

Environmental Scanning and Strategic Decisions in Multinational Corporations

Raman Muralidharan, Indiana University South Bend

ABSTRACT: This paper reports on an empirical study of the strategic decision consequences associated with environmental scanning by MNCs at the HQ-FS level. The study focuses on decisions that relate to strategic change. After a review of theoretical arguments that relate environmental scanning with strategic change, hypotheses are developed and tested. Results are discussed in light of relevant works in the area, and implications for international management research and practice are noted.

INTRODUCTION

Gathering environmental information—otherwise known as environmental scanning—is a critical element of strategic decision making (Aguilar, 1967; Simon, 1993). Since multinational corporations (MNCs) operate across a multitude of country environments, environmental scanning gains increased significance in MNCs (Mascarenhas, 1982; Kogut, 1984; Ghoshal and Kim, 1986; Buckley and Casson, 1998). Reflecting this importance, earlier studies have examined various aspects of environmental scanning in MNCs (for a recent and detailed review of this literature, see Muralidharan,

1999). While most research on the topic has been at the MNC level of analysis—which focuses on the management of the overall MNC—in a recent paper, Muralidharan (1999) reported on a study of environmental scanning at the headquarters-foreign subsidiary (HQ-FS) level—which focuses on the HQ's management of particular foreign subsidiaries.

While Muralidharan (1999) examined the existence of, and factors influencing, environmental scanning at the HQ-FS level, this paper reports on the strategic decision consequences of environmental scanning at the HQ-FS level. The connection between strategic decisions and scanning at the

Dr. Raman Muralidharan is an Assistant Professor of Management in the School of Business and Economics at Indiana University South Bend. His research interests include the strategic management of national and multinational corporations as well as the public policy implications of international business activity. Email: rmuralid@iusb.edu

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HQ-FS level is important because the survival and growth of foreign subsidiaries depend on the MNC HQs making appropriate decisions in response to changes in the foreign subsidiary environments. In particular, the entrepreneurial as well as loss prevention decisions that MNCs make in response to opportunities and threats in the foreign subsidiary environments are critical to protect and enhance the value of their investments in foreign subsidiaries (Chandler, 1992).

Also, to exploit arbitrage opportunities in product, financial, and other resource markets that may exist across various country operations, MNC HQs have to make strategic decisions based on information gleaned from scanning the foreign subsidiary environments (Kogut, 1984, 1985; Kogut and Kulatilaka, 1994; Buckley and Casson, 1998; Rangan, 1998). Despite its importance, the connection between environmental scanning and strategic decisions at the HQ-FS level has not been systematically studied before. By empirically examining this connection, this study seeks to address the gap in the literature.

In addition, this study seeks to make another important contribution. The decision consequences of environmental scanning examined in this paper relate to strategic changes. This is the first study, to the author's knowledge, that examines the link between environmental scanning and strategic changes within MNCs. Many authors have argued that the ability to change strategy, in the form

of shifts in product flows for example, in response to changes in demand and supply conditions in country markets is one of the most distinct advantages that MNCs possess over uninalational corporations (Kogut, 1984, 1989; Kogut and Kulatilaka, 1994). In a recent work, Buckley & Casson (1998) have suggested that the ability to make such strategic shifts should be considered as a central feature in developing theories of MNCs. Thus, strategic changes such as shifts in product flows, as well as changes in administrative systems required to support such shifts in strategy, are important aspects in the study of MNCs. By focusing on the link between environmental scanning and strategic changes, this paper expects to contribute to this important, yet under investigated, area of study within MNCs.

ENVIRONMENTAL SCANNING AND STRATEGIC CHANGE: THEORY AND HYPOTHESES

Strategic change is defined in the strategic management literature as changes in strategy content as well as changes in important systems that support strategy (Rajagopalan & Spreitzer, 1997). Consistent with this definition, in this study strategic change is defined as change in strategy content as well as change in strategic controls. *Strategy content*, here, refers to the broad courses of action (or strategy) that a firm pursues to achieve its objectives, and *strategic controls* refer to the managerial systems that a firm institutes to guide the implementation of strategy.

It has long been argued that environmental scanning plays an important role in effecting strategic changes. For example Schryogg & Stienman (1987) argued that since strategies are based at least in part on assumptions about the environment, if information becomes available suggesting that these assumptions are invalid, then strategy might have to be changed. By providing the information necessary to validate planning assumptions, environmental scanning plays a critical role in strategic change (Schryogg & Stienman, 1987). In addition, changes in strategy may be necessary to respond to new opportunities or threats that emerge during the implementation of strategy (Ansoff, 1980; Preble, 1992). Environmental scanning plays a role in such strategic change also by providing the information needed to recognize the emergent opportunities and threats in the environment (Preble, 1992). Finally, the design of strategic control systems is influenced by information available to effectively exercise the various types of strategic controls. For example, use of output reports as the basis for exercising strategic control depends on information available to reliably set standards and measure actual outputs, and the use of operating procedures as the basis for exercising control depends on the MNC's knowledge of cause-effect relationships (Eisenhardt, 1985; Ouchi, 1977; Thompson, 1967). Information from the environment can affect the perceived reliability of existing output measures or affect the

firm's understanding of cause-effect relationships and, consequently, call for changes in the strategic control system.

