

## STRATEGY FORMULATION PROCESSES: DIFFERENCES IN PERCEPTIONS OF STRENGTH AND WEAKNESSES INDICATORS AND ENVIRONMENTAL UNCERTAINTY BY MANAGERIAL LEVEL

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*Some literature suggests that managers' perceptions of strengths and weaknesses indicators vary by management level. Differences likely result because of individuals' cognitive schemes, which include their cognitive biases. In turn, systematic errors may occur in managerial decisions. Results from the research reported herein support the notion that managers' perceptions of the indicators of a firm's strengths and weaknesses, and of environmental uncertainty, vary by managerial level. Differences in these perceptions were discovered to be more significant within each firm. Implications of these results are examined, including the impact on the deployment of firms' strategy formulation processes.*

### INTRODUCTION

Although some controversy exists (Grinyer and Norburn, 1975), a positive relationship between the use of strategic planning processes and firm performance has been suggested (Eastland and McDonald, 1970; Thune and House, 1970; Herold, 1972; Burt, 1978; Wood and LaForge, 1979). Others (e.g. Sheehan, 1975; Kudla, 1980; Robinson and Pearce, 1983), propose that in certain settings this relationship is enhanced if the planning process does not become too formalized. Armstrong (1982) suggested that the importance of strategic planning increases when a firm is confronted by inefficient markets, must cope with high degrees of uncertainty and major environmental changes, and has highly complex operations. Recently, Gray (1986) noted that

strategic planning is a sound concept and that difficulties encountered by some 'planning' firms typically result from faulty strategy formulation processes.

A critical component of the formulation process is identification of a firm's internal strengths and weaknesses and its external opportunities and threats. Many authors (e.g. Hofer and Schendel, 1978; Andrews, 1980; Porter, 1980; Higgins, 1983) argue that these activities are critical early steps in the strategy formulation process. For most organizations, particularly those that operate in multiple-product markets and businesses arenas, the activities to identify the strengths and weaknesses and to recognize relevant opportunities and threats are quite complicated. Nonetheless, firms must be able to categorize and convert their strengths into distinctive competencies in

order to gain the competitive advantage necessary to capitalize on environmental opportunities (Hofer and Schendel, 1978). Such tasks must be effectively completed at both the corporate and business unit levels in the multi-business firm (Hitt and Ireland, 1985).

Identification of strengths and weaknesses requires the involvement of a wide range of managers; thereby complicating the process. Taylor (1979) suggested that the contributions made by managers to the complete planning process vary by level. Dyson and Foster (1982) found that the effectiveness of certain parts of a planning process is enhanced through participation of many organizational members. A key reason for extensive involvement is that managerial tasks are typically grouped within three distinct (i.e. qualitatively different) yet interrelated levels. As proposed by Parsons (1960), the managerial 'task' differs among the institutional, managerial, and technical levels. Increasing divisions of organizational tasks principally caused the development of the three levels (Parsons, 1960). The different tasks performed at these distinct levels may cause managers at different levels to focus on different indicators of strengths and weaknesses, and to view the external environment differently. Thus the indicators used by managers to identify strengths and weaknesses and perceptions of the external environment likely vary across managerial levels.

Substantial previous research has established the diffuse nature of the strategic process (e.g. Bower, 1970; Prahalad, 1976; Hofer, 1976; Bower and Doz, 1979). Strategy formulation involves managers at different levels in the organization. Typically, it is *not* conducted by a single manager or even within a single managerial level. This introduces the twin issues of who is the assessor and what is the assessment? The assessment process cannot be separated from the assessors. This research suggests that assessments of the firm and its environment vary systematically and substantially with managerial level. No single objective assessment is available.

The argument is developed both conceptually and empirically. Conceptually it is shown, based on research in cognitive psychology and organization theory, that assessments should be expected to vary in a systematic fashion with managerial level. Empirically, this outcome is

established using a methodology that overcomes several measurement problems.

### Cognitive and management level

Individuals' basic cognitive properties result in perceptions of the environment and of internal strengths and weaknesses.

Managers are individuals with multiple characteristics (e.g. age, personal history, values and education). These characteristics may vary significantly across managers (Hambrick and Mason, 1984). Given their individuality, managers bring somewhat unique perspectives to processes used to evaluate an organization and its internal and external environments. Few organizational events are approached by a manager as being totally unique and requiring systematic analytical study. Instead, they are processed through pre-existing knowledge systems. Known as schemas<sup>1</sup> (see Norman, 1976, for a discussion of schemas), these systems represent beliefs, theories and propositions that have developed over time, based on the manager's personal experience. Schemas are cognitive models that allow managers to categorize events, assess consequences, and consider appropriate actions. Without schemas a manager, and ultimately organizations, would become paralyzed by the need to analyze 'scientifically' an enormous number of ambiguous and uncertain situations. In other words, managers must be able to scan environments selectively so that timely decisions can be made (Hambrick, 1986). The selection of environmental elements to be scanned is likely affected by a manager's schema.

