

Measurement and Model of Information Technology Strategy and Business Strategy Alignment

Chairat Jussapalo^{1*}, Somboonwan Satyarakwit², Parin Fuangvut³

¹ Computer Center, Hatyai University

125/502 Polpichai Rd., Hatyai, Songkhla, Thailand 90110

² Academic Affairs, Dhurakij Pundit University

110/1-4 Prachachuen Rd., Laksi, Bangkok, Thailand 10210

³ Information System Center, Dhurakij Pundit University

110/1-4 Prachachuen Rd., Laksi, Bangkok Thailand 10210

*EMAIL: chairat@hu.ac.th

Abstract: This research aimed to measure the level of information technology strategy and business strategy alignment of Thai business organizations. The new approach of assessing information technology strategy supporting business strategy was proposed. The multiplicative method was employed to measure the level of information technology strategy and business strategy alignment. The factors influenced the level of alignment were investigated, and the alignment model was proposed. Data were collected from organizations registered on the Stock Exchange of Thailand.

The research results revealed the low level of the alignment between information technology strategy and business strategy. The study identified three factors which contributed to the alignment. These factors are 1) participation of business and information technology executives in developing both information technology and business strategies, 2) executives' awareness and support of information technology activities, and 3) knowledge management and communication between information technology and business executives. The variation of the alignment could be explained 34.6% by these three factors. The practical model of developing information technology and business strategies alignment was proposed.

Keywords: Measurement Alignment; Model of Alignment; Information Technology; Strategic Alignment

I. Introduction

Today, Information Technology (IT) plays a significant role and greatly attributes to the operations of business organizations by the use of hardware, software and data communication technologies. According to Somboonwan Satyarakwit et al. (1998), IT is defined as methods, knowledge and tools for the collection, processing and the storage of data. It also enhances information communications, presentation and use for the operations of business organizations. A business organization that employs IT in their operation expects that its use will be effective [32]. The use and understanding of IT benefits is an interesting issue among chief executive officers, chief information officers and academics. Because of its great

expense, organization executives require detailed knowledge in assessment approaches in relation to its performance in business organizations. For this reason, IT performance has been continuously studied by academics [31] [26] [1] [10] [6]. IT's effectiveness partly results from the alignment between IT strategy and business strategy. The level of alignment between these two strategies has also been continuously studied for many years [18] [24] [29] [19] [8] [7] [33]. The IT strategy and business strategy alignment has been ranked as one of the most popular research subject since 1991 [35]. The Computer Sciences Corporation's Annual Survey in 2001 indicated that IT strategy and business strategy alignment was in the top ten rankings over the past decade.

This study aims to develop a new method to measure the alignment between IT strategy and business strategy by using data from Thai business organizations. This study also determined the factors influencing the level of alignment and proposes a new alignment model.

II. Research Objectives

This study's objectives include following:

- 1) To measure the level of the alignment between IT strategy and business strategy of Thai business organizations using a new method of measurement.
- 2) To investigate the factors contributing to the alignment of IT strategy and business strategy.
- 3) To propose a new model for IT strategy and business strategy alignment.

III. Literature Review

Information technology (IT) is composed of hardware, software, databases, communication technologies and other relating tools [2]. IT brings about changes in the operations of an organization because of its capacity to search, store, restore, and exchange information related to the operations of the organization.

Porter (1985: 34-41) presented a business strategy analysis and consideration approaches called generic strategies which consisted of the three strategies: cost leadership strategy, differentiation strategy, and focus strategy. Cost leadership strategy centers on the capability of a firm to produce and deliver its products and services of a competitive quality at a lower cost.

Differentiation strategy relates to the ability of a firm to create and deliver products that are unique in nature. Focus strategy refers to the ability for a firm to create a product to suit the tastes or demands of a specific market. Based on Porter's strategies, other scholars developed three additional strategies: innovation, growth, and supply chain strategy. Innovation involves the adoption of new products or processes.

Growth involves the expansion of a product line in width, depth or length as well as its functional enlargement by adding value in the value chain. Supply chain strategy involves the combination of two or more groups or individuals which work together, such as in a joint venture and the signing of an alliance contract in order to achieve a common objective [22] [3].

Henderson and Venkatraman (1993: 6-9) defined alignment between IT strategy and business strategy as a strategic fit and functional integration of the following four elements: business strategy, IT strategy, organizational infrastructure and processes, and IT infrastructure and processes. According to Luftman et al. (1999), proper IT and business strategy alignment is referred to appropriate application of suitable IT to business strategy.

The measurement of IT and business strategies alignment is important when assessing the proper IT applications and services that support the effectiveness of business strategies or business operations. There were several approaches to measure IT and business strategies alignment. Typologies, Taxonomies, and model fit were examples of the approaches. Typologies used a deductive method while taxonomies used an inductive method. Some suggested model fits were multiplication, mediation, matching, grouping, profile deviation, and covariation [34].

