Relationships Between Business Strategy, Environment And Controls:
A Three Country Study

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Abstract

This paper reports the results of a study on the relationships among business strategy, environment, and control system attributes in three countries, namely, Australia, Singapore and Malaysia. Multiple discriminant analysis revealed significant relationships between business strategy and selected environmental and control system attributes. While the discriminant functions derived could be used to classify firms into strategy types, several of the environmental and control system attributes differed by national contexts. Limitations of the research and areas for further research are discussed.

1. Introduction

A consequence of globalization is the increased intensity of competition among businesses operating in both domestic and world markets. Strategic and competitive innovations in any country are detected quickly and imitated by businesses in other countries, forcing business firms to pay attention to issues of strategy and competitiveness. This has motivated a renewed interest in the strategic integration of internal processes and resources to improve a firm's competitiveness and performance. In the strategic management literature, considerable attention has been focused on issues such as acquiring favourable competitive positions or postures in an industry environment (Porter, 1980; 1985), achieving a proper adjustment (or fit) between business strategy and the environ-

ment (Venkatraman,1984; Hrebiniak and Joyce, 1985), capitalizing on a firm's resources and competencies (Prahalad and Hamel, 1990; Wenerfelt, 1984), and achieving competitiveness through reinventing industry and regenerating strategy (Hamel and Prahalad, 1990). Even in the field of accounting, management accounting techniques and practices are being refocused to match the new competitive environment and to seek and maintain competitive advantage. Since the pioneering work of Johnson and Kaplan (1987) there has been increasing acceptance of integrating the strategic dimension into management accounting practices and research.

However, research at the interface between strategy and accounting is still relatively scanty. Empirical evidence of their relationships is limited, fragmentary and somewhat conflicting (Dent, 1990; Simons, 1987). Dent suggested

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further research on the relationships between organizational strategies and control systems, the connection between strategic decision making and control systems, and the role of control systems in strategic management. This study will address the first area. In addition, the few empirical studies focusing on the relationships between strategy and controls were confined to the North American context, rather than cross-national or cross-cultural. The nature of the strategy-control relationships may vary with national or cultural contexts. Since cross-national effects have been neglected in the strategy-accounting interfaces, the present research attempts to address this gap. In particular, this paper reports on the empirical results of the interrelationships among strategy, environment and control system attributes in three countries, namely, Australia (representing an advanced country), Singapore (representing a newly industrializing country) and Malaysia (representing a fast developing country). This study thus provides further empirical evidence supplementing the extant literature from a cross-national perspective. A brief review of past research is presented, followed by discussions of the research methodology and results.

2. Literature Review

Miles and Snow Strategic Orientations

Considerable empirical research attention has been paid to the relationship between environment and strategy using different strategic orientations and operationalizations of environment (Porter, 1980; Mintzberg and McHugh, 1985; Miller and Friesen, 1984). While different strategic types or taxonomies have been applied in empirical research, the Miles and Snow (1988) categorization is one of the most widely used and empirically tested in both management and accounting research. The Miles and Snow typology provides a rich description of four strategic orientations: Prospectors, Defenders, Analyzers, and Reactors. Prospector firms constantly seek new market opportunities and compete largely through new product-market inno-

vations. Monitoring of external environment and organizational flexibility is emphasized to ensure quick responses to market changes. Hence planning in Prospector firms tends to be broad and organizational structures decentralized. Defender firms, at the other end of the strategic spectrum, operate in relatively stable market domains and compete mainly on the basis of price, quality and service. Tight control and cost efficiencies are their focus. Consequently planning is more intensive while structures are more formalized and centralized.

Analyzer firms, being hybrids, combine the characteristics of both Prospectors and Defenders. They operate in stable product-markets as well as selectively entering new markets. Production and cost efficiencies are emphasized in established businesses, while innovations are selectively adopted in newer markets. Consequently Analyzers are organizationally more complex, combining both centralization and decentralization characteristics. Reactor firms are characterized by the absence of a consistent strategy and are usually viewed as unstable and non-viable.