Unfortunately, schemas are not infallible guides to the organization and its environments. In fact, some are relatively inaccurate representations of the world, particularly as conditions change. Furthermore, events often are not labeled accurately and sometimes are processed through inaccurate and/or incomplete knowledge structures.

<sup>1</sup> Brief and Downey (1983) discuss the role 'implicit theories' play in the structuring of organizations. While differences do exist, a manager's schemas and his/her implicit theories tap similar dimensions of an individual's cognitive make-up. This comment also applies to Bartunek's (1984) use of the term 'interpretive schemes', and to the term 'dominant logic' as used by Prahalad and Bettis (1986).

Keisler and Sproull offer the following concise descriptions of managers' schemas: 'Managers operate on mental representations of the world and those representations are likely to be of historical environments rather than of current ones' (1982: 557). It is the experiential or historical nature that is critical. Managers will tend to overgeneralize the extent to which a few similar attributes of a current situation represent an analogue to the past. In terms of the present study it is likely that perceptions of strengths and weaknesses will vary systematically across managerial levels. The variance may be expected since managers' mental representations of conditions probably will be historical in nature and the historical experiences on which they are based likely have varied across managerial levels. This is not to say that managers at each level share a common overall history, but rather that they often have some significant common historical experiences that vary across levels. As a result, measurable differences in perceptions across levels may be anticipated. For example, managers at each organizational level will tend, on the average, to be near the same age. Age variance across levels will be significantly greater than within any one level (Hall, 1976; Veiga, 1981). Being of roughly the same age, cohort managers at each level will tend to have similar life experiences and resultant values and beliefs (stored as schemas). People who were draft age during the Second World War and people who were draft age during the Vietnam War on the average tend to have values and perspectives about war (stored as schemas) that differ significantly. In other words, different cohorts have different schemas simply as a result of different experience bases that are a product of broad social trends and events. For example, younger professionals (those under 35) are more likely to see the absence of participative management as a weakness of the organization than are older professionals (those over 55) (*Business Week*, July 2, 1984).

Furthermore, members of each managerial level are likely to be near the same organizational age (i.e. to have been members of the organization or a similar one for about the same period of time). This suggests that they probably have experienced similar histories of organizational

events. Stated differently, the organizational history on which various schemas are based will tend to be similar within each managerial level and tend to vary across managerial levels (e.g. at higher levels, schemas will be based on a longer historical organizational record).

Additionally, since managers at different levels (institutional, managerial, technical) perform different tasks, their recent histories differ. Although schemas are based on total histories, the most recent history (assuming that it is of reasonable length to have an effect) may be the most salient for managers' current tasks.

A second, general reason why perceptions are likely to vary as a function of managerial level is the concept of cognitive biases. The psychology of cognitive biases is the study of how people (managers), in making decisions, sometimes make systematic (and often severe) errors (Tversky and Kahneman's, 1974, work is an excellent introduction to, and survey of, this literature). When dealing with uncertain and complex tasks, people (managers) often rely on a limited number of heuristic principles. Doing so simplifies the decision process significantly. In general these heuristics are useful, but on some occasions they can result in critical errors. Recent evidence (e.g. Hitt and Barr, 1984) suggests that this may occur often in managerial selection decisions. Reliance on a limited number of heuristics in making strategic decisions could be disastrous.

For the purposes of this research the availability heuristic may be the most important one (see Tversky and Kahneman, 1973, for a thorough discussion). Basically, this heuristic leads people to make decisions by using information that can be recalled easily (i.e. information that is 'available'). For example, Tversky and Kahneman (1973) indicate that one may assess the risk of heart attack among middle-aged people by recalling such occurrences among one's acquaintances, even if it can be demonstrated that it is an inappropriate basis for drawing such a conclusion. In the present case it seems that the information that is 'available' will vary by managerial level. In general this occurs because managers at different levels tend to concentrate on different tasks (as noted earlier), and hence deal with different sets of information.

Closely related to the concept of availability is the concept of salience. As Keisler and Sproul state:

people attend to and encode salient material—events that are unpleasant, deviant, extreme, intense, unusual, sudden, brightly lit, colorful, alone, or sharply drawn. . . . In sum, salient information has greater weight in the determinance of what is remembered and how well it is organized (1982: 556).

Hence, salience is likely to determine how well remembered and organized (i.e. how 'available') information is. What is salient at one level may be totally irrelevant at another because of the different tasks performed. For example, at the technical level, events or information, such as morale of production employees, loss of an account because of quality control problems and a complaint of an unfair dismissal, are likely to be salient. In contrast, examples of salient events or information at the institutional level might include: a sudden drop in stock price, a loss of market share, a change in the bonus plan, and a change in government antitrust policy.

It should be emphasized that the arguments presented do not assume that the cognitive properties of managers overwhelm current reality and impose a totally historical representation of the firm and its environment. However, the arguments do suggest that mental representations significantly bias the interpretation of current reality. As Nystrom, Hedberg and Starbuck (1976) discuss, the effects of historical conditioning decay slowly when new conditions are encountered.