While the need for strategic change in response to invalid assumptions, emerging opportunities and threats, and information affecting strategic control design are important to all firms, some factors unique to the management of foreign operations highlight these needs. First, the literature on MNCs has noted various differences between the home and the host country environments, such as: culture, political system, economic system, and business practices. Because of these differences, MNCs' strategies for their foreign operations are likely to incorporate a higher level of assumptions than their strategies for the domestic market. Second, because of MNCs' ability for, and advantage in, cross-geographic arbitrage, they can be expected to recognize and respond to emerging opportunities and threats more actively. Finally, with respect to strategic control, MNCs have to contend with the effects of factors such as exchange rate fluctuations in addition to other business related factors that affect the reliability of output standards and measures. Also, given the differences between home and host country environments, the scope for information driven changes to MNCs' knowledge of cause-effect relationships in their foreign operations is high.

Whereas all of the factors reviewed above suggest that the likelihood of strategic change

resulting from environmental scanning within MNCs at the HQ-FS level should be high, two reasons have been advanced in the literature suggesting that strategic change in response to environmental shifts are not very likely. The first of these arguments deals with the lack of infrastructure, both to recognize the need for changes and to implement the changes. For example, MNCs may not have active environmental scanning systems, or may lack production capacities in various markets to shift production and take advantage of arbitrage opportunities (Kogut, 1985, 1989). The second argument is that the administrative heritage—or managers' general preference for maintaining existing ways of operating—tends to be strong and usually acts as a barrier to strategic change (Bartlett & Ghoshal, 1989). Given these arguments, it is expected that the likelihood of strategic changes in response to environmental scanning is likely to be neither high nor low, but somewhere in-between (moderate). Hypothesis 1 flows from these arguments.

H1: There is a moderate likelihood that strategic changes may result from environmental scanning.

Shifts in the environment are best perceived when the current environment is seen in relationship to conditions over time. Since frequent scanning provides a more continuous stream of environmental information, firms that scan more frequently are

better equipped to perceive changes in the environment than firms that scan infrequently or on an adhoc basis (Buckley & Casson, 1998). Also, active scanners are more likely to identify environmental changes earlier than firms that scan less frequently (Ansoff, 1980; Buckley & Casson, 1998). The better and earlier recognition of environmental shifts provide frequent scanners with a better ability to recognize the need for strategic change (Buckley & Casson, 1998). Also, the organizational change literature suggests that one way to lower resistance to change is to provide organizational members with information about conditions that call for organizational change in order to make them aware of and proactively shape their perceptions about the need for change (Connor & Lake, 1994). Because of their greater information gathering efforts, frequent scanners are likely to be better positioned to marshal the information necessary to build awareness and perception of the need for change. The above arguments suggest a positive relationship between scanning frequency and the likelihood of strategic changes. Hypothesis 2 states the positive relationship expected between scanning frequency and the likelihood of change in strategy content, while Hypothesis 3 deals with the likelihood of change in strategic control.

H2: There is a positive relationship between scanning frequency and the likelihood of change in strategy content.

As reviewed earlier, information from the environment can directly influence strategic control design. However, since systems such as strategic controls are designed to support the implementation of strategy, much of the literature on strategic management suggests that strategy content is the primary driver of control system design (Fiegener, 1994; Govindarajan & Gupta, 1985; Hill & Jones, 2001; Porter, 1980). Accordingly, while strategic controls are expected to change directly as a result of environmental scanning, they are even more likely to change in response to change in strategy content. Therefore, the relationships between scanning frequency, change in strategy content and change in strategic controls are expected to be as stated in Hypothesis 3.

H3: Likelihood of change in strategic controls is positively related to the likelihood of change in strategy content, more so than to scanning frequency.

THE EMPIRICAL STUDY

The study design involves analyzing data collected from U.S. based MNCs about their foreign subsidiary management practices. In particular, the collected data pertained to the HQ's scanning of foreign subsidiary environments and the associated strategic decision consequences. The data collection protocols (including some characteristics of the collected data) as well as the measures for the relevant constructs are detailed below.

Data

The sample was drawn from U.S. based MNCs listed in the COMPUSTAT data base, with annual sales of at least \$25 million, and with a foreign sales to total sales ratio of at least 15 percent. A total of 619 firms met the criteria. Data was collected through a survey of these firms, and was supplemented with secondary data from COMPUSTAT. Since the unit of analysis for the study was one headquarters-foreign subsidiary combination, each respondent was asked to answer a question pertaining to the overall international operations, and the rest of the questionnaire with respect to any one foreign subsidiary of their choice. Foreign subsidiary was defined in the survey as a foreign country operation in which the MNC owns equity, and whose top official reports to the U.S. headquarters (Muralidharan, 1999). This definition was required to keep the sample relatively homogenous and relevant to the study. For example, the definition helps to exclude foreign operations that report to entities other than the U.S. HQ, such as a regional HQ. Discussions with executives during the development and testing of the survey questionnaire revealed that it was difficult to choose a respondent, because the job titles of managers with the appropriate knowledge to answer the survey differed across firms. Therefore, following the approach used by Kobrin *et al.* (1980), the surveys were mailed to CEOs, along with letters that explained the study and requested that the appropriate officer in the headquarters respond to

the survey. A total of 175 usable responses were received for a response rate of 28.27 percent.