Miles and Snow (1988) postulated that while Defenders operate in more stable environments and Prospectors in more dynamic ones, the strategies of Defender, Prospector and Analyzer should perform equally well in most environments if properly implemented, and internal structures are consistent. The empirical support for this has been mixed. While studies such as Smith, Guthrie and Chen (1986) and Conant, Mokwa and Varadarajan (1990) provided support, others produced different and conflicting findings. For example, Ramaswamy, Thomas and Litschert (1994) reported that Defenders perform better than Prospectors in a regulated (airline)environment. Hambrick (1983) found that Prospectors outperform Defenders in industries that are innovative and dynamic. Similar findings were reported by Zajac and Shortell (1989) and Simons (1987). Zajac and Shortell concluded that Defenders perform poorly relative to Analyzers and Prospectors in a dynamic

(hospital) environment. Simons (1987) in his study focusing on strategy and control found a positive correlation between performance and industry dynamism for Prospectors and negative correlation for Defenders. However Simons studied only one dimension of environment, which is dynamism, in his research. Other dimensions such as hostility and heterogeneity were not investigated. This study will include these environmental variables, and also explore the impact of different national contexts.

Strategy and Control System Attributes

Empirical research on the strategy and control interface is a recent one. The relationship between strategy and control is not well developed, nor is there a large body of knowledge about the effects of strategy on management control systems (Simons, 1987, 1990). In the Miles and Snow typology, a link between strategy and control is posited. A Defender strategy operating in a product-market domain focusing on cost efficiency requires a sophisticated control system that relies heavily on formal accounting procedures, cost control and trend monitoring. In contrast, a Prospector strategy of constantly searching for and exploiting new market opportunities requires flexible and innovative structures which would de-emphasize accounting controls. The Analyzer strategy operating in both stable and changing domains would combine attributes of Defenders and Prospectors.

The few studies that empirically investigated the relationships between strategy and control systems found differences in control systems among firms adopting different types of strategy (Miller and Friesen, 1982; Govindarajan and Gupta, 1985; Simons, 1987). Simons (1987) was among the first to investigate the relationships of strategy and control system attributes from an accounting perspective. However not all the results of the above studies were consistent, or were as hypothesized. In the Miller and Friesen (1982) study, control and innovation were positively correlated for conservative firms (or "Defenders" using Miles and Snow terminol-

ogy) and, conversely, for entrepreneurial firms (or "Prospectors"). This finding seems to be at variance with Miles and Snow's contention that Prospectors tend to de-emphasize control systems in order to innovate, while Defenders focus on cost control and not on innovations. Govindarajan and Gupta (1985) found positive links between subjective approaches to bonus remuneration (one aspect of management control) and effective "build" strategy, and concluded that strategy is a contingent variable for the design of control system. Simons (1987) offered preliminary evidence suggesting a relationship between accounting control systems, business strategy and performance. He reported that effective Prospectors use their financial control systems more intensively than Defenders, with tighter budget goals and more frequent reporting, and placing more emphasis on forecasts and monitoring output than on cost controls. On the other hand, Defenders (particularly large firms) use their control systems less intensively than Prospectors. Defenders emphasized bonus remuneration based on the achievement of budget targets and had little change to their control systems. No significant relationship between cost control and performance was found for Defenders - a surprising finding considering that Defenders are required to focus on cost control to maintain their strategic advantage.

A number of explanations were offered to explain the apparent contradiction between Simons' findings and Miles and Snow's proposition that Prospectors place lesser reliance on control vis-à-vis Defenders (Dent, 1990). Prospectors might rely on their control systems to constrain innovative excesses and risk taking by divisional managers within acceptable limits. Moreover, the greater environmental changes and uncertainty faced by these firms might call for more frequent performance monitoring to facilitate organizational learning and responses. In addition, the wider scope of Prospector activities in different markets might encourage the greater use of financial controls as a common denominator of management. As for Defenders, which usually exhibit greater stability, cost control im-

posed through rigorous budgetary systems may be inefficient. Besides, as Kaplan (1983) pointed out, efficiency in production may better be promoted through direct investment in physical systems and the monitoring of quality and inventory levels instead of relying on existing accounting control procedures.

In addition, the authors of this paper are of the opinion that the inconsistency in research findings between Miles and Snow, and Simons could also be attributed to the different conceptualizations of control used. Miles and Snow as organizational researchers take a broad view of organizational control as essentially "the prevention and correction of deviation from plan" (p.44). On the other hand, Simons' emphasis was on formalized accounting control systems and procedures which are reflected in his control system attributes listed in Table 1, such as tight budgetary measures and goals, cost controls, and reporting frequency. These differences in conceptualization and operationalization of the control variables could have influenced the empirical outcomes. It is plausible that Prospectors utilizing more flexible over-arching organizational controls (as defined by Miles and Snow) can still use their accounting controls (Simons' operationalization) more intensely to monitor product-market initiatives and to keep checks on innovative excesses. In subsequent papers Simons (1990, 1994) indicated that how managers use control systems may be a key element in competitive strategy.

