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The Relationship between Strategic Information System and Business Strategies in Malaysia

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ABSTRACT

The relationship between strategic information system and business strategy of the firm has often been raised among managers. This paper examines the nature and extent of the relationships between strategic information system and business strategy pursued by the firms. A structured questionnaire was developed and self-administered to managers in the capital city, Kuala Lumpur. A total of 86 usable responses were used to analyse the results of the study. The findings show that there were five types of strategic information system used by Malaysian firms: accounting information system, finance information system, marketing information system, management information system and general information system. The business strategies pursued were focus strategy, cost leadership strategy and differentiation strategy. Empirical evidence detected a relationship between the strategic information system used and the business strategy adopted. There were also significant differences between each of the business strategies pursued and type of strategic information system used by the firms. The implications of the findings are also discussed.

ABSTRAK

Perhubungan antara sistem maklumat strategik organisasi dengan strategi perniagaan firma sering dibangkitkan oleh pengurus. Oleh itu, kajian ini meneliti bentuk dan batasan perhubungan antara sistem maklumat strategik dan strategi perniagaan yang dijalankan oleh firma. Sebuah soal selidik berstruktur direkabentuk untuk dipenuhi sendiri oleh pengurus di bandaraya Kuala Lumpur. Sejumlah 86 respons bolehguna telah diterima dan dianalisis. Hasil kajian ini menunjukkan bahawa terdapat lima jenis sistem maklumat strategik yang diamalkan oleh firma di Malaysia: sistem maklumat perakaunan, sistem maklumat kewangan, sistem maklumat pemasaran, sistem maklumat pengurusan dan sistem maklumat umum. Strategi perniagaan yang digunakan oleh firma adalah strategi tumpuan, strategi kepimpinan kos dan strategi pembezaan. Bukti empiris mengesan perhubungan antara sistem maklumat strategik dengan strategi perniagaan. Perbezaan yang signifikan juga dikesan bagi setiap jenis strategi perniagaan dengan sistem maklumat strategik firma. Implikasi kajian juga dibincangkan.

INTRODUCTION

The rapid development of information technology (IT) and information systems (IS) has created much impetus to the management of organizations, particularly in terms of its effectiveness and efficiency (Porter & Millar 1985). IS/IT has been used to support a range of business activities, from the research and development and engineering to marketing research and record keeping. Although IS/IT can support a variety of ways in organizing and operating a company, it could not provide satisfactory response to the question of which is the best solution (Rockart & Short 1989). As such, the importance of IT/IS varies widely among firms. To use IT/IS as a competitive weapon, managers have to understand and foresee the impact of IT/IS at the firm, industry and strategy level, and direct its resources to the firm's most important targets to achieve maximum value from its utilization (Parsons 1983).

In recent years, managers are questioning the value of IT/IS strategies, particularly on budget overruns and unrealized benefits that have engendered a very cautious approach to technology investment. As such, several questions have emerged: To what extent is IT/IS an important strategy to organizations? Is there a relationship between strategic information system and the generic strategies of firms? What strategic information systems are related or relevant to specific business strategies? Therefore, the purpose of this paper is to determine the nature of strategic information systems pursued by Malaysian firms, and identify the business strategies pursued by these firms. The relationship between the generic strategies pursued and the strategic information system used by the firm will also be examined.

This research could provide a better understanding of the role of strategic information system or strategic information technology in organizational business strategy. The relationship between strategic information systems and the business strategies of the firms could also be clarified. This can also be useful to managers in selecting appropriate strategic information systems in tandem with their business strategies. The findings could also assist the managers in assessing the impact of the changing needs on the existing situation, in both business strategies and strategic information system.

LITERATURE REVIEW

A survey by Wilson (1989) in the United Kingdom found that over three-quarters of the financial sector and Times 500 companies claimed to have an information system strategy. Segars, Grover, and Kettinger (1994) also showed that the information system strategies supported the organizational or business strategies. Parsons (1983) argued that the information system

and information technology can support each of the three generic strategies by Porter (1980).

Drawing upon the earlier work of Earl (1986), Galliers (1987a) identified the changing nature and focus of information systems (IS) planning over time. However, the way in which organizations compete is unlikely to be a function of time. There is no evidence that new and emerging organizations compete in ways that are different to the ways in which older, more mature organizations compete. A changing focus of IS/IT planning suggests that the tasks, objective, direction and involvement, methodological emphasis and administrative context of IS planning would change with increased organizational maturity.