Since 1990, many outstanding models of IT and business strategy alignment have been presented and referred to in significant IT management journals including the MIT Model introduced by Scott Morton (1991). This model transforms the processing of IT into applications in the organization's strategy. Its main concept is that IT investment should provide long-term profits to the organizations. The MIT model is composed of strategy, technology, structure, management processes and individuals and roles. All of the composition should be harmonized with each other along the organization operations. A second model influenced by the MIT model was introduced by Henderson and Venkatraman (1993). This model was called the Strategic Alignment Model (SAM) that consisted of the following four components: business strategy, IT strategy, organizational infrastructure and processes and IT infrastructure and processes.

IV. Research Methodology

This study employs quantitative research. The data used in this study was collected from large business organizations that employ IT strategy and business strategy in order to gain competitive advantages. Each business organization is registered on the Stock Exchange of Thailand (SET). In 2008, there were 541 business organizations listed on the SET.

Research instruments

There were two different survey questionnaires developed for this research study. One questionnaire was developed for Chief Information Officers and another for Chief Executive Officers. The questionnaire comprised of five sections covering the following topics: background information, business attributes, business strategy, IT strategy, and IT applications used to support business strategy.

Instrument test and data collection

Validity and reliability tests of the questionnaires were conducted. The survey questionnaires were reviewed by 5 specialists in IT and business administration fields for content coverage, language use and harmony of questionnaire structure with conceptual framework and research objectives. For reliability, the survey questionnaires were tested on 30 business organizations with similar qualifications to the sampled organizations. The reliability coefficient fell between 0.79 and 0.91.

V. Background Information of Sampled Organizations

The data was obtained from chief information and chief executive officers from 150 business organizations which accounted for 27.72% of the total 541 organizations registered on the Stock Exchange of Thailand. The chief executive officers responded to the questions concerning business administration while the IT administrators responded to the questions concerning information technology.

Most of the business administrator respondents were chief executive officers. They have been in the positions on the average of 6.8 years, received master degrees and had average age of 46.7 years. Most of the IT administrators responding the questionnaires were IT managers, have been in their positions for 5.1 years, had master degrees and had average age of 40.4 years. Most of the sampled organizations earned over 1,000 million Baht a year with over 1,000 employees and had functional organizational structure. Big shareholders and top executive officers were Thai. The types of business were quite equally distributed.

Most organizations had their business and IT strategies, 88.7% of the number of organizations had business strategies while 78.0% had IT strategies. The organizations performed proper activities in developing the strategies such as SWOT analysis and identifying key success factors.

VI. Measuring Level of Using Business and Information Technology Strategies

On a 5-score scale, the sampled organizations indicated the overall level of using business strategies at 3.69. For each strategy the highest score belonged to the supply chain strategy (4.02), followed by the cost leadership strategy (3.86), the differentiation strategy (3.75), the focus strategy (3.54), the

innovation strategy (3.52) and the growth strategy (3.48), respectively.

The IT strategies were assessed from IT operations supporting the business strategies. The assessment was conducted via questions on the information systems used by each organization. The questionnaires asked the objectives of the information systems used by the organizations. Table 1 shows the objectives of the information systems that support each business strategy [15]. This study selected only two important objectives for each business strategy.

Table 1 Objectives of Information Systems Supporting Business Strategies

Objectives of Information Systems	Business Strategy
Reducing cost of business operations	Cost Leadership
Reducing cost of customers and / or suppliers	
Making products or services different from competitors	Differentiation
Enhancing products or services to increase market opportunity	
Developing products for specific target group	Focus
Developing services for specific target group	
Making major changes in business processes	Innovation
Using IT as a part of new products or services	
Expanding business boundaries	Growth
Developing variety of products or services	
Linking to customers, suppliers, and other alliance	Supply Chain
Using IT of the organization for the business benefits of stakeholders	

The questionnaires also asked about the types of IT applications and information systems used by each organization. Table 2 maps the IT applications and/or the information systems and business strategies. The check mark (✓) identifies which information system supports each business strategy. These mappings are identified from the objectives of the information systems.