On the basis of the above review, the empirical evidence on the relationship between Miles and Snow strategy types and control systems and environmental characteristics was mixed and inconclusive.

National and Cultural Contexts

The above empirical studies on strategy and control were confined to the North American context. Differences in national contexts might have an impact on the interrelationship among strategy, environment and control system attrib-utes. Huo and Mckinley (1992) highlighted the importance of the national context for strategic management, and how national characteristics might affect business strategies. Douglas and Rhee (1989), Ali, Abdulrahman and Camp (1992) and Porter (1990) also examined the different competitive strategies of firms located in different countries.

Recently there has been increasing interest in how national culture affects strategy and control system attributes. Schneider (1989) argued that national culture (defined as system of shared assumptions/values of a nation as a whole) could affect the process of strategy formulation, particularly in scanning, selecting, interpreting, validating information and establishing priorities. Differences in national cultures were also likely to result in different interpretations and responses to the same strategic issue (Schneider and Meyer, 1991). Since Ouchi (1979) highlighted the role of culture in control, some empirical attention has focused on this issue on a cross-cultural basis, particularly between American and Japanese contexts. Hofstede (1991) posited that accounting systems and the way they are used will vary along national cultural lines and pointed to the lack of research in this area.

Birnberg and Snodgrass (1988) in their exploratory study of twenty-two firms in the U. S. and Japan found evidence that culture (using different cultural characteristics) affects the nature of formal control systems. They concluded that Japanese firms (with a more homogeneous and co-operative culture) placed less emphasis on enforcing management wishes and had fewer bureaucratic procedures than American firms. Japanese firms were also able to spend less on control-related activities than their counterparts in the United States. In the U. S., a significant proportion of the resources and effort embodied in the accounting information and control system was directed at achieving behavioral congruence through bureaucratic rules and incentive systems - features not necessary in a homogeneous culture with positive work attitudes.

While Daley et al. (1985) compared attitudes toward financial control systems in the United States and Japanese firms, Ueno and Sekaran (1992) examined the influence of culture on budget control practices in terms of two cultural dimensions, individualism-collectivism and uncertainty avoidance. These were two of the four dimensions originally developed by Hofstede (1980). Ueno and Sekaran (1992) found that the United States culture (high on individualism) predisposed the U. S. companies to use more communication and coordination, build more slack in the budget and resort to short term performance evaluation, more than Japanese companies. An interesting finding was that Japanese companies, which were high on uncertainty avoidance, were not significantly higher on long-term planning than the U. S. companies - a result contradictory to Daley et al. (1985). The inconsistency in findings was attributed largely to differences in methodology and sampling used. They concluded that the individualism-collectivism dimension was a good predictor of budget planning practices and processes in the two countries. Daniel and Reitsperger (1991) provided empirical evidence to support the argument that Japanese companies, following a zero defect quality strategy, had modified their management control systems to encourage continuous quality improvements that were the key to this strategy.

Harrison (1994) examined the cross-national generalizability of participation's effect on the relation between budget emphasis in superior evaluative style and subordinates' job related attitudes using Singapore and Australia as proxy nations. He found support for the cross-cultural transferability of the design characteristics of management accounting systems. However, his study is limited to one component of the management control system. In their study of a sample of matched firms in the U. S. and Taiwan, Merchant, Chow and Wu (1995) found a weak link between dimensions of national culture and firms' measurement, evaluation and reward practices. Other variables (e.g., education and experience, type of business, company's stage of economic development and labor force mobility) were more important than national culture in explaining differences and similarities in control practices in the two countries. However, the study was constrained by very small sample size (only four firms), the use of multinational firms which has the potential for diluting cultural effects, and data accessibility in the Taiwanese firms. Chow, Kato and Fields (1994) in their experimental study of Japanese and American MBA students found some differences existed between Japanese and American self selection of (or preferences for) management system component However, many of the observed differences were not consistent with predictions based on Hofstede's (1991; 1980) model. The authors called for further research on the complex relationships between control preferences and culture.

However, these studies examined cultural dimensions and control attributes only. The study by Chow, Shields and Chan (1991) included performance as a variable and found that cultural individualism and management control system had significant independent, but not interactive, effects on performance. In terms of controls, performance increased as the fit between pay and work flow interdependence increased. The impact of individualism orientation was mixed. For example, when pay was interdependent among workers, the low individualism subjects out-performed the high individualism subjects. However, the high individualism subjects did not out-perform the low individualism subjects under either independent work flow or pay. Based on an experimental research design undertaken on university undergraduates in the U. S. and Singapore, these findings need to be collaborated by empirical investigations involving field and survey studies. In addition this study only examined only two control system components.