Thus, different tasks at different managerial levels interact with schemas, cognitive biases, information availability and information salience to cause different perceptions. Based on this evidence, the following hypothesis was formulated:

*Hypothesis 1: Perceptions of strength and weakness indicators vary by management level (top, middle and lower).*

In general terms, managers at the institutional level focus on the organization's proper alignment with its relevant environments. Top managers and key strategic planners are part of the institutional level. These managers seek principally to identify strengths and weaknesses related to the firm's performance (effectiveness) in areas important to critical external constituents. Thus,

concerned with identifying the internal strengths necessary to capitalize on external opportunities (facilitating the firm's efforts to do the 'right things') (Drucker, 1974).

One of an institutional-level manager's key responsibilities is the prioritization of resource allocations across units (Bettis and Prahalad, 1983). However, this task is not accomplished easily (Bettis, 1979). To prioritize resource allocations, particularly when changing the firm's strategies, upper-level managers initiate changes in the organization's administrative context (Bower, 1970; Prahalad, 1976). Therefore, managers may be expected to examine information on market share, financing capacity and the planning system as indicators of strengths and weaknesses. In addition, top managers must cope with high degrees of environmental uncertainty (Thompson, 1967). Thus, indicators related to the firm's external constituents—such as relations with labor unions, knowledge of clients' needs and distribution channels—become important. Institutional-level roles critical to successful accomplishment of these activities are those of disseminator, figurehead, negotiator and liaison (Pavett and Lau, 1983). Daft and Macintosh (1984) found that, in order to control firm performance, upper-level executives focus on non-financial (i.e. products, competitors, economic trends, exploiting new opportunities) and financial (i.e. projected 5-year revenue and assets) activities. Their work implies the importance of the abilities of top management, product development, financing capacity, growth tendencies and the price earnings index as strength and weakness indicators.

Based on this evidence, the following hypothesis was formulated:

*Hypothesis 1a: Top managers perceive interest and abilities demonstrated by top management, planning system, knowledge of clients' needs, product development, financing capacity, price earnings index, growth tendencies, distribution channels, relations with labor unions, and information on market share as important strength and weakness indicators.*

The contributions to strategic planning that are to be rendered by those at the managerial (or middle) level are qualitatively different from those expected from either the technical or institutional levels. Uytterhoeven (1972), proposed that 'general management, at the middle

level is, in a number of respects, more difficult' (p. 76). Similarly, van Cauwenbergh and Cool (1982) observed 'that middle management judgment, opinion, values and evaluation affect the strategy formulation and implementation processes in a decisive way'. The essential tasks associated with these important responsibilities, as proposed by Parsons (1960), include mediation between the desires expressed by those at the institutional level and the tasks to be performed by the technical subsystem. Similarly, van Cauwenbergh and Cool (1982) and Kotter (1977) suggest that middle-level managers must develop 'good' political skills in order to participate effectively in the realms of the other two levels. Couch (1979) proposes that the middle-level manager must maintain familiarity with the 'formal' organization of his/her unit as well as with its 'informal' structure. Thus, middle-managers will focus on the firm's form and structure, interests and abilities of top management, and the control and planning systems as important indicators of strengths and weaknesses. Lastly, Couch (1979) indicates that managerial-level managers must develop skills that will enable them to relate to those at other levels effectively, to focus on results (rather than only activities performed) and to develop a sound financial operation. This evidence suggests the importance of services provided to clients, the industrial plant, distribution channels, financing capacity and information on market share as strength and weakness indicators to the middle-level manager.

Based on the evidence, the following hypothesis was developed:

*Hypothesis 1b: Middle-level managers perceive organizational form and structure, interests and abilities of top management, the control system, the planning system, services rendered to clients, the industrial plant, distribution channels, financing capacity and information on market share as important strength and weakness indicators.*

Managers at the technical level (typically first-level managers) likely will perceive strengths and weaknesses, and their indicators, relative to the firm's ability to do 'things right' (Drucker, 1973) within the technical core. The primary task of those at the technical level is to produce the organization's goods or to provide its services to exploit successfully the firm's strategic position (Wortman, 1982). Generally speaking, it is at this level that a large portion of the firm's actual

work occurs in terms of the value that is added to the product or service by the firm (van Cauwenbergh and Cool, 1982). To accomplish the degree of control called for by these responsibilities, technical-level managers rely on their personal leadership skills and/or their analysis of output data and records (Daft and Macintosh, 1984). Pavett and Lau (1983) found that technical-level managers as compared to those at the institutional and managerial levels rated the leadership role (including activities associated with interpersonal relations, motivational activities, and the integration of organizational and personal goals) as more critical to their efforts to complete their jobs effectively. In total, these findings suggest the importance of the organization's form and structure, employee activities, employees' technical abilities, standard operating procedures, product quality, production techniques, product development, and the firm's industrial plant characteristics as important indicators of strengths and weaknesses from the technical-level manager's perspective. Accordingly, the following hypothesis was formulated.