To gain some insight into how the questionnaires were handled at the CEOs office, about 200 of the 619 firms, chosen at random, were called by telephone. These nationwide telephone calls revealed a wealth of information. First, it was clear that the initial contact letter explaining the study was helpful in that the CEOs, in several cases, had directed their staff to forward the questionnaire, on its arrival, to an executive that they had chosen as the appropriate respondent. Second, as suspected, the job titles of the executives picked by the CEOs as having the appropriate information to complete the survey varied widely. Third, the calls helped gain some understanding of why some firms chose not to respond. Many of the firms that had chosen not to respond pointed out that, because of the numerous requests they receive to participate in surveys, they had adopted a general policy of not participating in surveys at all.

Response bias was checked by comparing the responding firms with non-responding firms on their total sales, foreign sales, ratio of foreign sales to total sales, and number of employees. Tests revealed no significant differences in the mean scores between the two groups. Since the choice of foreign subsidiary was left to the respondents and not controlled by research design, it was interesting to examine the choice of foreign subsidiaries for their representativeness of the overall

population of U.S. MNC affiliates around the world. Foreign subsidiaries from 32 countries were represented in the 175 responses. These 32 countries accounted for 80 percent of the population of majority owned non-bank foreign affiliates of non-bank U.S. MNCs reported in the 1994 benchmark surveys. Also, the distribution of foreign subsidiaries within the 32 countries in the 175 responses closely approximates the distribution of foreign affiliates in the population. With respect to the demographic characteristics of responding firms, the average firm size (total sales) was \$2.5 billion and the average ratio of foreign sales to total sales was 37 percent.

Measures

Environmental Scanning/ Scanning Frequency

Headquarters' scanning of the foreign subsidiary environment was measured by asking: "How often during a year does the U.S. headquarters collect information on the following aspects of the chosen foreign subsidiary and the foreign country in which it operates?" Thirteen aspects of the environment were itemized after the question, and the responses were captured on a five point likert scale where 1 was labeled *Not at all*, 2 was labeled *Once a year*, 3 was labeled *Once every quarter*, 4 was labeled *Once a month*, and 5 was labeled *Two or more times a month*. The 13 aspects of the environment were selected from the literature and represent all major sectors of the environment. The 13 items are listed

below and the respective labels used in the analysis are stated within parenthesis.

- Societal attitudes toward foreign companies in the foreign country [Societal Attitudes]
- General demographic trends in the foreign country [Demographic Trends]
- Economic status of the foreign country [Economic Status]
- Government regulations on foreign investments [Regulations]
- Trade pacts involving the foreign country [Trade Pacts]
- Technology development trends in the foreign country [Technology Trends]
- Inflation rate in the foreign country [Inflation]
- Interest rates in the foreign

- country [Interest Rates]
- Prices of raw materials in the foreign country [Raw Material Prices]
- Exchange rates of the foreign country's currency [Exchange Rates]
- Market size of the foreign country [Market Size]
- Competitor actions in the foreign country [Competitor Actions]
- Market response to your products in the foreign country [Market Response]

A factor analysis of the 13-item scale revealed three factors that accounted for 60 percent of the total variance. As shown in Table 1, two variables (market size and economic status) seemed to load on two factors

Table 1 Rotated Component Matrix For The 13 Scanning Variables

Variables	1 [Macro environment scanning]	2 [Financial environment scanning]	3 [Market competitive environment scanning]
Societal attitudes	<u>0.803</u>	-0.018	0.199
Demographic trends	<u>0.734</u>	0.122	0.151
Economic status	0.562	0.411	0.265
Regulations	<u>0.668</u>	0.387	0.122
Trade pacts	<u>0.798</u>	0.268	0.014
Technology trends	<u>0.731</u>	0.087	0.240
Inflation	0.318	<u>0.651</u>	0.231
Interest rates	0.147	<u>0.798</u>	0.032
Raw material prices	0.063	<u>0.581</u>	0.146
Exchange rates	0.107	<u>0.737</u>	0.066
Market size	0.424	0.253	0.565
Competitor actions	0.265	0.156	<u>0.684</u>
Market response	0.058	0.086	<u>0.877</u>

N=164 (after a list wise deletion for missing data).