While the trend is toward increased cross-cultural research, particularly emphasizing cross-national comparisons of control system components, there is still a dearth of empirical

literature examining the multivariate relation-
ships of strategy, environment and controls in
different national and/or cultural contexts. This
provided the motivation for our comparative
study. Our study of these interrelationships in
three different national contexts (namely, Aus-
tralia, representing an advanced country; Singa-
pore, representing a newly industrializing coun-
try; and Malaysia, representing a rapidly devel-
oping country) should provide further insights to
the extant literature.

3. Research Methodology

Operationalization of Variables

In this research strategy types were op-
erationalized using the Miles and Snow typology.
This typology has been widely adopted in other
studies (Simons, 1987; McDaniel and Kolari,
1987; James and Hatten, 1994) and would also
facilitate comparability of research findings. In
addition, empirical validity of this typology has
been reported in various studies (Shortell and
Zajac, 1990; Hambrick, 1983). In particular,
perceptual self-typing of strategic orientations as
used in this study has received considerable em-
pirical support for its validity (Shortell and Za-
jac, 1990; Conant et al., 1990; James and Hat-
ten, 1995).

Our study focused on three strategic
categories: Prospectors, Analyzers and Defend-
ers. Reactors which typify a lack of consistent
strategy have been omitted[1]. The Miles and
Snow's typology instrument contained brief de-
scriptions of a firm using a Defender strategy de-
scribed only as Type 1, one using a Prospector
strategy described as Type 2, and one using an
Analayzer strategy described as Type 3. Re-
spondents were asked to indicate which of the
descriptions most closely fitted the firm com-
pared to other firms in the industry, or whether
they belonged to none of these categories. No
specific reference to Defenders, Prospectors and
Analyzers was made to avoid any connotation
that one was preferred. The instructions also
explicitly stated that no strategy type is inher-

ently good or bad.

Environment was measured using scales
developed by Khandawalla (1977), Miller and
Friesen (1984) and Miller (1987). The environ-
mental variables used were dynamism, heteroge-
neity and hostility. Dynamism is defined as the
amount of change and unpredictability in the
economic, technical and political dimensions of
the industry environment. It is measured as the
mean of a four-item 7-point Likert-type scale
with verbally anchored end-points. Heterogene-
ity is defined as the diversity (differences) in
competitive tactics across a firm's respective
markets. It is scored on a one-item 7-point
scale. Hostility is defined as the extent and un-
predictability of competitive pressures from key
competitors faced by a firm. It is also measured
as the mean of a three-item 7-point Likert scale.
The overall means of the dynamism and hostility
constructs were computed and tested for reliabil-
ity using Cronbach alpha.

Ten control system variables, which are
related to accounting and control attributes, were
derived by Simons (1987) using factor analysis
of an original set of thirty-three anchored 7-point
Likert-type scales. These control system vari-
ables were adopted for the research and a brief
explanation is provided in Table 1.

Research Sample

The research was carried out in Austra-
lia, Singapore and Malaysia, representing a de-
veloped country, a newly industrializing country
and a rapidly developing country, respectively.
In each country, a sample of manufacturing
firms was drawn from a diverse group of indus-
tries using a 4-digit standard industry classifica-
tion code. Data were collected using mail ques-
tionnaires, supplemented by pre-questionnaire
and follow-up interviews by the researchers.
The questionnaire was addressed to the Chief
Executive Officer (CEO) of each firm to be
completed either by the CEO, or by someone in
a senior management position who was familiar
with the research issues investigated in this

Table 1
Control Systems Variables

Control System Variables	Explanation
Tight budget goals (F1)	Extent to which meeting tight budget targets is emphasized.
External scanning (F2)	Extent to which data on external events are included in control information.
Results monitoring (F3)	Extent to which managers monitor interperiod budget and performance results.
Cost Control (F4)	Extent to which cost analysis techniques and controls are used.
Forecast data (F5)	Extent to which forecast data included in control reports.
Goals related to output (F6)	Knowledge and importance of factors related to effectivensss product output.
Reporting frequency (F7)	Frequency of issuing control reports.
Formula-based bonus (F8)	Extent to which bonus remuneration is established remuneration by formula based on achieving budget targets rather than discretionary.
Tailored control systems (F9)	Extent to which control systems are tailored to departmental circumstances and needs.
Control system changeability (F10)	Frequency of change in control systems and importance of employing informal communications to transmit control information.

study. The response rates in the three countries ranged from 27% to 33%. The total usable responses were: Australia, 77; Malaysia, 96; and Singapore, 69. No significant non-response bias was found in any of the three country samples.