*Hypothesis 1c: Technical-level managers perceive the organization's form and structure, employee activities, abilities of employees, standard operating procedures, product quality, the firm's industrial plant characteristics (size, energy, equipment, etc.), production techniques, and product development as important strength and weakness indicators.*

### **Firm-specific effects**

Although management level is a critical variable, the importance of strength and weakness indicators may also vary by firm. Managers within firms have unique histories thereby affecting their schemas. In addition, firms in different industries face different competitive conditions (Porter, 1980). Firms in different industries likely focus on different strengths in order to seek competitive advantages. Thus the uniqueness of the products, tasks and skills (internal) and of the competitive environment (external) should cause managers to focus on different indicators of strengths and weaknesses across firms in different industries. The following hypothesis was based on this evidence.

*Hypothesis 2: The perceptions of important strength and weakness indicators will vary by firm (each in a different industry).*

## Environmental uncertainty

Research focusing on external assessment processes has been categorized by Bourgeois (1980). Among the most important of these research efforts are the seminal studies of Lawrence and Lorsch (1967) and Emery and Trist (1965). These researchers found that firms' actions are affected significantly by individuals' perceptions of environmental uncertainty (PEU). In view of this and other evidence, some (e.g. Duncan, 1972; Downey, Hellriegel and Slocum, 1975; Boulton *et al.*, 1982; Hitt, Ireland and Palia, 1982) have concluded that PEU is indeed a significant environmental variable. As an indication of this importance, PEU was one of the key environmental variables Bourgeois (1980) suggested should be examined when studying corporate actions. Similarly, Hambrick (1981) noted that both strategy and environment are crucial contingencies for organizations; they are inextricably interwoven. For example, Lindsay and Rue (1980) and, to a lesser extent, Boulton *et al.* (1982) found environmental uncertainty to be related to a firm's strategic planning processes. Similarly, Dirsmith and Covaleski (1983) found that the environment exerts a strong influence on a firm's strategic norms. Given this evidence, it may not be surprising that Hrebiniak and Snow (1980) discovered interrelationships between perceptions of environmental uncertainty and intraorganizational influence.

Perceptions of environmental uncertainty may vary by management level. Cox, Hitt and Stanton (1978), for example, found PEU to vary by an administrator's hierarchical level. These differences may be accounted for in the context of managerial tasks, schemas and cognitive biases at different levels. Top managers, for example, probably have different environmental information available to them than do lower-level managers. In the same light the salience of particular environmental information will likely vary by level. Thompson (1967) hypothesized that organizations seek to seal off or buffer their technical cores from environmental influences. This suggests that managers in the technical core may be relatively naive with respect to external environmental conditions.

Based on the research presented above, the following hypothesis was formulated:

*Hypothesis 3: Perceptions of environmental uncertainty vary by management level (top, middle and lower).*

## METHOD

### Sample

Data were collected from top-, middle-, and appropriate lower-level managers from three of the largest companies in South America. Two firms were headquartered in Venezuela; one in Brazil. Three different industries (oil tools, petrochemical and brewing) were represented. Top managers were defined as the chief executive officer and his immediate subordinates of at least vice-presidential rank. Middle managers were defined as those who had at least two levels of supervisors under their responsibility and no more than two reporting levels below top executives. Lower-level managers were defined as those reporting to middle-level managers or below. These definitions were closely coordinated with company officials to designate the appropriate managerial level for participants in the study. The sample included 56 managers: 12 top managers; 24 middle managers; and 20 lower-level managers (only lower-level managers with input into and/or involvement with the strategic planning process were included). Of these 56, 31 were from the oil tools firm (7 top, 6 middle, 18 lower), 21 from the brewing firm (4 top, 15 middle, 2 lower), and four from the petrochemical firm (1 top, 3 middle). The differential, relative proportions from each firm reflect the approach used in the strategic planning process and firm structures. For example, all management levels are highly involved in strategic planning in the oil tools firm. However, the strategic planning process in the petrochemical firm is more centralized with involvement of only key management staff.

These firms are large by South American standards and medium size by U.S. standards (sales between \$100 million and \$500 million). For example, the oil tools firm has six manufacturing plants, each producing a different line of products, and the brewing firm has two large breweries.

Many of the managers sampled were educated in the U.S. and most had attended management development seminars on strategic planning

processes. Each of the firms uses a formalized 'normative' strategic planning process. The formulation and implementation of long-range corporate strategies is an international phenomenon. Thus, although some cultural differences might exist between managers in these firms and managers in firms from non-Latin American countries, the hypotheses proposed are appropriately tested with this data set. Further, there are no data suggesting that cultural differences affect the processes described in this study's hypotheses (Hofstede, 1980).

### Data collection procedure

Analysis of internal factors (strength and weakness indicators) used by managers in determining strategic actions required a procedure to define the factors utilized accurately. Stevenson (1976) conducted personal interviews. However, as noted previously, evidence exists suggesting that managers' descriptions of factors used in making decisions may be inaccurate (Hoffman, 1960; Slovic, 1969; Balke, Hammond and Meyer, 1973). Similarly, Hambrick (1982) suggested that managers may be unable to describe their actual, environmental scanning behaviors accurately. Argyris and Schon (1974) state that one cannot obtain a person's 'theory in use' by simply asking for it. It must be constructed by observing and recording the person's actual decision behavior.