Underlines signify which variables load on each factor

(had a loading of greater than 0.40 on two factors) and therefore were disregarded for further analysis. The variables loading on the three factors suggest that each factor represents a meaningful segment of the environment. Specifically, the first factor includes variables (societal attitudes, demographic trends, regulations, trade pacts, and technology trends) that represent the general or macro segment, while the second factor includes variables (inflation, interest rates, raw material prices, and exchange rates) that represent the financial segment. The third factor includes variables (competitor actions, market response) that represent the market-competitive segment of the environment. The three-factor solution shows that the MNC HQs vary their scanning behavior across the three environmental segments. To represent scanning by environmental segment for further analysis, three new variables—macro-environment scanning (MS), financial environment scanning (FES), and market-competitive environment scanning (MCS)—were created. This was done by obtaining average scores for the variables that load on each factor. The Cornbach's alphas for the three new variables (MS 0.84, FES 0.69, MCS 0.60) are relatively high.

Likelihood of Strategic Changes

The following question was asked to measure likelihood of strategic changes: "The information obtained with respect to the chosen foreign subsidiary and the country in which it

operates (referred to in the question measuring environmental scanning/scanning frequency) may lead the U.S. headquarters to make certain decisions pertaining to the chosen foreign subsidiary. What is the likelihood that the following decisions will be made?" Eleven strategic decisions were listed and the responses were captured on a five point likert scale where 1=not likely, 2=somewhat likely, 3=likely, 4=very likely, and 5=extremely likely.

The 11 decisions included three pertaining to change in strategy content and eight pertaining to change in various aspects of strategic control. The three items used to measure the likelihood of change in strategy content, and the respective labels used in the analysis, were:

- Change the direction or the volume of product flows between the chosen foreign subsidiary and the other country operations [Change product flows]
- Change investment plans for the subsidiary [Change investment plans]
- Add or eliminate a function performed by the subsidiary (e.g., marketing, production, research & development, export, import) [Change functions performed]

The three items are consistent with our definition of *strategy content* as "the broad courses of action that a firm pursues to achieve its objectives," and were chosen because prior literature has emphasized these three areas as central issues in international strategy.

Porter (1986) for example, argued that strategy in the international environment primarily concerns differentiation (how business functions are divided among the various country operations) and integration (how the differentiated activities are coordinated—including the direction and volume of product flows between country operations). Other writers have also emphasized the centrality of product and other resource flows between country operations, and the division of functions among country operations (Kobrin, 1991; Gupta & Govindarajan, 1991; Ghoshal & Bartlett, 1990). Issues related to investment in foreign markets are widely regarded as essential elements of a firm's international strategy. The question of where to invest and reinvest, for example, has occupied center stage in research on foreign direct investments by MNCs. In addition, decisions related to increasing or decreasing investments in a country market has long-term implications for the performance of both the subsidiary and the MNC and is, therefore, strategic in nature.

The eight items used to measure the likelihood of change in strategic controls, and the respective labels used in the analysis, were:

1. Change the frequency or the number of performance reports required from the subsidiary [Change reporting requirements]
2. Change rules, policies, or procedures that subsidiary managers are expected to follow [Change policies/procedures]
3. Transfer key executives into or out

of the subsidiary [Transfer key executives]

4. Increase or decrease the level of informal communications with the subsidiary managers [Change extent of informal communications]
5. Increase or decrease the dependence on evaluating performance reports from the subsidiary to manage the subsidiary [Change dependence on reporting]
6. Increase or decrease the dependence on establishing rules, policies, or procedures to manage the subsidiary [Change dependence on policies/procedures]
7. Increase or decrease the dependence on staffing key management positions in the subsidiary with headquarters managers to manage the subsidiary [Change dependence on staffing]
8. Increase or decrease the dependence on informal communications with the subsidiary managers to manage the subsidiary [Change dependence on informal communications]

The eight items are consistent with our definition of *strategic controls* as “the managerial systems that a firm institutes to guide the implementation of strategy.” They also represent various strategic control mechanisms that have been mentioned in the literature on control systems within MNCs. For example, the eight items include decisions about control mechanisms that have

been labeled as output control, bureaucratic control, and input control by some researchers (Baliga & Jaeger, 1984; Gupta & Govindarajan, 1991; Muralidharan & Hamilton, 1999), and as direct and indirect controls by others (Phatak, 1989). A factor analysis was performed to confirm whether the 11 items measure the two kinds of strategic decisions: those pertaining to strategy content, and those pertaining to strategic control. Table 2 shows the results of the factor analysis.

The analysis resulted in a three-factor solution accounting for 67.67 percent of the total variance. Two variables (Change dependence on reporting and Change dependence on policies/procedures) appeared to load on two factors (had a loading of greater than 0.40 on two factors) and, therefore, were disregarded for further

analysis. All of the variables measuring the likelihood of change in strategy content loaded on one factor (the second factor) as expected, while the six remaining variables measuring the likelihood of change in strategic controls were split between two factors (the first and the third).