Statistical Analysis

In order to identify the profile of environmental and control system variables that best explain the categorization/classification of firms by strategic types in each of the three countries, a stepwise multiple discriminant analysis (MDA) was used (Klecka, 1980). MDA will find the relationships of the independent variables and derive a linear combination of these variables that will maximally distinguish among members of the three strategy groups. The resulting discriminant function can be used to classify or predict firms into the three strategy types.

To develop and test the discriminant function, the sample (in each country) was split into two sub-samples on a random basis, using a SPSS discriminant analysis program. One sub-sample (the analysis sub-sample) was used to generate the discriminant function, while the other sub-sample (the hold-out sub-sample) was used to test the predictive ability of the discriminant model. A stepwise procedure, utilizing the criteria of minimization of Wilk's lambda for variable selection, was used to select the set of significant discriminating variables for the discriminant function (Klecka, 1980).

Preliminary analyses showed that the assumptions underlying MDA applications were being met. Firstly, inspection of the data showed that normality could be assumed. However, discriminant analysis is not particularly sensitive to minor violations of the normality assumption (Klecka, 1980). In addition, the split sample method does not assume normality (Pinches, 1980). Before applying MDA, MANOVA was used to check group means and homogeneity of variances. MANOVA tests using Pillai's Trace, Wilk's lambda and Hotelling's Trace for each of the three national data set showed significant group differences and interaction effects, which would lend to discriminant analysis(Morrison, 1990). The MANOVA output also yielded Bartlett-Box F and Cochrans C tests of univariate homogeneity of variance tests. These were found to be not significant in the three data set, indicating that the variances could be assumed as equal. In addition, preliminary Box's M tests of the equality of variance-covariance matrices were conducted and found to be not significant in the three data sets[2], indicating that the variance-covariance matrices were also equal across the three strategic groups. This satisfied the assumption of homogeneous variance-covariance matrices and paved the way for MDA to be conducted for each of the three national samples.

4. Results And Discussion

A preliminary analysis of the Australian, Malaysian and Singaporean data was carried out to reveal any significant differences by country contexts before proceeding to examine their respective discriminant functions. Significant country differences were found from MANOVA and ANOVA tests. The independent variables were analyzed using ANOVA and Duncan multiple range tests. Table 2 shows the ANOVA and Duncan multiple range test results for the variables by countries. In terms of environmental variables, only dynamism was significantly different, with the Australian environment rated as more dynamic than the other two Asian countries. This plus the higher rating for heterogeneity and hostility indicated that Australia was perceived to be undergoing rapid changes as a result of recession, deregulation and restructuring processes.

In terms of control system attributes, significant country differences were found for F1 (tight budget goals), F3 (results monitoring), F4 (cost control), F8 (formula-based bonus remuneration) and F10 (control system changeability), with the Australian firms scoring highest on these variables. Hence Australian firms have the tightest budget goals, and the highest emphasis on results monitoring, cost control, formula-based bonus remuneration and control system changeability - which appear logical given the greater environmental dynamism.

While ANOVA did not reveal any significant country differences for F2 (external scanning), significant differences between Malaysia and Singapore were indicated by the Duncan multiple range tests. In addition, there were significant differences between Malaysia and Singapore in terms of F4 (cost control) and F8 (formula based bonus remuneration). Differences in other variables by countries were not significant. This provides the background for the comparative analysis of the discriminant functions of the three countries. Our focus here is to examine the interrelationships of strategy by control and environmental characteristics in the three countries using multiple discriminant analysis.

Table 2
Results Of Anova And Duncan Multiple Range Tests By Countries

Variable	Malaysia	S'pore	Australia	F-value	p
Dynamism	17.833[a]	16.913[a]	19.740	11.143	0.000
	(4.113)	(3.399)	(3.496)		
Heterogeneity	4.708	4.623	4.753	0.157	0.855
	(1.399)	(1.373)	(1.479)		
Hostility	13.188	13.449	14.104	1.732	0.179
	(3.669)	(2.800)	(3.114)		
F1	27.427[a]	26.522[a]	28.714	5.154	0.006
	(4.078)	(4.458)	(3.990)		
F2	13.375[b]	11.913	12.649	2.762	0.065
	(4.003)	(3.748)	(4.077)		
F3	16.656	16.246[c]	17.597	3.597	0.029
	(3.135)	(3.183)	(3.163)		
F4	15.781[d]	14.159	16.532[d]	7.806	0.001
	(3.625)	(4.337)	(3.102)		
F5	4.250	4.014	4.247	0.372	0.689
	(1.830)	(1.867)	(2.027)		
F6	10.531	9.739	10.403	1.978	0.141
	(2.357)	(2.704)	(2.871)		
F7	4.427	4.710	4.688	0.874	0.419
	(1.697)	(1.724)	(1.206)		
F8	8.958[d]	8.058	9.091[d]	3.692	0.026
	(2.308)	(2.357)	(2.834)		
F9	8.479	8.145	8.974	2.089	0.126
	(2.550)	(2.481)	(2.378)		
F10	9.771[a]	9.565	11.260	8.862	0.000
	(3.038)	(2.867)	(2.124)		