STRATEGIC INFORMATION SYSTEM

The objective of an information system is to monitor or document the operations of some other system, which is called the target system and could not exist without such a system (Gall 1986). According to Reponen (1993), strategic information system is a planning process in the minds of the decision makers, users and developers of the systems. Thus, strategic information system is a plan for developing, implementing, managing and operating the information system. The strategic information system is also the result of an interactive working process in the organization (Reponen 1993). The most important decision areas in the strategic information system is the strategic use of IT; application development policy; high level architecture; organization of the IS function and investment planning. The contents of the strategy may be different in each case (Reponen 1993).

From past studies, there are four types of strategic information systems: accounting information system (AIS) as suggested by Choe (1996) and Ransom (1983); financial information system (FIS) as proposed by Davis (1986) and Hoth (1982); management information system (MIS) as indicated by Hartney (1994) and Wilson (1995); and finally the marketing information system (MkIS) as mentioned by Sevier (1986) as well as Pitt (1986).

Accounting Information System (AIS) The accounting information system must have a target system. The target system must be business operations in a narrow sense, which should be associated with the aspects of business operations of accountability for the assets/liabilities of the enterprise, the determination of the results of operations that ultimately leads to the computation of comprehensive income, and the financial reporting aspects of business operations. Other non-accounting aspects of business operations are covered by information systems such as management information system, marketing information system and others.

Choe (1996) studied on the relationship between the influencing factors and performance of accounting information system (AIS). He has identified

the moderating effect of evolution level of IS on the relationship. The results suggest that there are significant positive correlation between the performance of AIS and the influence factors such as user involvement, capability of IS personnel and organization size.

Ransom (1983) examined the effect on information content of the signal generating process or accounting information system. He discovered that signals communicated by accounting reports possess information content. The accounting information system was defined in terms of the management choices of accounting methods with respects to inventory, depreciation and the investment tax credit. Ransom also classified inventory methods as LIFO ('last-in-first-out') or FIFO ('first-in-first-out'), depreciation methods are classified as accelerated or straight-line and investment tax credit methods are classified as deferral or flow-through.

Ransom (1983) concluded that there was a relationship between a measure of information content and the accounting information system as defined by managements' choices from alternative accounting methods. Accounting research examining the effect of an individual choice of accounting methods would be well served by utilizing designs that could control for other choices among alternative accounting methods. He also concluded that the accounting information system would assist the management in handling their organizations.

Computerized systems such as accounting information for operational control, managerial decision-making and strategic planning have far reaching impact on the organization (Oglesbee 1983). Prior research has advocated the need to develop an integrated information system that combines concepts and theories from both database and knowledge base research.

Based on the foundations of the accounting information systems, computer science and artificial intelligence to develop an integrated accounting information system that contains both data and knowledge of data, Kandelin (1990) showed that the accounting information is the main contributor to the top managers' decision making process and the integration between the conceptual model and the computational model would give benefits as it provides the fundamental usage of the system. The findings of Choe (1996), Ransom (1983) and Kandelin (1990) have indicated the presence of the accounting information system in their organisational practices.

Financial Information System (FIS) Davis (1986) studied the interface between a financial information system and an individual user. The study consisted of a laboratory experiment in which each subject was presented with all possible combinations of five questions and four information presentations. Davis showed that the use of financial information system was important to the individual user and IT were tools for decision-makers in making a solution to their financial analysis problems. In that study, Davis

found that the policy variables such as the pension funding individually affects more on the performance measures. The debt to equity ratio can be significantly altered through the combined effects of choice of accounting policy, and alternative debt to equity financing. Performance measures however, are significantly affected by the interaction of the accounting policy pattern and incremental time blocks or dimensions.

Management Information System (MIS) Hartney (1994) sought to identify the primary behaviours of IS project managers that contributed to their effectiveness and their project success. It was found that the management information system consists of five activities : those serving the customer, those creating the solutions, those driving the process, those mastering the unexpected, and those influencing the players. It was also found that the management information system was important to the IS managers in making a judgment on the managerial process.

Wilson (1995) examined the extent to which the attitudes of top level decision-makers in Richmond, Virginia, USA, might affect the implementation of a computer-based Management Information System (MIS) in the city's organization. To adapt the instrument to the population under study, an attitude survey was conducted to: (1) measure the attitudes of decision-makers toward the use of computers within the organization, and (2) compare attitudes toward the use of computers based on the level of organizational administration, departmental assignment within the organization, the level of formal educational attainment, formal education orientation, age, and gender. He found that decision-makers at the City of Richmond were decidedly positive towards the implementation of a computerized MIS. Thus, cities implementing a computerized MIS need to motivate employees to embrace the new system by fostering open communications about concerns and needs that makes learning about a new system a priority. It is, therefore, essential for decision-makers to convey a positive and supportive attitude, be sensitive to the concerns and fears of subordinates, and train employees accordingly.