Models can be developed to duplicate managers' judgements regarding important organizational strengths and weaknesses by observing their assessments of organizational effectiveness with various strengths and weaknesses denoted. The result is a quantitative representation of the person's cognitive model (schema) regarding the organization's strength and weakness indicators. The model depicts the decision-influencing cues (strength and weakness indicators) and their weights.

The policy-capturing procedure (Slovic and Lichtenstein, 1971; Slovic, Fischhoff and Lichtenstein, 1977) was used to provide models of managerial judgements regarding the relevant strength and weakness indicators (decision factors). The results of this procedure are based on an analysis of actual decisions, and provide a description of the manager's decision policy. In turn, this knowledge can be used to predict future

decisions. Slovic and Lichtenstein (1971) and Slovic *et al* (1977) concluded that this procedure results in precise and quantified identification of a decision-maker's judgement policies.

Use of this procedure requires that a comprehensive list of decision factors (strength and weakness indicators, in this instance) be identified. A panel of four Latin American managers, each with extensive experience in strategic management, was used to develop a list of possible decision factors. Stevenson's (1976) compilation served as a foundation. Based on the panel members' experiences and knowledge sets, some factors were added while others were deleted. The final list included 21 factors (as shown in Table 1) that may be important indicators of a firm's health (based on internal evaluations).

The policy-capturing procedure specifies that managerial decisions be observed so that models of the factors used in the decisions and their respective importance weightings can be developed. Doing this requires that descriptions of multiple simulated firms be developed in terms of the indicators of firm health (decision factors) varying the levels of these indicators. Once developed, managers are asked to assume that the simulated firm's objectives, products and technologies are similar to those of their own firm. Each simulated firm is then to be examined and its effectiveness evaluated. Treating the effectiveness ratings as dependent variables and the 21 indicators (with levels varying between each case) as independent variables, regression models can be constructed denoting the decision factors used in the managers' effectiveness evaluations and their weightings.

Christal (1967) demonstrated that identical results can be obtained from simulated cases, such as those used in this research, and real situations. The policy-capturing procedure has been used to identify judgement policies in a variety of decisions, including performance appraisals (Taylor and Wilsted, 1974), labor-management negotiations (Balke, Hammond and Meyer, 1973) and organizational effectiveness (Hitt and Middlemist, 1979; Hitt *et al.*, 1983).

The number of cases was limited to 30 for reasons of response practicality. Managers were given the 30 cases and were instructed to rate the effectiveness of each firm on a scale of 1 (very ineffective) to 7 (very effective). They were

Table 1. Strength and weakness indicators

I1	The organizational form and structure
I2	The interest and abilities demonstrated by top management
I3	The standard operating procedures
I4	The control system
I5	The planning system
I6	Employee activities
I7	The technical abilities of employees
I8	The number of employees
I9	The abilities of employees
I10	Knowledge of clients' needs
I11	Product quality
I12	Services provided to clients
I13	The industrial plant (size, energy, equipment, etc.)
I14	Production techniques
I15	Product development
I16	Financing capacity
I17	The price-earnings index
I18	Growth tendencies
I19	Distribution channels
I20	Relations with labor unions
I21	Information on market share

asked to rate the effectiveness of each firm based on the indicator levels presented in each case. The managers were told that the indicator levels were determined by a managerial audit. Previous research suggests that managers search for the indicators most important to their own strategic actions, observe the indicator levels presented in the case, and decide on the simulated firm's effectiveness (Hitt and Middlemist, 1979).

Each manager completed an effectiveness rating for 30 simulated firms, yielding a sample size of  $30 \times 56$  or 1680 observations. The assumption of independence between each of the respondent's 30 observations is consistent with a within-subjects, repeated measures design (Winer, 1974). Precedent exists for the assumption that each case represents an independent observation (Stewart and Gelberd, 1972; Hitt and Middlemist, 1979; Hitt *et al.*, 1983). In addition, there are arguments supporting the use of 1680 as independent observations. Regression models are based on change in the dependent and independent variables. If respondents did not view differences in the cases, their evaluation of the dependent variable would not have changed, resulting in low  $R^2$  values. Only one manager's regression model (out of 56) had an  $R^2 < 0.40$ . Most model  $R^2$  values were well

above 0.50. Furthermore, the assumption of independence may lead to a Type II error, but the assumption of non-independence would increase the probability of a Type I error. Neither is desirable, but future research is more likely to discover a Type II rather than a Type I error (Hartwig and Dearing, 1979).