Note: Scores are mean scores, standard deviations are in parentheses. a = Malaysia & Singapore significantly differ from Australia at $p < .05$; b = Malaysia significantly differ from Singapore at $p < .05$; c = Singapore significantly differ from Australia at $p < .05$; d = Malaysia & Australia significantly differ from Singapore at $p < .05$.

Multiple discriminant analysis showed that firms in the three strategy groups can be classified in terms of environment and control system attributes in the three countries studied. The significant results of stepwise MDA are summarized in Table 3. The discriminant function in each of the three countries was highly significant ($p < 0.0000$) and explained 89%, 94% and 100% of the common variance in the Malaysian, Singaporean, and Australian samples, re-spectively. The canonical correlations indicate the strength of the relationship of the discriminating variables in the function and the predictive value. In addition, the square of the coefficient indicates the percentage of variance associated with group membership identified by the discriminating variables. The figures ranged from 70.7% for Malaysia to 75.3% for Singapore, and 81.9% for Australia.

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The multiple discriminanat functions in the three samples indicated that there were significant relationships between strategy types (using the Miles and Snow typology) and environmental characteristics and control system attributes in the three national samples.   Hence the discriminant analysis model of environmental and control variables can be used to classify firms into their strategy groups in each of the three countries.   Group centroids of the three strategy groups from the discriminant analysis are reported in Table 3 and are consistent across the three countries.

The data were further analyzed to determine the relative importance or contribution of the independent variables in discriminating among strategy types. The size of standardized discriminant function coefficients (in Table 4) would normally indicate the discriminant weights of the respective variables. However, the existence of some multicollinearity in the data could affect the discriminant weights derived from the analysis.   Consequently a more meaningful interpretation of the discriminant function was based on the structure coefficients since these coefficients would not be affected by relationships with other variables (Klecka, 1980). The

structure coefficients are simple bivariate correlations between the discriminant function and each discriminating variable, and they can be used to determine the relative contribution/importance of the individual variables.

These results for the three countries are given in Table 4. In the Singaporean and Malaysian samples, the control changeability factor loaded most heavily in their respective discriminant functions, while dynamism was the most significant discriminator in Australia. This difference could be attributed to the impact of the recession and market changes in the Australian market, as explained earlier. In terms of environmental variables, all three variables (dynamism, hostility and heterogeneity) were significant discriminators in Malaysia and Australia, while only dynamism emerged significant in the Singapore sample. The absence of hostility and heterogeneity in Singapore's discriminant function could be due to the smaller market of Singapore which is more homogeneous and stable. In contrast, the Malaysian market which is also more multicultural is growing rapidly with the entry of new competitors. At the same time, the Australian economy has been experiencing severe recessionary conditions and restructuring,

Table 3
Results Of Stepwise Discriminant Analysis

A. Canonical Discriminant Function	Malaysia	Singapore	Australia
Eigenvalue	2.4310	3.0519	4.5162
% of Variance	89.23	94.01	100.0
Canonical correlation	0.8408	0.8679	0.9048
Wilk's Lambda	0.2269	0.2066	0.1813
Chi-square	51.909	55.190	53.790
Degrees of freedom	14	10	7
Significance	0.0000	0.0000	0.0000
B. Group Centroids			
Defender	-2.3983	-2.5326	-2.5031
Analyzer	0.4891	0.2519	-
Prospector	1.3255	1.7200	1.7067