Marketing Information System (MkIS) Sevier (1986) examined the factors that influenced college choice with a specific emphasis on how information about colleges was gathered, and ordered by students and parents during the decision process; the timing of the decision on where to attend college; the types of information most valued by students and parents; what factors beyond students were involved in the college decision; the impact and influence of college cost and financial aid; and a profile of the kinds and types of students that attend private and competitive liberal arts colleges. The findings showed that the impact of college cost and financial aid in the choice process, and the decline in influence of the high school guidance

counselor and the emergence of the home as the locus for the college choice decision.

Pitt (1986) focused on the marketing practices of selected nonprofit organizations. This research found that there was a significant positive relationship between the position accorded to market within the organizational hierarchy, and the adequacy of funding of the nonprofit organization. The marketing information system played an important role by simplifying the marketing strategy in the nonprofit organizations.

General Information System (GIS) Brown, Gatian, and Hicks (1995) mentioned that the investment in strategic IS/IT is an important way for firms to seek competitive advantage. Yet there is still little empirical evidence that showed the implementation of strategic IS/IT results in long term competitive advantages. This is due to the difficulty in isolating economic benefits attributable to strategic IS/IT implementation. In their longitudinal study of 35 sample firms over a period of 13 years, they found that the stock market reacted favorably to announcements for firms using the strategic IS/IT. However, in subsequent years, those firms tended to be more productive and more profitable than their firms in their respective industries.

Clemons and Kimbrough (1986) suggested that the strategic IS/IT shares three characteristics: (1) such systems will reduce costs or, either add value for customers or add benefits to users; (2) users incur significant switching costs when changing to systems offered by a competitor; and (3) adoption time is short relative to the time a competitor needs to copy the system, thus providing early developers with an opportunity to develop their initial base of users.

The Butler Cox PLC had done a research on the performance of the information systems function in 1987. The findings showed that there were six main ways in which IS/IT may be used to provide a competitive edge in a business. One of the ways in which IS/IT may be used to provide a competitive edge in a business is by creating a new product or service to compete with an existing offering - selling databases (MIS/ MkIS); changing the size and scope of the market - using telecommunications (MkIS), reducing the life cycle cost of goods - reduced development time (FIS/AIS); help in producing more complex products - producing sophisticated financial services; help with a rapid response to a competitive move (MIS/ MkIS) and finally help redistribute value-added processes within an industry - using electronic links between manufacturers, retailers and suppliers (MIS/ MkIS).

From the above literature, it is evident that many firms used strategic information systems (whether in accounting, finance, marketing or management) in their organization. They did not only concentrate in one functional area but on all of these functional areas.

MODELS OF BUSINESS STRATEGIES

Organizations compete in different ways. Chan and Huff (1992) identified several alternative strategy typologies. The model by Ansoff (1965) is still used as a primary modeling tool by strategy students and practitioners. In the model, Ansoff identified four possible strategies based on the product-market characteristics: market penetration, product development, market development, and diversification. Miles and Snow (1978) suggested that competitors in any industry would fall into one of four distinct categories, one of which would imply different responses to the strategic initiatives of others. The four categories suggested were: defenders, prospectors, analyzers and reactors. Prospectors are considered to be firms with aggressive competitive strategies, that is pioneers in development, while defenders are firms with the most conservative competitive strategies, focusing primarily on cost savings. Analyzers make fewer and slower changes than prospectors and have moderate investment practices, while reactors do not engage in strategic planning - they simply react. From an investment in IT perspective, prospector and defender firms are perhaps the most interesting to study, since they present polar perspectives on strategic planning (Gatian et al. 1995).

According to Porter (1980) the profitability of a firm hinges on five forces: threats of entry, threats of product substitutes, bargaining power of buyers, bargaining power of buyers, and intensity of competition among firms in the industry. In order to enhance the profit potential, firms could adopt the following generic strategies: cost leadership, differentiation, and focus strategies. Cost leadership refers to the ability to provide comparable products or services more efficiently with the lowest outlays of capital, time and labor by a firm. Differentiation refers to the ability of a firm to distinguish its products in such a way that they are of unique and superior value to customers. The focus strategy emphasizes on the selection of a target segment in the industry and tailoring strategy to serve them to the exclusion of others.

RELATIONSHIP BETWEEN BUSINESS STRATEGIES AND STRATEGIC INFORMATION SYSTEM

Atkins (1994) identified the differences in the strategic approach of IS/IT when firms pursue these different business strategies. In his study, the Ansoff model as well as the Miles and Snow model were considered. The findings showed that linking business and IS/IT strategies remains a major challenge for many businesses. The report also showed that IS managers in the United Kingdom appeared to have an appreciation of the business strategies pursued by their organizations, and the purpose of using certain IS in congruence with the business strategies adopted in their organisations.