### Indicator independence

The random assignment of indicator levels should disallow collinearity among the independent variables, thereby avoiding the effect found by Dudycha and Naylor (1966) (that interrelationships among decision cues (indicators in this research) affected raters' judgements). An inter-correlation matrix was constructed to examine the independence among the indicators. The matrix shows the bivariate Pearson product-moment correlations for each pairing of 21 indicators over the 30 cases ( $n=30$ ).

As shown in Table 2, the highest  $r$  between any pair of indicators was 0.49, yielding a highest common variance of 0.24. Furthermore, 98 percent of the pairwise  $r$  values were below 0.4, and 87 percent were below 0.3. The lack of collinearity lends more credence to the decision models derived.

### Perceived environmental uncertainty

The Miles and Snow (1978) PEU instrument, modified for the Latin American environment, was used to collect data on perceived environmental uncertainty. The instrument contained six scales, composed of 25 items, that measured perceived uncertainty in six major dimensions of a firm's external environment: (1) suppliers of raw materials and parts; (2) competitors' behavior; (3) clients; (4) financial/capital markets; (5) government regulatory agency actions; and (6) behavior of labor unions. Managers were asked to evaluate the predictability of each item of the environment on a seven-point Likert-type scale. Means from each of the six scales were obtained and summed for the total PEU scale. To assess instrument reliability, coefficient alphas were calculated for each scale. All coefficient alphas were acceptable except for the 'clients' scale. However, elimination of one item resulted in an acceptable coefficient for this scale. The six coefficient alphas were: suppliers of raw materials





Table 3. Moderated regression analysis with management level as the moderator

Model	$R^2$	$\Delta R^2$	$F$
Restricted	0.386	0.026	1.682*
Full	0.412		
			(65,1584)

\* $p < 0.01$ .

between the restricted ( $y = a + bx + cz$ ) and full ( $y = a + bx + cz + dxz$ ) models was tested using the procedure recommended by Cohen (1968). As shown, the difference in  $R^2$  was statistically significant. These results support Hypothesis 1.

Regression models were developed to examine the important strength and weakness indicators for each management level to test Hypotheses 1a, 1b and 1c. Results of these analyses are shown in Table 4. The results provide some support for Hypothesis 1a. The model shows that top managers use the strength and weakness indicators of interests and abilities of top management, the planning system, knowledge of client's needs, price-earnings index, distribution channels and information on market share as hypothesized. However, other indicators (not hypothesized) were also used by top managers. These include technical abilities of employees (-) abilities of sales personnel, product quality, and services provided to clients. Finally, certain indicators hypothesized as important did not appear in the model (e.g. product development, financing capacity, growth tendencies and relations with labor unions).

The results also partially support Hypothesis 1b. The interest and abilities of top management, planning system, services rendered to clients and information on market share were found to be important strength and weakness indicators as hypothesized for middle-level managers. Other indicators were also found to be important. These include technical abilities of employees (-), abilities of sales personnel, and knowledge of clients' needs. Other indicators hypothesized as important were not included in the resulting model (organization structure, control system, industrial plant, financing capacity, distribution channels).

Table 4. Regression models of strength and weakness indicators for each of the three management levels

Strength and weakness indicators	Top management SRC	Middle management SRC	Lower-level management SRC
I1			0.13**
I2	0.14**	0.18*	0.08*
I3			
I4			
I5	0.30**	0.46**	0.39**
I6			0.09*
I7	-0.16**	-0.17**	
I8			
I9	0.13**	0.08*	0.21**
I10	0.21**	0.13**	0.16**
I11	0.13*		0.19**
I12	0.19**	0.14*	0.29**
I13			
I14			
I15			
I16			
I17	0.17*		0.24**
I18			
I19	0.15*		
I20			
I21	0.18**	0.24**	0.14**

$F = 23.26^{**}$   $F = 47.78^{**}$   $F = 45.54^{**}$   
d.f. = 11,348 d.f. = 7,712 d.f. = 10,559  
 $R^2 = 0.43$   $R^2 = 0.32$   $R^2 = 0.45$

\* $p < 0.05$ ; \*\* $p < 0.01$ .

SRC: Standardized regression coefficient.

Finally, partial support was found for Hypothesis 1c. Organization form and structure, employee activities and product quality were found to be important strength and weakness indicators for lower-level managers, as hypothesized. However, although hypothesized, standard operating procedures, technical abilities of employees, industrial plant, production techniques and product development were not found to be important strength and weakness indicators. Other strength and weakness indicators not hypothesized entered the lower-level managers' model (interests and abilities of top management, planning system, knowledge of clients' needs, abilities of sales personnel, piece-earnings index and information on market share).

Hypothesis 2 was tested using moderated regression analysis. The results are shown in Table 5. The difference between  $R^2$  values of

Table 5. Moderation regression analysis with company industry as the moderator

Model	$R^2$	$\Delta R^2$	$F$
Restricted	0.386	0.032	2.089*
Full	0.418		
			(65,1584)

\* $p < 0.01$ .