Table 2 Information Systems Supporting Business Strategies

Information System (IS)	Cost Leadership	Differentiation	Focus	Innovation	Growth	Supply Chain
Core IS						
Material Purchasing	✓			✓		
Manufacturing or Service	✓		✓	✓		

Sales and Marketing	✓			✓		
Computer Aided Design	✓		✓	✓		
Distribution	✓		✓	✓		
After Sales Service	✓	✓	✓			
Inventory	✓			✓		
Supporting IS						
Office Automation	✓			✓		
Accounting and Finance	✓					
Office Supplies Purchasing	✓					
Assets Management	✓					
Human Resource Management	✓					
Training	✓					
Groupware	✓					
Other IS						
e-Mail	✓			✓	✓	✓
Website		✓	✓	✓	✓	✓
e-Commerce	✓	✓	✓	✓	✓	✓
ERP	✓	✓		✓	✓	✓
Logistics and Supply Chain	✓	✓		✓	✓	✓
Customer Relations Mgt.	✓	✓	✓	✓	✓	✓
Knowledge Management	✓	✓		✓	✓	

The measurement of level of information systems supporting business strategies was carried out based on the total score of 4 for each business strategy. The total score was derived from the two objectives, a score of 2 for each objective of each business strategy.

Information systems supporting each business strategy could have a score between 0 to 4. If an organization did not have any information system objectives (Table 1) or any information system (Table 2) associated with a strategy, the score of the strategy would be zero. If an organization indicated having only either objective or information system, the strategy would have score of 1. If an objective was identified and at least one of the associated information systems was also identified, the score would be 2. From Table 1, there are two objectives of information systems for each business strategy, therefore, the maximum score for information systems supporting each business strategy is 4. This score represents the level of IT strategies.

With the total score of four, the overall average score of IT strategies was 2.79. Viewing each strategies separately, it was discovered that the cost leadership strategy has the highest score (3.18), followed by the supply chain strategy (2.88), the differentiation strategy (2.78), the growth strategy (2.77), the focus strategy (2.62), and the innovation strategy (2.52), respectively.

VII. Measuring Information Technology and Business Strategies Alignment

To examine the alignment between business strategy and IT strategy, cross tabulations were conducted by multiplying the score of each IT strategy by the score of each business strategy. The multiplication method was used because of its simplicity and popularity [5]. The method was also easily explainable and could well express the variations. It was discovered that the overall alignment between business strategy and IT strategy of the sampled organizations was only 10.72 out of 20. The alignment of each strategy is presented in Table 3.

Table 3 The Level of IT and Business Strategies Alignment

Strategy	Level of Alignment			
	Average	Standard Deviation	Minimum	Maximum
Cost Leadership	12.60	4.95	2	20
Differentiation	10.74	5.04	2	20
Focus	9.46	4.55	3	20
Innovation	9.11	4.80	2	20
Growth	9.75	4.16	2	20
Supply Chain	12.64	4.48	3	20
Overall	10.72	4.66		

The results indicated a quite low IT and business strategy alignment. The study, then, investigated the data in the questionnaires about the participation of and relationships between chief information and chief executive officers since these data had high reliability coefficients. The data included (1) the exchange of IT and business knowledge, (2) frequent communication between chief information and chief executive officers, (3) the administrators' commitment to support implementation of IT strategies, (4) the administrators' awareness of significance of using IT in the organizations, (5) the administrators' encouragement of IT operations, (6) the opportunity of IT administrators to participate in developing business strategies, (7) making clear business strategies practicable to develop IT strategies, (8) the business administrators' participation in developing IT strategies, (9) jointly rating importance of IT projects, and (10) the business administrators' support of IT investments [16] [23] [35] [11] [25] [12] [28] [13] [2] [14]. These data were analyzed as the following: (1) difference tests between mean scores of chief information and chief executive officers' response to the above 10 variables, (2) factor analysis, and (3)

a multiple regression analysis. It was indicated that there was no difference in the mean scores of chief information and chief executive officers' answers. In the factor analysis, the Principle Component Analysis (PCA) with the orthogonal axis-rotation by Varimax method was carried out. The test of 10 variables, a KOM value of 0.911, a Bartlett's Test of Sphericity Approx. Chi-Square of 2315.441, a degree of freedom of 45 and a P-value of 0.00 were obtained. The findings showed that the 10 variables could be categorized into the following three factors: (1) the administrators' participation in making both IT and business

strategies, (2) the administrators' awareness and support of IT activities and (3) knowledge management and communication between the chief information and chief executive officers. The percents of variance rotation sums of squared loadings for the three factors were 28.17, 27.08, and 24.43 respectively. The percent of cumulative rotation sums of squared loadings was 79.69. The multiple regression analysis was then performed to predict the level of alignment from the three factors. The analysis indicated the significance of the coefficients of the three factors. However, the variation of the alignment could be explained by the three factors only 34.6%. ($R^2 = 0.346$, Adjust $R^2 = 0.340$, S.E.E. = 15.36, F-Model = 52.288, P-value = 0.000)

VIII. Alignment Model Development

Based on data used to measure IT and business strategies alignment and factors which contributed to the alignment, a model of IT and business strategies alignment is proposed. Unlike the MIT Model introduced by Scott Morton (1991) and SAM Model of Henderson and Venkatraman (1993), the proposed model presents the micro factors instead of macro components. The Model, IT Effectiveness and Alignment (iTEAM), is illustrated below.