According to Chan and Huff (1993), an effective IS strategy would give positive impact to the business performance and that there is a positive relationship between the information systems strategy and the IS strategic fit. Chan (1997) also examined the typology of Defender, Analyzer, and Prospector business strategies by using Venkatraman's (1991) measure of business strategy, and IS (operational support systems, market information systems, strategic decision support systems and inter-organizational systems). The results showed that IS alignment affects business performance, but only in some organizations. The alignment was found to influence overall business success in prospectors and analyzers but not in defenders, and in insurance and pharmaceutical manufacturing industries but not in banking and auto-parts manufacturing industries. Thus, the alignment between business strategy and IS system can improve organizational performance.

THEORETICAL FRAMEWORK

Based on the studies by Atkins (1994), Chan (1997), Reponen (1993), Choe (1996), Ransom (1983), Davis (1986), Hartney (1994), a conceptual framework is shown in Figure 1. From Figure 1, the strategic information system consists of five functional systems, namely the accounting information system, financial information system, management information system, marketing information system, and general information system (combination of these four functional areas). In the model, the strategic information system and the generic strategies are interrelated. For example, the cost strategy can be related with the accounting or financial strategy. Differentiation strategies may be related with the marketing information systems. The focus strategy may be related with the management or marketing information systems. Thus, the conceptual model suggests that each of the business strategies may be related with certain type of strategic information systems available in an organization.

THE HYPOTHESES

Based on the studies by Atkins (1994) and Chan (1997), the following hypotheses are advanced:

H_1 : *Business strategies and strategic information system used in the firms are positively correlated.*

H_2 : *There is a relationship between cost leadership strategy and the accounting information system and financial information system used by the firms.*

H_3 : *There is a relationship between differentiation strategy and the marketing information system used by the firms.*

H_4 : *There is a relationship between focus strategy and the marketing information system used by the firms.*

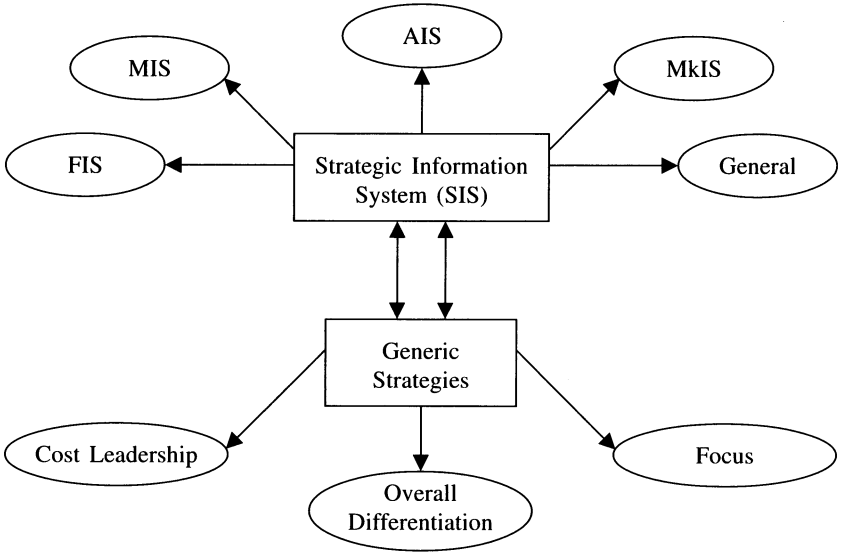

FIGURE 1. The framework of the relationship between strategic information system and business strategies

METHODOLOGY

In this study, a structured questionnaire was developed based on past studies (Porter 1980; Choe 1996; Davis 1986; Hartney 1994; Sevier 1986; and Brown et. al. 1995). The questionnaire has four parts. The first part of the questionnaire focused on the information system activities of the company. Respondents were asked to rate each of the twenty five items on a five-point interval scale ranging from 1 (highly important) to 6 (highly not important). The second part of the questionnaire focuses on fifteen items on the generic strategies of the company. Respondents have to indicate whether the strategy pursued is 1 (highly important), to 6 (highly not important). The third part of the questionnaire covers the company's background, and the final part provides information on the respondent's background.

SAMPLING

This research was carried out at organisations in the Klang Valley, predominantly the greater Kuala Lumpur city area. The study population comprised of managers working in the city sourced from the latest available (1997) Federation of Malaysian Manufacturers Directory. A total of 350 respondents were identified (namely the general managers, management information system managers and the chief operating officers (COO)) and the questionnaires were self-administered by the respondents. A total of 86

useable questionnaires are used in this study, representing an overall response rate of 24.4%.

METHOD OF ANALYSIS

The SPSS 11.0 was used, with descriptive statistics including frequency distributions, correlations and means, as well as standard deviations obtained.