Table 6. Regression models of strength and weakness indicators for each management level in the oil tools firm

Strength and weakness indicators	Top management SRC	Middle management SRC	Lower-level management SRC
I1			0.15**
I2	0.17**	0.12*	0.08*
I3			
I4			
I5	0.27**	0.31**	0.40**
I6			
I7	-0.16**	-0.15**	
I8		0.14*	
I9		0.13*	0.21**
I10	0.26**	0.16**	0.18**
I11	0.32**		0.17**
I12		0.21**	0.29**
I13			
I14			0.07*
I15			
I16			
I17			0.26**
I18		-0.14*	
I19			
I20		-0.11*	
I21	0.17**	0.29**	0.15**
$F = 25.74^{**}$ (d.f. 6,203) $F = 13.04^{**}$ (d.f. 10,169) $F = 47.87^{**}$ (d.f. 10,529) $R^2 = 0.435$ $R^2 = 0.436$ $R^2 = 0.475$			

\* $p < 0.05$ ; \*\* $p < 0.01$ .

SRC: Standardized regression coefficient.

the full and restricted model was statistically significant. The results support Hypothesis 2, suggesting that the importance of strength and weakness indicators vary by firm. Since management level and firm have been found to affect the importance of strength and weakness indicators, regression models were developed for each

Table 7. Regression models of strength and weakness indicators for each management level in the brewery

Strength and weakness indicators	Top management SRC	Middle management SRC	Lower-level management SRC
I1	0.19*		-0.32**
I2	0.22**	0.12**	
I3			
I4			
I5	0.41**	0.50**	0.26*
I6			
I7	-0.16*	-0.13**	
I8			
I9	0.16*		
I10	0.26**		
I11			
I12		0.19**	
I13			
I14			
I15			
I16			0.34**
I17		0.18**	
I18			
I19	0.22**		
I20	0.23**		-0.22*
I21	0.22**	0.23**	
$F = 13.55^{**}$ (d.f. 9,110) $F = 33.69^{**}$ (d.f. 6,443) $F = 6.82^{**}$ (d.f. 4,25) $R^2 = 0.525$ $R^2 = 0.314$ $R^2 = 0.522$			

\* $p < 0.05$ ; \*\* $p < 0.01$ .

SRC: Standardized regression coefficient.

management level within each firm. Results of these analyses are shown in Tables 6, 7, and 8. In these models differences by level become more distinct. There are four of 14 indicators used that were common in all managerial models in the oil tools firm. Only one indicator out of 11 used was common to all models in the brewery. No common indicators among the two managerial models in the petrochemical firm were found. Weights and signs of some of the common indicators also varied across managerial models within firms. The model  $R^2$  values were higher in most cases for the top management and lower-level managers within firms. Middle-level manager models were the least consistent.

### Perceived environmental uncertainty

Based on research and previous use of the construct, environmental uncertainty, as per-

Table 8. Models of strength and weakness indicators for each management level in the petrochemical firm

Strength and weakness indicators	Top management SRC	Middle management SRC
I1		
I2		
I3		
I4		
I5		0.41**
I6		
I7		
I8		
I9		
I10		
I11	0.44*	
I12		0.22*
I13		
I14		
I15		
I16		
I17	0.44*	
I18		
I19	0.56**	
I20		
I21		0.40**
	$F = 9.11^{**}$ (d.f. 3,26) $R^2 = 0.512$	$F = 15.26^{**}$ (d.f. 3,86) $R^2 = 0.350$

\* $p < 0.05$ ; \*\* $p < 0.01$ .

SRC: Standardized regression coefficient.

ceived by managers, may be expected to vary by firm, since the firms were in different industries and one was located in a country different from the other two firms. Mean PEU scores for managers from each firm were: oil tools ( $\bar{X} = 21.22$ ); brewer ( $\bar{X} = 18.15$ ); and petrochemical ( $\bar{X} = 21.63$ ) ( $F = 4.10$ ,  $p < 0.05$ ). The ANOVA shows statistically significant variance among the mean PEU scores. However, Duncan's multiple range test, used to examine where those differences occurred, failed to show significant differences by firm. The only element in the environment where differences were detectable regarded the 'clients' dimension. The brewery managers had statistically significant lower perceived uncertainty with clients ( $\bar{X} = 2.33$ ) than oil tools managers ( $\bar{X} = 4.33$ ) or petrochemical managers ( $\bar{X} = 4.05$ ) ( $F = 20.91$ ,  $p < 0.02$ ).

Table 9. Duncan's multiple range test for differences in perceived environmental uncertainty among management levels\*

Dimension	Management level		
	Lower	Top	Middle
Overall PEU			
Client environment			
Financial market			
Labor union environment			

\*The management levels are presented in order of the mean PEU values from highest to lowest. The differences in PEU for any two management levels not underscored by the same line are statistically significant.

Although few differences in PEU were found by firm, differences in PEU by management level were detected in the ANOVA. The mean PEU scores by management level were; lower-level managers ( $\bar{X} = 22.19$ ); middle managers ( $\bar{X} = 18.48$ ); and top managers ( $\bar{X} = 20.15$ ) ( $F = 4.96$ ,  $p < 0.02$ ).