A closer examination of these variables suggests that the four variables loading on the first factor represent change in control mechanisms that have been characterized as indirect controls, and the two variables loading on the third factor represent change in control mechanisms that have been characterized as direct controls (Phatak, 1989). Consequently, the hypotheses involving strategic controls were tested using the two sets of variables—ones measuring the likelihood of change in indirect

Table 2 Rotated Component Matrix For The 11 Strategic Change Variables

Variables	1 [Change in indirect controls]	2 [Change in strategy content]	3 [Change in direct controls]
Change investment plans	.142	<u>.769</u>	.251
Change functions performed	.337	<u>.713</u>	.099
Change product flows	.001	<u>.827</u>	.115
Change reporting requirements	<u>.724</u>	.380	.087
Change policies/procedures	<u>.822</u>	.258	-.015
Change dependence on reporting	.614	.121	.532
Change dependence on policies/procedures	.665	.145	.475
Change extent of informal communication	<u>.744</u>	.027	.224
Change dependence on informal communication	<u>.709</u>	-.003	.380
Change dependence on staffing	.194	.181	<u>.825</u>
Transfer key executives	.170	.207	<u>.763</u>

N=166 (after a list wise deletion for missing data).

Underlines signify which variables load on each factor

controls and ones measuring the likelihood of change in direct controls.

ANALYSIS AND RESULTS

To examine the first hypothesis, the data obtained in response to the question on strategic change were analyzed. ["The information obtained with respect to the chosen foreign subsidiary and the country in which it operates (referred to in the question measuring environmental scanning/scanning frequency) may lead the U.S. headquarters to make certain decisions pertaining to the chosen foreign subsidiary. What is the likelihood that the following decisions will be made?"]

Table 3 (on the next page) summarizes the data on likelihood of strategic changes along variables that measure the likelihood of change in strategy content, indirect controls, and direct controls. The table shows that the proportion of firms indicating that strategic change is "not likely" varies across the nine variables and ranges from 10.9 percent to 43.4 percent. Also, the proportion of firms indicating that change is "extremely likely" is very low for all nine variables, ranging from 2.4 percent to 10.3 percent. For the majority of firms, the likelihood of strategic change lies between these two extremes. The proportion of firms indicating that change is "somewhat likely," "likely," or "very likely" ranges from a low of 53.7 percent for

change in dependence on staffing, to a high of 84.5 percent for change in investment plans. The analysis, therefore, indicates that the likelihood of strategic changes in response to environmental scanning is moderate, lending support to the first hypothesis.

Hypothesis 2 was tested by examining the effect of scanning frequency (represented by the three variables financial environment scanning, market-competitive environment scanning and macro environment scanning) on the likelihood of change in strategy content (represented by the variables change product flows, change investment plans, and change functions performed). The statistical procedure Multivariate-GLM (in SPSS) was used to test the hypothesis as the procedure allows one to simultaneously examine the univariate effects of the independent variables on each of the dependent variables, as well as the multivariate effects of the independent variables on the dependent variables taken together.

As seen in Table 4 (two pages ahead), the three independent variables (scanning variables) are correlated with each other. To avoid collinearity problems, three sets of analyses—one with each scanning variable—were performed.¹ Before running the Multivariate-GLM analyses, the data was checked for compliance with the procedure's assumption of correlation between the

¹ In addition, Chi-Square tests were performed to examine the relationship between the scanning variables and the change in strategy variables. Results of these tests are consistent with results from the GLM analyses.

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Table 3 Likelihood of Change in Strategy Content, Change in Indirect Control, and Change in Direct Control Variables

Strategic Decision Variable	Mean	Std Dev.	% of firms with score of 5	% of firms with score of 4	% of firms with score of 3	% of firms with score of 2	% of firms with score below 2
Change in Strategy Content Variables							
Change product flows	2.12	1.13	2.4	13.5	36.5	60.0	40.0
Change investment plans	2.82	1.04	4.6	26.4	61.5	89.1	10.9
Change functions performed	2.30	1.17	4.0	18.3	38.9	68.6	31.4
Change in Indirect Control Variables							
Change reporting requirements	2.25	1.10	4.6	10.3	41.4	69.0	31.0
Change policies/procedures	2.31	1.12	4.0	17.1	36.6	73.7	26.3
Change extent of informal communications	2.91	1.26	10.3	35.4	63.4	81.7	18.3
Change dependence on informal communications	2.62	1.19	6.9	24.3	51.4	79.8	20.2
Change in Direct Control Variables							
Transfer key executives	2.27	1.14	4.6	14.3	38.9	69.1	30.9
Change dependence on staffing	2.02	1.10	2.9	9.8	32.4	56.6	43.4

Note: Labels used on the 5 point scale measuring the variables were: 1=not likely, 2=somewhat likely, 3=likely, 4=very likely, 5=extremely likely.

Table 4 Correlation Table

	FES	MCS	MS	CPFL	CIPL	CFUN	CRPT	CRUL	CCOM	CDCO	CSTF
MCS	.333**										
MS	.459**	.404**									
CPFL	.220**	.274**	.110								
CIPL	.219**	.246**	.221**	.543**							
CFUN	.123	.187*	.221**	.430**	.474**						
CRPT	.123	.174*	.177*	.278**	.360**	.474**					
CRUL	.075	.127	.212**	.193*	.277**	.429**	.640**				
CCOM	.088	.084	.161*	.112	.264**	.257**	.436**	.475**			
CDCO	.091	.109	.119	.087	.266**	.299**	.423**	.431**	.678**		
CSTF	.240**	.089	.177*	.157*	.309**	.320**	.347**	.250**	.279**	.297**	
CDST	.203**	-.030	.169*	.267**	.329**	.318**	.315**	.279**	.323**	.449**	.506**

N, after a pair wise deletion for missing data, ranged from 168 to 175.