To determine the business strategies pursued by the firms, the factor analysis method was used, and the principal component solution was adopted. The varimax rotation was used and Eigenvalues greater than 1.0 was requested in the analysis. The principal component solution was also adopted to determine the dimensions in the strategic information systems. Based on the results of the principal component solutions, the cluster analysis was then, used to determine the categorization or classification of the generic strategic groups and the strategic information systems.

The goal of cluster analysis is to identify relatively homogeneous groups of cases based on selected characteristics. Specifically, cluster analysis permits the inclusion of multiple variables as sources of configuration definition. In this study, there were 15 items for the generic business strategies. K-means cluster analysis was used to analyze the subsequent data. One-way Analysis of Variance was also used to examine the influence of the generic strategies onto the strategic information system.

Reliability Test The alpha coefficient for the twenty-five items on strategic information system was 0.9271. The coefficient for the accounting information system variable was 0.9453, 0.8509 for marketing information system, 0.814 for the financial information system, 0.7176 for the management information system, and 0.7349 for the general information system. The Cronbach alpha coefficient for the fifteen items on business strategies was 0.9265. The coefficient for the items on focus was 0.9008, 0.8686 for the cost leadership, and 0.8196 for the differentiation strategy. These results suggest a fair level of internal consistency in the responses.

FINDINGS AND DISCUSSION

PROFILE OF RESPONDENTS

Table 1 shows the profile of the individual respondents, while Table 2 showed the company's background. In the sample, 47.7% are Chinese, 45.3% are Malays, and 2.3% were Indians. In terms of age, 43% were between the ages of 31 to 40 years, 36% were between the ages of 41 to 50 years, 18.6% were less than 30 years in age and the rest are above 50 years old.

TABLE 1. Respondent profile

Variables	Frequency	%
Race		
Malay	39	45.3
Chinese	41	47.7
Indian	2	2.3
Others	4	4.7
Age		
<30 years	16	18.6
31-40 years	37	43.0
41-50 years	31	36.0
>50 years	2	2.3
Gender		
Male	74	86.0
Female	12	14.0
Qualification		
SRP/SPM/STPM	6	7.0
Diploma	13	15.1
Degree	55	64.0
Professional	12	14.0
Position		
CEO/GM/ED/EC	44	51.2
Manager/Director	32	37.2
Others	10	11.6
Duration in company		
< 1 year	12	14.0
1 - 3 years	19	22.1
3 - 5 years	15	17.4
5 - 10 years	23	26.7
> 10 years	17	19.8
Duration in position		
< 1 year	17	19.8
1 - 3 years	27	31.4
3 - 5 years	12	14.0
5 - 7 years	19	22.1
7 - 10 years	7	8.1
> 10 years	4	4.7
Salary		
<RM3000	14	16.3
RM3000 - RM5000	30	34.9
>RM5000	42	48.8

TABLE 2. Company profile

Variables	Frequency	%
Major activity		
Industrial products	32	37.2
Trading/services	20	23.3
Consumer products	16	18.6
Finance	9	10.5
Construction	4	4.7
Others	3	3.5
Property	2	2.3
Ownership		
Malaysian	73	84.9
Foreign	10	11.6
50 -50	3	3.5
No. of employees		
<50 employees	27	31.4
50 - 99	9	10.5
100 - 199	18	20.9
200 - 299	5	5.8
300 - 399	5	5.8
>500 employees	22	25.6
Annual sales		
<50 million	28	32.6
50 - 99	16	18.6
100 - 149	5	5.8
150 - 199	10	11.6
200 - 249	10	11.6
250 - 299	3	3.5
>300 million	14	16.3
Market share		
<10%	19	22.1
10 - 14	20	23.3
15 - 19	10	11.6
20 - 24	12	14.0
25 - 29	4	4.7
30 - 34	8	9.3
35 - 39	4	4.7
>40%	9	10.5
Net profit		
Less than 0%	2	2.3
0 – 4%	7	8.1
5 – 9%	22	25.6
10 – 14%	24	27.9
15 – 19%	12	14.0
20 – 24%	12	14.0
25 – 29%	5	5.8
>30%	2	2.3

Nearly 86% of the respondents were male and 12% were female. With respect to the educational qualification, the majority (64.0%) was degree holders. More than 50% of the respondents were the Chief Executive Officers, 37.2% were managers and 11.6% were in executive positions.

With regards to job tenure in the company, 26.7% of the respondents had 5 to 10 years of working experience, 19.4% had more than 10 years experience and the rest had less than 5 years experience. Nearly 49% of the respondents earned more than RM5, 000.00 per month.

From Table 2, 37.2% of the total firms were involved in industrial products, and 23.3 per cent were involved in trading or services industries. Nearly 19% were involved in consumer products and 10.5 per cent were involved in the financial sector. Nearly 5% were in construction sector, and 3.5 per cent were in others sectors like the property sector.