Table 4
Standardized Canonical Coefficients & Structure Coefficients

A. Malaysian Sample	Standardized Coefficient	Structure Coefficeint
Dynamism	0.5420	0.6092
Hostility	0.4744	0.4437
Heterogeneity	0.0986	0.4378
F1 (Tight budget goals)	0.0695	0.0016
F6 (Goals related to output effectiveness)	-0.3838	-0.0375
F8 (Formula based bonus remuneration)	0.4531	0.0994
F10 (Control system changeability)	0.5805	0.6142
B. Singaporean Sample		
Dynamism	0.3822	0.3314
F3 (Results monitoring)	-1.2705	0.0992
F5 (Forecast data)	0.9739	0.3251
F7 (Reporting frequency)	0.8371	0.3391
F10 (Control system changeability)	0.7929	0.5033
C. Australian Sample		
Dynamism	1.0998	0.5134
Hostility	0.7757	0.3669
Heterogeneity	0.4458	0.2255
F3 (Results monitoring)	-0.4191	0.0700
F7 (Reporting frequency)	-0.6312	0.0525
F9 (Tailored control system)	-0.9923	-0.0054
F10 (Control system changeability)	0.7132	0.1506

making environmental factors more critical in strategy formulation. In the Australian discriminant function, control factors did not load as heavily as environmental factors.

In terms of control system variables, control system changeability (F10) was the most significant discriminant factor in all the three countries. This would seem logical as control systems should be modified to suit strategic needs, as advocated by Johnson and Kaplan (1987) and now supported by empirical evidence (Simons, 1987; Daniel and Reitsperger, 1991). The other control factors which were significant discriminators varied between countries.

In the Malaysian sample, they were F8 (formula based remuneration), F6 (goals related to output effectiveness), and F1 (tight budget goals); in the Singaporean sample, F7 (reporting frequency), F5 (forecast data) and F3 (results monitoring); and in the Australian sample, F3, F7 and F9 (tailored control system). Results monitoring(F3) and Reporting frequency (F7) were significant discriminators in both Australia and Singapore, but not in Malaysia. However, these control variables (with the exception of F5 and F7 in Singapore) generally did not have high structure coefficients.

Overall this analysis indicated that Pros-

pectors faced with a more dynamic, hostile or heterogeneous environment would require greater control system changeability. In other words, the strategy-types are closely related to environmental and control system characteristics. A Prospector strategy firm which operates in a less stable business environment, as it seeks out new market opportunities and engages in innovative production, tends to develop control systems with built-in flexibility and which allows more scope for informal communication. This control system changeability feature must be incorporated in the design of control systems for Prospector strategy firms.

As stated earlier, a random split stepwise procedure was used to test the classification or predictive power of the discriminant model. The classification results of both the analysis and the hold-out sample in the three countries are presented in Table 5. The overall percentages of strategy types correctly classified in the analysis sample and in the hold-out sample, which is used for validation purposes, are high, ranging from 78.85% to 95.45% for the analysis sample and 62.07% to 81.82% for the hold-out samples.

When interpreting the model's classification accuracy, the grouping should contain an equal number of respondents, otherwise, the evaluation should be compared to a proportional chance classification model (Joy and Tellefson, 1975; Pinches, 1980). This involved the use of proportional probabilities of group membership as the prior probabilities. For example, the actual priors from the Malaysian sample of 96 firms consisted of 26.0% Defenders, 36.5% Analyzers, and 37.5% Prospectors. The analysis sub-sample used to derive the discriminant model consisted of 30.8% Defenders, 34.6% Analyzers and 34.6% Prospectors. Based on these data, the proportional chance model correctly classified 33.6% ((.260) (.308) + (.375) (.346) + (.365) (.346)) of the firms in the sample. The overall percentage of strategy types correctly classified in the Malaysian analysis sample (Table 5a) was 78.85%, indicating that the discriminant model was significantly more

accurate than the corresponding chance model. When compared to a corresponding proportional chance model, the discriminant models derived were significantly more accurate in the analysis and hold-out samples in the three countries[3]. It is also interesting to note from the diagonal percentages in Table 5 that the discriminant model was more successful in classifying Prospectors and Defenders than in classifying Analyzers. This might be expected as Prospectors and Defenders occupied the opposite ends of the strategy spectrum, and can be more easily identified.

Hence the results showed that strategy groups can be discriminated or differentiated on the basis of selected environmental and control system characteristics using a multiple discriminant analysis model in the three different national settings. The results across the three countries were consistent.