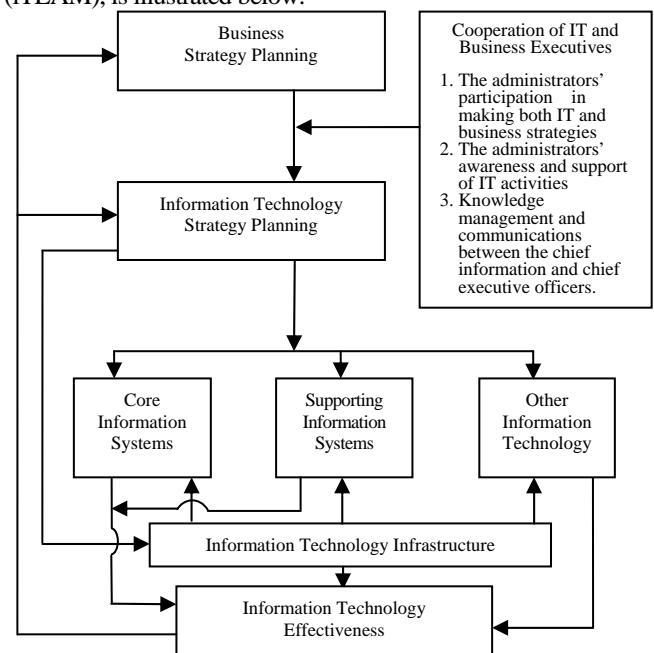


Figure 1 IT Effectiveness and Alignment Model (iTEAM)

IX. Discussion and Recommendations

The overall level of IT and business strategies alignment was 10.72 which counted for only 53.60% of total score of 20. The result may be due to the fact that the IT applications of many Thai organizations basically support the routine operations instead of supporting the competitive strategies. The alignment

for the supply chain management and cost leadership strategies had the highest levels of alignment, 12.64 and 12.60 respectively. This findings support the development of IT utilization in the organizations. Initial IT applications usually focus on transaction processing and supporting routine operations which contribute to efficiency or cost reduction. With a global business environment and advancement of communication technology, business organizations seem to employ value chain or supply chain strategy by setting up networks with their suppliers and customers.

Three factors relevant to participation of and relationships between chief information and chief executive officers, derived from the ten variables, that contribute to IT and business strategy alignment include: (1) the administrators' participation in making both IT and business strategies, (2) the administrators' awareness and support of IT activities, and (3) knowledge management and communication between the chief information and chief executive officers. The percentage of variation of alignment explained by these factors is only 34.6. This low percentage may be due to the low alignment values of sampled organizations. The analysis assumed the linear relationship of the three factors. If the relationship was non linear, this may have caused the low value of the explained variation.

IT strategy could be expressed in terms of IT infrastructure, core information systems supporting information systems and other modern IT. These components could be used to assess the relationship between IT and business strategies. If an organization wishes to employ a particular strategy, the administrators could design their IT applications from the mapping shown on Table 2. To assure the alignment of IT and business strategies, the IT and business executives should have a close working relationship according to the three factors outlined in the iTEAM Model. The alignment of IT and business strategies would contribute to the success of business strategy. Then and only then can the business administrators claim the effectiveness of using IT in their organizations.

X. Areas for Further Research

1. This study investigated large organizations registered on the Stock Exchange of Thailand. A similar study should be conducted among medium-sized and small business organizations in order to gain a broader conclusion. There should also be an IT and business strategy alignment comparison between large, medium-sized and small business organizations.

2. The value of IT and business strategy alignment was obtained through multiplication method. Other approaches can be used to further study whether and how different methods of measuring alignment produce different results.

3. Investigating the problems and difficulties that cause misalignment between IT and business strategies in private and public organizations is another research topic that can be investigated. The findings could be very beneficial to both IT and business administrators.

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Background of Authors

Chairat Jussapalo received the B.B.A. (Business Computer) degree from Prince of Songkla University, M.B.A. degree from Ramkhamhang University and D.B.A.(candidate) degree from Dhurakij Pundit University.

Assoc. Prof. Dr. Somboonwan Satyarakwit received the B.COM (1 st Class Honor) degree from Chulalongkorn University, M.B.A. (Quantitative Business Analysis) and D.B.A. (Quantitative Business Analysis) degree from Indiana University, Email: sboonwan@dpu.ac.th

Dr. Parin Fuangvut received the B.B.A. (Business Computer) degree from Rangsit University, M.Com (Business Information Systems) and Ph.D. (Information Systems) degree from University of Wollongong, Email: parin@dpu.ac.th.