In the sample, nearly 85% of the firms were Malaysian owned, and the remainder were foreign owned. In terms of the number of employees, 31.4% of the firms have less than fifty employees, while 25.6% of the firms have more than 500 employees. About 20.9% have 100-199 employees.

In terms of annual sales, 32.6% of the firms have sales less than RM 50 million. About 18.6% have sales between RM 50-RM99 million sales. About 16.3% of the firms have more than RM 300 million sales.

Majority of the firms (23.3%) have at least 10 - 14 per cent of market share relative to competitors followed by 22.1 per cent have less than 10 per cent relative to competitors. About 14 % have at least 20 to 24 per cent and 11.6 per cent have about 15 to 19 per cent market share. About 27.9 per cent of the firms gaining about 10 to 14 per cent of net profit followed by 25.6 per cent gain about 5 to 9 per cent net profit. It shows that most of Malaysian firms gain net profit between 5 to 25 per cent.

STRATEGIC INFORMATION SYSTEMS

By using the factor analysis, Table 3 showed that the principal component solution resulted in five factors accounting for 70.3 per cent of the variance explained. Five factors with Eigenvalues of larger than one were extracted. The first factor is interpreted as AIS accounting for 39.5 per cent of the variance. In this factor, items such as cost accounting, company's accounting report, financial accounting and computation of payroll and employees funds are loaded. The second factor represents MkIS, accounted for 15.4 per cent of the variance with four variables. The four variables of the marketing information system are electronic trading; electronic data interchange and telemarketing; just in time processing system; and announcement using the bulletin board. The third and the fourth factors represent the FIS and MIS respectively. FIS consists of three variables that is the product/service distribution and marketing; sales and advertising and computation of purchasing and selling value.

TABLE 3. Factor analysis for strategic information system

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Computation of cost accounting	0.87665				
Computation of financial accounting	0.87307				
Computation of company's accounting report	0.85660				
Computation of payroll and employees funds	0.83484				
Computing income and overall expenses	0.79363				
Computing overhead expenses, raw material supplies and expenses	0.78759				
Financial reporting aspects of business operations	0.78709				
Transaction processing system (TPS): the system records inventory transactions and updates an inventory master file	0.75882				
Financial management	0.71187				
Computation of comprehensive income	0.59037				
Sales order processing system	0.50173				
Electronic trading; e.g. exchange orders invoices		0.86294			
Electronic Data Interchange and telemarketing		0.83197			
Just In Time (JIT) processing system		0.78590			
Announcement using the electronic bulletin boards		0.61010			
Product / service distribution and marketing			0.77581		
Sales and advertising			0.74248		
Computation of purchasing and selling value			0.70629		
Designing and reviewing organizational units				0.70013	
Enrich product with info-based services, e.g. Computer Aided Design (CAD)/Computer Aided Manufacturing (CAM) technology				0.65491	
Customer and quality support; e.g. Decision Support System(DSS)				0.60737	
Relational database performing an extended range of task.				0.57121	
Foster open communications through computer					0.70019
Electronic mail to enhance communications and improve organizational responsiveness					0.61282
Serve/create the solution to customer					0.59322
Percentage	39.5	15.4	6.0	5.1	4.3
Cumulative Percentage	39.5	54.9	60.9	65.9	70.3

Note: α = 0.9271(25 variables)

Four components of MIS are designing and reviewing organizational units; enrich product with info-based services; customer and quality support; and relational database performing an extended range of task.

The last factor is interpreted as the GIS, which include three variables: foster open communications through computer; electronic mail to enhance communications and improve organizational responsiveness; and serve or create the solution to customer.

The principal component solution thus, supported the presence of five strategic information systems in the firms. This is consistent with the previous views of the five types of strategic information system prevalent in organizations today. This finding enhances the validity and the theoretical model of the strategic information systems. As such, it could not be denied that the five types of IS were apparent and adopted by firms in Malaysia.

BUSINESS STRATEGIES

Table 4 showed the results of the principal component solution that resulted in three factors, accounting for 69.4 per cent of the variance explained.

The first factor is interpreted as "focus" accounting for 49.9 per cent of the variance. This strategy referred to items such as splintering into highly diverse market niche, applying extensive research on product/service, applying product design on product/service, achieve a cost advantage within its target market, directing efforts to the needs of a unique segment of customer and narrowly defined geographic market.

The second factor represents "cost leadership", accounted an additional 13 per cent of the variance. The items found in this strategic group are emphasizing on low cost relative to competitors, increasing market share, overall lower per-unit cost, greater access to resources and applying the economies of scale: lowest cost producer in industry.