* Indicates correlation is significant at the .05 level.

** Indicates correlation is significant at the .01 level.

KEY: FES=Financial environment scanning, MCS=Market competitive environment scanning, MS=Macro environment scanning, CPFL=Change product flows, CIPL=Change investment plans, CFUN=Change functions performed, CRPT=Change reporting requirements, CRUL=Change policies/procedures, CCOM=Change extent of informal communications, CDCO=Change dependence on informal communications, CSTF=Transfer key executives, CDST=Change dependence on staffing.

dependent variables, by using the Bartlett's test of sphericity (Hair *et al.*, 1992). As suggested by Hair *et al.* (1992:160), the data was first checked for univariate normality and variables that were not univariate-normal were transformed using the recommended procedures before applying the test. Results of these tests confirmed the appropriateness of using the procedure on the data.

The results for the effect of scanning frequency on the likelihood

of change in strategy content are shown in Table 5 below. All of the multivariate relationships and seven of the nine-univariate relationships between the three scanning frequency variables and the three likelihood of change in strategy content variables are statistically significant. Moreover, as indicated by the univariate results, the directions of the relationships are positive as predicted. The two-univariate relationships that were not significant were the ones between

Table 5 *Multivariate-GLM Results for the Effect of Scanning Frequency on the Likelihood of Change in Strategy Content*

Analysis	Variables ¹	Multivariate F ratio ²	Univariate F ratio ³	p value ⁴	Sign ⁵
Analysis 1	FES	3.504		.017	
	CPFL		8.509	.004	+
	CIPL		7.605	.006	+
	CFUN		3.211	.075	+
Analysis 2	MCS	5.402		.001	
	CPFL		13.592	.000	+
	CIPL		10.547	.001	+
	CFUN		5.899	.016	+
Analysis 3	MS	3.438		.018	
	CPFL		1.259	.263	+
	CIPL		8.023	.005	+
	CFUN		6.244	.013	+

N=170 for each of the three analyses.

¹ FES=Financial environment scanning, MCS=Market competitive environment scanning, MS=Macro environment scanning, CPFL=Change product flows, CIPL=Change investment plans, CFUN=Change functions performed.

² Represents F ratio for the effect of the independent variable on CPFL, CIPL and CFUN taken together.

³ Represents F ratio for the relationship between the independent variable and each of the three variables CPFL, CIPL and CFUN considered individually.

⁴ p values <.05 are highlighted in boldface.

⁵ Sign of the univariate regression coefficient.

financial environment scanning and change functions performed and between macro environment scanning and change product flows. Overall, the results provide broad, although not total, support for the second hypothesis.

To test Hypothesis 3, the effect of scanning frequency on the likelihood of change in indirect controls and direct controls was examined. These results were then compared with the effect that the likelihood of change in strategy content had on the likelihood of change in indirect and direct controls. The Multivariate-GLM procedure was used for the analyses. As in the case of tests for Hypothesis 2, since the three scanning variables were correlated with each other, they were not used in the same analysis. Similarly, since the three variables measuring the likelihood of change in strategy content were correlated (see Table 4), a new variable (labeled LCSC and obtained by averaging the scores on the three variables) was used to represent the likelihood of change in strategy content. The Cronbach's alpha for the three-item scale was high (0.74). The results for the effect of scanning frequency on the likelihood of change in indirect controls is shown in Table 6 (next page), while Table 7 shows the results for the effect of scanning frequency on the likelihood of change in direct controls. Table 8 (three pages ahead) shows the results for the effect of likelihood of change in strategy content on the likelihood of change in indirect controls and direct controls.

The results in Table 6 show that only two of the 12 univariate relationships between scanning frequency and likelihood of change in indirect controls are significant and positive. Also, none of the multivariate relationships are significant. Table 7 shows that the relationships between financial environment scanning frequency and the likelihood of change in direct controls are significant and positive. None of the results for the relationship between market-competitive environment scanning frequency and the likelihood of change in direct controls are significant. With respect to macro environment scanning frequency, while the multivariate relationship is not significant, one of the two-univariate relationships is significant and positive. In stark contrast to these results, Table 8 shows that all of the relationships between the likelihood of change in strategy content and the likelihood of change in direct and indirect controls are significant and positive.

Overall, the results suggest that while there is some positive relationship between scanning frequency and the likelihood of change in direct and indirect controls, there is a much stronger relationship between the likelihood of change in strategy content and the likelihood of change in direct and indirect controls. This finding supports Hypothesis 3.

