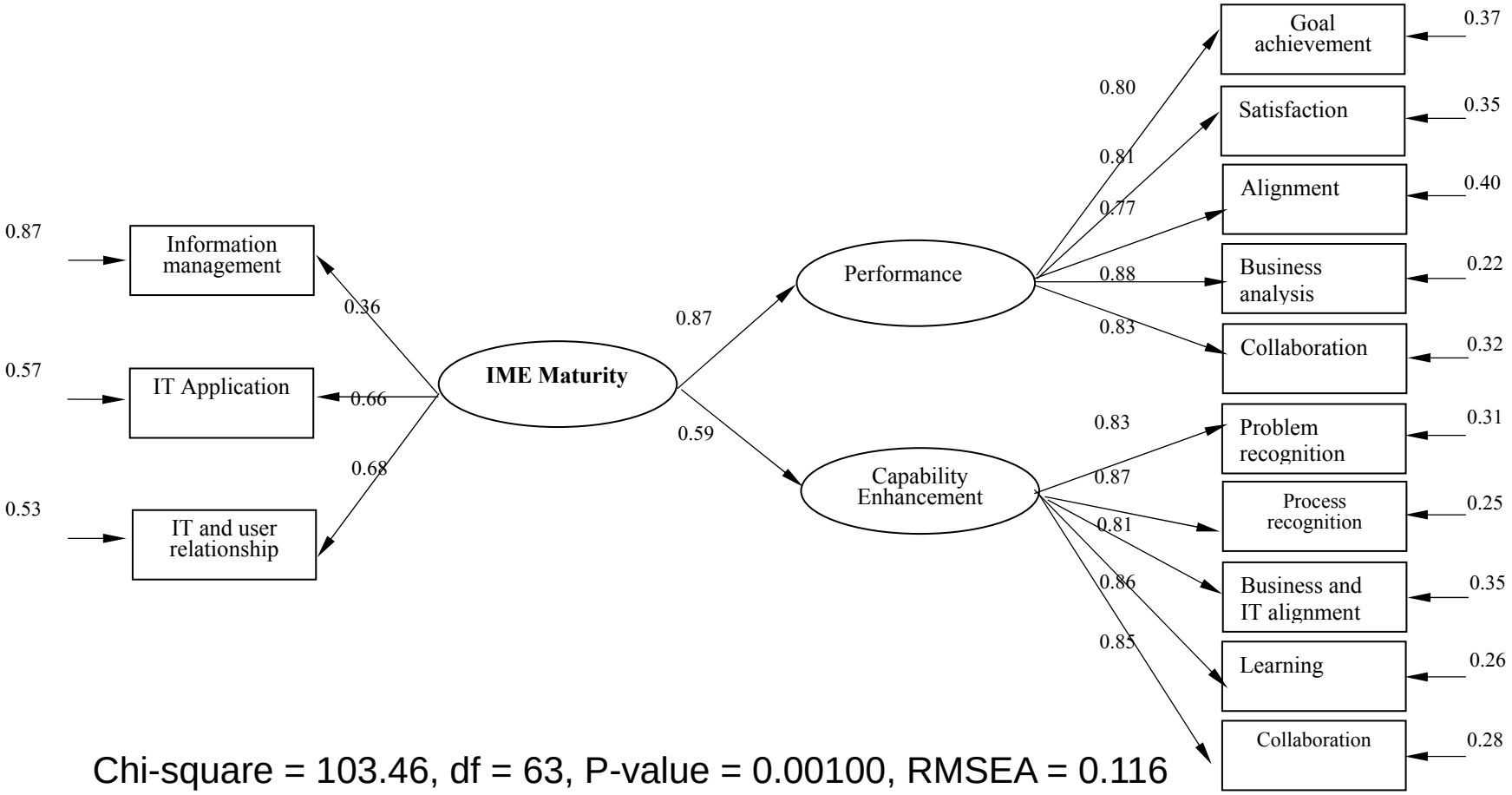
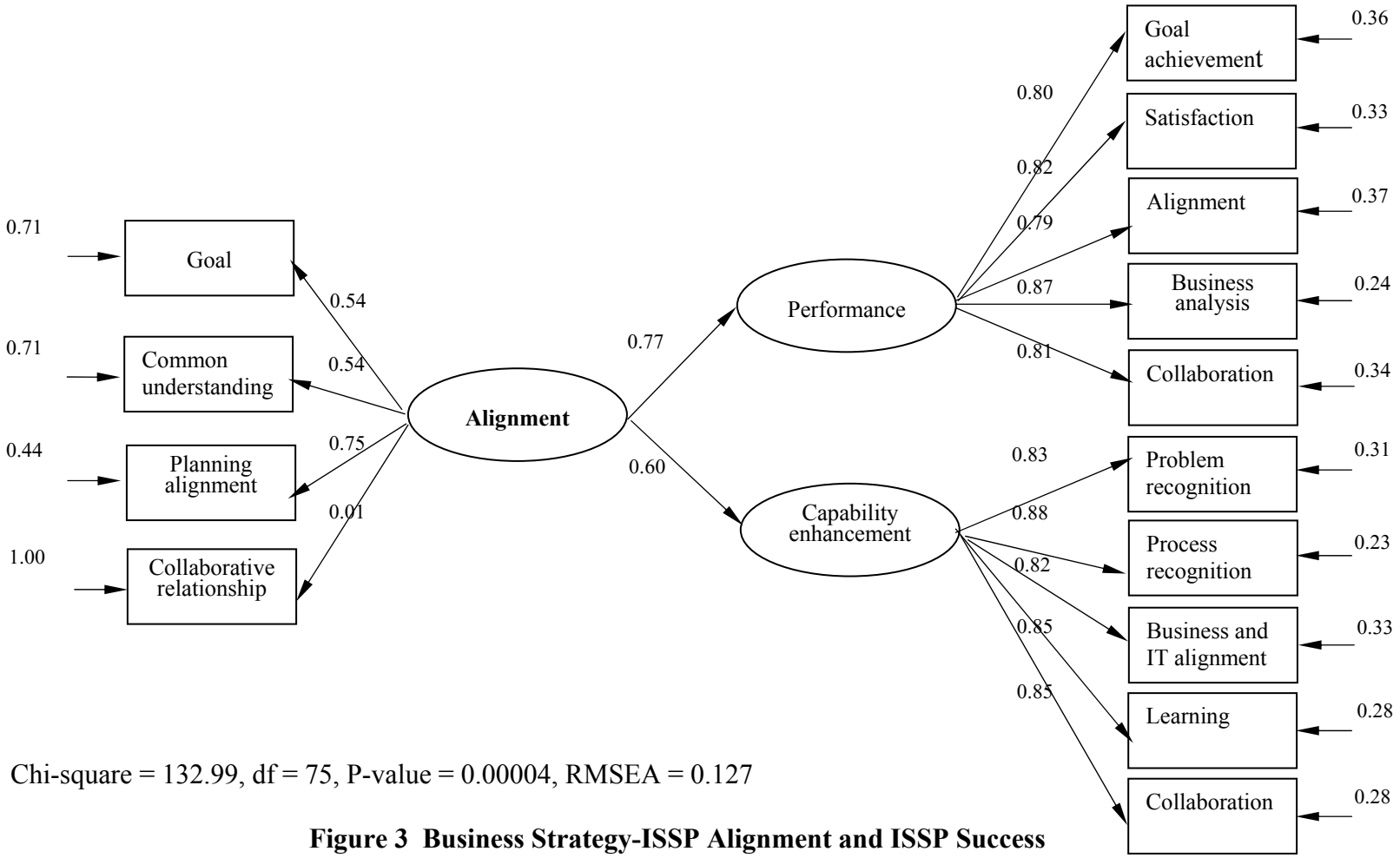


Figure 2 IM Environment Maturity and ISSP Success



Chi-square = 132.99, df = 75, P-value = 0.00004, RMSEA = 0.127

Figure 3 Business Strategy-ISSP Alignment and ISSP Success

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