The third factor represents the "differentiation" strategy with three variables, which accounted for an additional 7.5 percent of the variances explained.

The results of the factor analysis showed that the finding is consistent with the model developed by Porter (1980). This also suggests that the generic strategies are also practiced by firms in the study, and thus appropriate in the study. This enhances further the generalisability of the business strategy model by Porter.

RELATIONSHIP BETWEEN BUSINESS STRATEGIES AND STRATEGIC INFORMATION SYSTEMS

Table 5 shows the correlation between business strategies (focus, cost leadership and differentiation) and strategic information system (accounting information system, marketing information system, financial information system, management information system and general information system).

TABLE 4. Factor analysis for business strategies

Variables	Factor 1	Factor 2	Factor 3
Narrowly defined geographic market	0.83427		
Splintering into highly diverse market niche	0.79142		
Directing efforts to the needs of a unique segment of customers	0.72232		
Applying product design on product/service	0.69530		
Achieve a product/service advantage within its target market	0.65029		
Achieve a cost advantage within its target market	0.61122		
Applying extensive research on product/ service	0.59395		
Emphasizing on low cost relative to competitors		0.87089	
Applying the economies of scale: lowest cost producer in industry		0.81326	
Increasing market share		0.74806	
Overall lower per-unit cost		0.74527	
Greater access to resources		0.86430	
Targeting buyer who are not highly price sensitive			0.85409
Providing a product/service that offers purity of ingredients			0.84208
Providing a product/service that offers unique qualities			0.55402
Percentage Variance	49.9	12.0	7.5
Cumulative Percentage Variance	49.9	61.9	69.4

Note: α = 0.9265 (15 variables)

The results show that there is a relationship between business strategies and strategic information systems, significant at $p < 0.01$. However, the correlation between cost leadership and marketing information system was not significant at $p<0.05$. The cost strategy is more related to cost cutting measures as opposed to marketing efforts, which is more motivated by the marketing information system but by other modes of information system. Further, it is not unreasonable to consider that the cost strategy was primarily driven by the financial and accounting information systems. The cost strategy is generally pursued by firms with broad target markets or economies of scale, and not driven by specific target markets. As such, Hypothesis 1 is partially accepted.

TABLE 5. Means, standard deviations and inter-correlations of strategic information system and business strategies[a]

	Variables	Means	s.d	1	2	3	4	5	6	7
1	Management Information System	2.773	1.071							
2	Marketing Information System	3.410	1.299	0.4690**						
3	General Information System	2.736	1.110	0.6129**	0.4973**					
4	Financial Information System	2.659	1.240	0.4651**	0.3422**	0.5258**				
5	Accounting Information System	2.180	1.040	0.4387**	0.1158	0.5173**	0.5649**			
6	Cost Leadership	2.442	0.968	0.4432**	0.2037	0.5712**	0.5016**	0.6244**		
7	Differentiation	6.159	2.331	0.4526**	0.2404*	0.6348**	0.5327**	0.6469**	0.6207**	
8	Focus	1.098	0.461	0.5614**	0.2161*	0.5412**	0.5038**	0.5756**	0.5290**	0.6396**

Note: [a] All cases are significant at $p < 0.10$
Correlations greater than 0.2404 are significant at $p < 0.01$ (**)
Correlations greater than 0.2037 are significant at $p < 0.05$ (*)
s.d. - standard deviation

Table 6 shows that there are significant differences among the three business strategies and five strategic information systems, namely AIS, FIS, MIS, MkIS and GIS.

For Hypothesis 2, it was proposed that there is a relationship between cost leadership strategy and AIS and FIS used by the Malaysian organizations. As shown in Table 5, the correlation value between cost leadership and accounting information system is highly significant ($r = 0.6244$, significant at $p<0.01$) and the correlation value between cost leadership and FIS is also highly significant ($r = 0.5016$, significant at $p<0.01$). Table 6 also showed that the cost leadership strategy was perceived to be highly important when the AIS and FIS is used in their organizations. For those who practiced the MIS and GIS in their organizations would also perceived that the cost leadership strategy as highly important as compared to differentiation and focus strategy. Thus, Hypothesis 2 is supported.

In Hypothesis 3 it was proposed that there is a relationship between differentiation strategy and MkIS used by Malaysian organizations. As shown in Table 5, the correlation value between differentiation strategy and MkIS was significant at $p<0.05$ ($r = 0.2404$). This shows that there is a relationship between differentiation strategy and MkIS. This hypothesis is supported.

Hypothesis 4 proposed that there is a relationship between focus strategy and MkIS. From Table 5, the correlation value between focus strategy and MkIS is significant at $p<0.05$ ($r = 0.2161$). This shows that there is a relationship between differentiation strategy and MkIS. Thus hypothesis 4 is also supported.