DISCUSSION & CONCLUSIONS

This study sought to examine the link between environmental scanning and strategic decisions at the HQ-FS

level and, in doing so, it focused on decisions pertaining to strategic change. As discussed below, the results are both significant and useful.

Based on theoretical works which suggest that there is a high likelihood of MNCs changing their strategy and supportive systems in response to environmental shifts, as well as on works that argue that such changes are not as likely, it was hypothesized in this study that the likelihood of

strategic change in response to environmental scanning will be moderate. The results for this hypothesis support the idea that while MNCs may have compelling reasons and opportunities to profit from strategic changes in response to environmental shifts, there are also sizable barriers to making such changes, resulting in only a moderate likelihood of strategic change. This result is consistent with that of Rangan

Table 6 *Multivariate-GLM Results for the Effect of Scanning Frequency on the Likelihood of Change in Indirect Controls*

Analysis	Variables ¹	Multivariate F ratio ²	Univariate F ratio ³	p value ⁴	Sign ⁵
Analysis 1	FES	0.683		.605	
	CRPT		2.476	.117	+
	CRUL		1.221	.271	+
	CCOM		0.913	.341	+
Analysis 2	CDCO	1.586	1.344	.248	+
	MCS			.180	
	CRPT		5.855	.017	+
	CRUL		3.549	.061	+
Analysis 3	CCOM	1.647	0.947	.332	+
	CDCO		1.960	.163	+
	MS			.165	
	CRPT		3.737	.055	+
	CRUL		6.382	.012	+
	CCOM		2.433	.121	+
	CDCO		2.127	.147	+

N=171 for each of the three analyses.

¹ FES=Financial environment scanning, MCS=Market competitive environment scanning, MS=Macro environment scanning, CRPT=Change reporting requirements, CRUL=Change policies/procedures, CCOM=Change extent of informal communications, CDCO=Change dependence on informal communications.

² Represents F ratio for the effect of the independent variable on CRPT, CRUL, CCOM, and CDCO taken together.

³ Represents F ratio for the relationship between the independent variable and each of the variables CRPT, CRUL, CCOM, and CDCO considered individually.

⁴ p values <.05 are highlighted in boldface.

⁵ Sign of the univariate regression coefficient.

Table 7 *Multivariate-GLM Results for the Effect of Scanning Frequency on the Likelihood of Change in Direct Controls*

Analysis	Variables ¹	Multivariate F ratio ²	Univariate F ratio ³	p value ⁴	Sign ⁵
Analysis 1	FES	5.985		.003	
	CSTF		10.312	.002	+
	CDST		7.309	.008	+
Analysis 2	MCS	1.271		.283	
	CSTF		1.285	.259	+
	CDST		0.150	.699	-
Analysis 3	MS	2.621		.076	
	CSTF		4.323	.039	+
	CDST		3.531	.062	+

N=172 for each of the three analyses.

¹ FES=Financial environment scanning, MCS=Market competitive environment scanning, MS=Macro environment scanning, CSTF=Transfer key executives, CDST=Change dependence on staffing.

² Represents F ratio for the effect of the independent variable on CSTF and CDST taken together.

³ Represents F ratio for the relationship between the independent variable and each of the variables CSTF and CDST considered individually.

⁴ p values <.05 are highlighted in boldface.

⁵ Sign of the univariate regression coefficient.

(1998) who, based on aggregate country level data for MNC affiliates, found that there was only a modest shift in sourcing and production patterns in response to even large changes in real exchange rates. Rangan attributed this weak link between changes in sourcing and production patterns and environmental shifts to a lack of organizational infrastructure that is required to enable more significant changes. Results of this study at the micro firm level, and that of Rangan's at the more aggregate country level, underscore the importance of examining the organizational barriers

to making strategic changes in response to environmental shifts.

While a number of such barriers have been suggested in the literature, including inadequate environmental scanning, absence of production capacities, incompatibility of product designs and production systems across country markets, and administrative heritage (Bartlett & Ghoshal, 1989; Buckley & Casson, 1998; Kogut, 1985, 1989; Rangan, 1998), there has been little empirical examination of these barriers. In this context, the investigation in this study of one of the barriers—inadequate environmental scanning—is

Table 8 *Multivariate-GLM Results for the Effect of Likelihood of Change in Strategy Content on the Likelihood of Change in Direct and Indirect Controls*

Analysis	Variables ¹	Multivariate F ratio ²	Univariate F ratio ³	p value ⁴	Sign ⁵
Analysis 1	LCSC	12.306		.000	
	CRPT		45.887	.000	+
	CRUL		28.036	.000	+
	CCOM		13.074	.000	+
	CDCO		13.464	.000	+
Analysis 2	LCSC	17.522		.000	
	CSTF		21.569	.000	+
	CDST		28.611	.000	+

N=172 for analysis 1 and 173 for analysis 2.

¹ LCSC=Likelihood of change in strategy content, CRPT=Change reporting requirements, CRUL=Change policies/procedures, CCOM=Change extent of informal communications, CDCO=Change dependence on informal communications, CSTF=Transfer key executives, CDST=Change dependence on staffing.