5. Conclusion

The analysis in this paper indicated that control system attributes and environmental characteristics were significantly related to strategy types using the Miles and Snow typology of Defender, Prospector and Analyzer. Based on the results in the three different countries, a multiple discriminant model of selected environmental and control system characteristics was developed to classify and predict firms by strategy types. Among the three countries, common significant discriminators were dynamism and control system changeability. Other significant discriminators varied by country. The absence of hostility and heterogeneity in the Singapore discriminant function reflects the relatively small and stable Singapore market. The other control variables in each of the country's discriminant function, though significant, have only minor or moderate contribution in distinguishing among strategy types and reflected the national differences in the three countries. This suggests that national contexts do have an impact on the discriminant functions. While our emphasis in this study is on developing the multivariate functions which can classify strategy types in the three

Table 5
Classification Results Of Discriminant Analysis

ACTUAL GROUPS	No. of Cases	Predicted Group Membership		
		Defender	Prospector	Analyzer
A. Malaysian Sample				
1. Analysis Sample				
Defender	16	13 / 81.2%	0 / 0.0	3 / 18.8%
Prospector	18	0 / 0.0%	15 / 83.3%	3 / 16.7%
Analyzer	18	0 / 0.0%	5 / 27.8%	13 / 72.2%
Percentage of Grouped Cases correctly classified: **78.85%**				
2. Hold-out Sample				
Defender	9	7 / 77.8%	2 / 22.2%	0 / 0.0%
Prospector	18	0 / 0.0%	15 / 83.3%	3 / 16.7%
Analyzer	17	0 / 0.0%	10 / 58.8%	7 / 41.2%
Percentage of Grouped Cases correctly classified; **65.91%**				
B. Singapore Sample				
1. Analysis Sample				
Defender	11	11 / 100.0%	0 / 0.0%	0 / 0.0%
Prospector	14	0 / 0.0%	11 / 78.6%	3 / 21.4%
Analyzer	15	2 / 13.3%	2 / 13.3%	11 / 73.3%
Percentage of Grouped Cases correctly classified; **82.50%**				
2. Hold-out Sample				
Defender	9	6 / 66.7%	0 / 0.0%	3 / 33.3%
Prospector	12	1 / 8.3%	9 / 75.0%	2 / 16.7%
Analyzer	8	1 / 12.5%	4 / 50.0%	3 / 37.5%
Percentage of Grouped Cases correctly classified: **62.07%**				
C. Australian Sample				
1. Analysis Sample				
Defender	15	15 / 100.0%	0 / 0.0%	-
Prospector	29	2 / 6.9%	27 / 93.1%	-
Percentage of Grouped Cases correctly classified: **95.45%**				
1. Hold-out Sample				
Defender	7	6 / 85.7%	1 / 14.3%	-
Prospector	26	5 / 19.2%	21 / 80.8%	-
Percentage of Grouped Cases correctly classified: **81.82%**				

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countries, it also teased out some of the national differences for future study. Further research is required to examine the impact of specific national or cultural factors on the relationships among strategy, control and performance.

The findings also have managerial implications for firms. In developing their strategies, firms should be aware of the close relationship between strategy -types on the one hand and control system attributes and environmental characteristics on the other. In particular, a dynamic environment and the need for control system changeability are most significantly related to a Prospector type strategy, and this is the case with Prospector firms across the three countries. This is not to say that there have been no other strategy-environment-control relationships discovered. The findings of this study showed that, while some such relationships exist, they do not apply equally across the three countries. This suggests that national differences do have an impact on the strategy-environment-control relationship and should be taken into consideration in managerial decisions.

6. Suggestions For Future Research

The results here should be treated as tentative because of the sample size. While perceptual self-typing was used to categorize firms into strategic types, ideally researchers should employ this method in conjunction with archival data to arrive at a more complete description of strategy types (Shortell and Zajac, 1990). The use of Simons' ten control factors could have contributed to these limitations. It may have been more beneficial to use the original questions from the Simon's study to arrive at control system attributes which might be more reflective of the national setting. In addition, future research should structure in specific national contextual measures or cultural dimensions to investigate their impacts on the interrelationships among strategy, controls and performance. Longitudinal research focusing on changes in strategic orientation over time in different national or cultural contexts would provide a more dynamic and comprehensive framework of analysis. 📖

7. Endnotes

1. In the Australian sample, which was the initial exploratory study, Analyzer was not included in the Questionnaire as a strategy category. It was included in the subsequent surveys to provide a richer categorization of strategy types.
2. The Box's M results were: Australia, 39.045, $p < 0.364$; Malaysia, 86.924, $p < 0.2642$, and Singapore, 32.831, $p < 0.669$.
   None were not significant, indicating variance-covariance matrices were equal.
3. The proportional chance model calculated were: Malaysia: hold-out sample = 34.8%; Australia: analysis sample = 56.8%; hold-out sample = 62.3%; and Singapore: analysis sample = 33.7%; hold-out sample = 33.8%.

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