The results in Table 6 also show that the most important strategy adopted by Malaysian firms was the cost leadership strategy. This strategy was considered to be most important when adopting each of strategic information systems: AIS, MkIS, FIS, MIS, and GIS. The differentiation strategy and focus strategy were considered less important relative to the cost strategy. This is not unusual as the nature of the Malaysian firms seemed to focus on short-term orientation, and the cost strategy is central to that type of organisational strategy.

This finding is consistent with the findings by Atkins (1994) and Chan (1997). Atkins found the differences in the strategic approach of IS/IT when these firms pursued different business strategies. The present findings also showed that linking or aligning business and IS/IT strategies remains a major challenge for many businesses. According to Atkins (1994) most businesses tend to concentrate on AIS and FIS when they pursue the cost leadership strategy in their organizations. This is not unusual as the strategic moves towards cost leadership require firms to focus on controlling the costs at the operations level and also maintain a low cost strategy so that they could remain to be competitive. The AIS was also considered to be quite important

TABLE 6. Characteristics of the three business strategies derived from cluster analysis[a]

Variables[a]	Business Strategies[b]			Duncan Multiple Range Tests			
	1. Focus	2. Cost Leadership	3. Differentiation	1-2	1-3	2-3	$F^{[c]}$
Accounting Information System	1.7652**	3.9000**	2.1227**	*	n.s	*	26.5625
	(0.5776)	(1.6100)	(0.7355)				
Marketing Information System	3.2708	3.9250	3.4063	n.s	n.s	n.s	0.9921
	(1.1838)	(1.4769)	(1.3536)				
Financial Information System	2.2407**	4.0333**	2.6917**	*	n.s	*	9.9303
	(1.1030)	(1.4862)	(1.0497)				
Management Information System	2.3472**	3.9000**	2.8750**	*	*	*	10.4602
	(0.8394)	(1.1914)	(1.0190)				
General Information System	2.2222**	4.4333**	2.7750**	*	*	*	24.0123
	(0.7601)	(0.9565)	(0.9853)				
Number of cases[d]	36	10	40				

Note:

a. means are reported; standard deviations are in parentheses.

b. Difference between total sample mean and mean in each cell tested using t-tests.

c. Values are derived from ANOVA analysis.

d. n = 86

* $p < 0.05$, t-test

** $p < 0.01$, t-test

for firms pursuing the differentiation or focus strategy. In pursuing the cost strategy, the MIS appeared to be relatively important than the other types of IS. The third most important type of information system is the MkIS. In the focus and differentiation strategy, GIS and FIS appeared to be relatively more important for the firms pursuing these strategies than the cost strategy.

In this study, the AIS was perceived as the most important type of IS required in the organization, and the least important strategic information system is the MkIS. This is due to the reason that the three generic strategies are actually a part of the marketing strategy and the accounting area is the most critical area in managing a business enterprise.

CONCLUSION

The findings of this study have shown that there is a relationship between the strategic information system and the business strategies pursued by the firms in Malaysia. It was also clear that for certain type of business strategy, certain type of strategic information system is considered more important than the other type of IS. The greater importance attached to the AIS and the FIS are not unreasonable as the information in those IS were generally used to determine the organisations' performances. The greater emphasis on the cost strategy also suggests the type of strategic behaviour of Malaysian firms in managing their businesses. One potential implication of this finding is that the IS is important to organizations and the adoption of certain types of generic strategies would not preclude firms from not adopting the accounting or financial information system. The lesser importance attached to the MIS, MkIS, and GIS also suggest the primary emphasis of firms in lesser turbulent environments. Further, the 'fire fighting' method of managing firms by typical Malaysian managers also adds to the lesser emphasis on other types of IS.

The findings also suggest that the selection of business strategies is contingent upon the type of strategic information system adopted. For example, in adopting the focus or differentiation strategy, the general information system was perceived to be of higher importance relative to the marketing information system. This is attributed to the fact that the general information system provided a more comprehensive information base than the marketing information system. As such the selection of generic business strategies has to be made with care or caution.

The findings also imply that a typology of the business strategy and IS type could be developed. The generic strategy may be viewed in terms of cost or differentiation strategies, while the IS may be defined in terms if specific or GIS. Based on this framework, a framework for developing appropriate informational strategy for the organization may be identified.

For example, when the information system developed is general in nature, the GIS is appropriate when the firm is pursuing the cost or differentiation strategy. However, when the strategy pursued is cost, and the type of information system required is specific, then, accounting or financial information systems need to be used. In the differentiation strategy, the MkIS needs to be emphasized.

Further research is also needed to enhance the generalisability of these findings. Research should be conducted to determine the influence of industry type, firm sizes, and performance of firms on the relationship between business strategy and strategic information systems.

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