² Represents F ratio for the effect of the independent variable (LCSC) on the dependent variables taken together.

³ Represents F ratio for the relationship between the independent variable (LCSC) and each of the dependent variables considered individually.

⁴ p values <.05 are highlighted in boldface.

⁵ Sign of the univariate regression coefficient.

significant. Drawing on the works of Ansoff (1980) and Buckley & Casson (1998) who argued that frequent scanning allows for a better and early recognition of the need for strategic change, and the work of Connor & Lake (1994) who argued that information can play a role in overcoming administrative resistance to change, it was proposed in this study that frequent scanning plays a facilitative role in strategic change or, conversely, infrequent scanning is a barrier to strategic change. Specifically, Hypothesis 2 stated that there is a positive relationship between scanning frequency and the likelihood of change in strategy

content. The results show that all of the multivariate relationships and seven of the nine univariate relationships between the three scanning frequency variables and the three likelihood of change in strategy content variables are significant. Also, as the univariate results show, the directions of the relationships are positive, as predicted, lending broad support to the hypothesis that frequent scanning plays a facilitative role in changing strategy content. This finding holds implications for international management research as well as practice. Implications for management practice are discussed later in this section.

For research on international management, the finding supports theoretical arguments that inadequate scanning is a barrier to strategic change, and provides one of the few empirical confirmations of a barrier to strategic change. An obvious line of further research would be to examine the robustness of this finding through replicative studies, studies at the MNC level, and studies at the HQ-FS level for non-U.S. MNCs. In addition, empirical examination of other barriers to strategic change identified in the literature, and referred to earlier in this paper, will help in understanding the full complement of organizational characteristics that enable MNCs to effect the strategic changes necessary to take advantage of their unique position in exploiting environmental shifts in country markets.

With respect to the role of scanning frequency on change in strategic controls, it was hypothesized (Hypothesis 3) in this study that the likelihood of change in strategic controls will be positively related to the likelihood of change in strategy content, more so than to scanning frequency. Results show that while all of the relationships (both multivariate and univariate) between the likelihood of change in strategy content and likelihood of change in direct and indirect controls are significant in the predicted direction, only one of the six multivariate relationships and five of 18 univariate relationships between scanning frequency and changes in direct and indirect controls are significant,

lending support to the hypothesis. This finding sheds light on an aspect of strategic control that has received little attention in the literature. Particularly, the results show that strategic control design is dynamic and that it changes with changes in strategy and, to a less extent, directly with the collection of environmental information. Prior works on strategic controls within MNCs have, with rare exceptions (e.g., Prahalad & Doz, 1981; Muralidharan & Hamilton, 1999), dealt with designing strategic controls to fit existing context. For example, Baliga & Jaeger (1984) argued that the type of interdependence between the MNC and the foreign subsidiary, environmental uncertainty, and the proximity of the host country culture, are factors that influence the choice between cultural and bureaucratic forms of controls. More recently, Gencturk & Aulakh (1995) found that the level of internationalization, size of the business, interdependence, and host market attractiveness are significant contextual factors affecting the choice of output and process controls. In contrast to these "static" considerations of control system design, Prahalad & Doz (1981) argued that strategic control systems should change over time since the type of control system that is effective for a foreign subsidiary in its early days will cease to be effective as the subsidiary matures. Similarly, Muralidharan & Hamilton (1999) proposed a framework linking types of control systems with various stages of the foreign subsidiary's life cycle

based on the internal (e.g., strategy) and external (e.g., relevant environment) contexts at each stage. Barring a few case studies, these ideas about dynamic or changing control system designs have received little empirical examination.

While this study does not and was not intended to test the frameworks of Prahlad & Doz (1981) or Muralidharan & Hamilton (1999), the results confirm the broad idea that strategic control design is dynamic, and that changes to strategic controls are driven by changes in strategy content and information from the environment. This finding suggests that further exploring the dynamic aspects of strategic control systems can be a fruitful endeavor. In addition, since "static" frameworks dominate the extent literature on control system design in MNCs, future research in the area should focus on developing and testing dynamic models.

The findings of this study also hold implications for management practice. First, the findings indicate that firms interested in exploiting opportunities arising out of environmental shifts in their country markets, or in adjusting their strategies in response to invalid planning assumptions, will do well to improve their scanning frequency. In addition, firms may have to reduce other barriers to strategic change such as inadequate production capacities and managerial preferences for the status quo. The finding that strategic control design is dynamic suggests that managers establishing these systems for the first time need to be prepared

for changing them as well. Such preparation may include developing and sustaining an open and trusting relationship with subsidiary managers, so that changes to strategic control mechanisms such as reporting requirements, operating procedures, and the appointment of key personnel can be made smoothly.

In conclusion, the findings of this study supported theoretical arguments for expecting a moderate likelihood of strategic change in response to environmental scanning, found broad support for a facilitative role for scanning frequency in strategic change, and shed new light on dynamic aspects of control system design. As discussed above, the findings are significant and hold implications for both international management research and practice.

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