Major differences existed by management level in the perceived uncertainty of 'clients' ( $F = 7.01$ ,  $p < 0.02$ ), 'financial markets' ( $F = 2.86$ ,  $p < 0.07$ ) and 'labor unions' ( $F = 2.90$ ,  $p < 0.07$ ). Results of Duncan's multiple range test appear in Table 9. As shown, lower-level managers perceived more general environmental uncertainty than middle-level managers, but not as compared to top-level managers. Lower-level managers perceived more environmental uncertainty in the 'clients' dimension than top or middle managers. Lower-level managers perceived more uncertainty in the financial markets than middle managers. Finally top managers perceived more environmental uncertainty with labor unions than middle managers. These results support Hypothesis 3.

## DISCUSSION

The results indicate that the importance of strength and weakness indicators varies by management level and by firm. In addition, the results indicate that differences in perceived

environmental uncertainty also occur by management level.

Although assessments of strengths and weaknesses and the external environment have been assumed critical stages in the normative model of strategy formulation, they have received surprisingly little attention in the research literature. It is assumed that managers involved in the strategic planning process basically agree on the assessment outcomes of the planning process.

The only major systematic study of how organizations define strengths and weaknesses was conducted by Stevenson. He concluded that:

The results of the study brought into serious question the value of formal assessment approaches. It was found that an individual's cognitive perceptions of the strengths and weaknesses of his organization were strongly influenced by factors associated with the individual and not only by the organization's attributes. Position in the organization, perceived role, and type of responsibility so strongly influenced the assessment that the objective reality of the situation tended to be overwhelmed. In addition there were wide variations among standards of measurement and criteria for judgement employed (1976: 55).

The results of the present study support Stevenson's conclusions. Different tasks, schemas, cognitive biases, availability and the salience of information across managerial levels seem to affect perceptions of the importance of strength and weakness indicators and perceptions of environmental uncertainty. Importance of strength and weakness indicators also varied by firm.

It has been suggested that managerial agreement on various critical organizational variables enhances financial performance (March and Simon, 1958; Thompson, 1967). Hrebiniak and Snow (1982) support this conclusion. Specifically, these researchers found that agreement among top-level managers regarding a firm's strengths and its weaknesses (from among 10 key organizational functions) was related to financial performance. Thus, the findings reported herein may have important implications for the performance of firms using strategic planning processes that include managers from various levels.

While different orientations among managers are generally acknowledged, the effects on the

strategic planning process may be critical. Parsons emphasized the need for each managerial level to contribute qualitatively different inputs to firms' efforts. The significance of this interdependence is reflected in the following view: 'Either side is in a position, by withholding its important contribution, to interfere seriously with the functioning of the other and the larger organization' (1960: 69). However, if these differences become too great and/or are not understood, the survival of the firm may be threatened (van Cauwenbergh and Cool, 1982).

Partial support was provided for the hypotheses regarding the specific strength and weakness indicators important at each managerial level. Explanation for only partial support may be found in the firm effects. Although we may expect the importance of strength and weakness indicators to vary by management level, the importance also seems to vary by firm. Thus, importance of indicators may vary across firms at the same managerial level. As such, managerial level and firm-specific factors may interact to determine the importance of strength and weakness indicators.

Examination of the strength and weakness indicators by management level within each firm suggested greater variance by managerial level in the perception of a firm's strengths and weaknesses indicators. In the oil tools firm, for example, only four indicators (the interest and abilities demonstrated by top management, the planning system, knowledge of clients' needs, and information on market share) were selected by managers at all three levels. In total, 14 indicators appeared in these managers' models. Of greater interest is the fact that four other indicators were chosen only by lower-level managers, while three others were included only in middle-level managers' models.

The diversity is even more pronounced among subjects in the brewery and petrochemical firms. Only one indicator (the planning system) appeared in all three managerial levels' models in the brewery firm. Three indicators were common to top- and middle-level managers. Interestingly, top managers included three indicators in their models that were not selected by the remaining two sets of managers, while three other indicators were chosen by middle managers alone. Finally, no common indicators emerged

between the two managerial levels (top and middle) in the petrochemical company).

Conversely, firm effects, in contrast to managerial level, were not found to have a strong influence on perceived environmental uncertainty. Since the lack of firm effects is counterintuitive, more research is required before definitive conclusions can be reached. However, the results raise an important research question.

The results showed differences in perceptions of environmental uncertainty among individuals in different managerial levels. This suggests that managers' cognitive schemas do affect their perceptions of the degree of environmental uncertainty faced by their firms. Overall, lower-level managers perceived significantly greater amounts of uncertainty as compared to those at the middle level, but not as compared to top-level managers. Thus, the heuristics used by lower-level managers, and the kinds of information available to them, may influence perceptions of environmental uncertainty differently from those of middle-level managers.

This finding is also of interest in light of Thompson's (1967) work. Thompson suggested that organizations attempt to seal off, or buffer, their technical cores from environmental disturbances in order to increase efficiency. The aforementioned results may reflect a failure to buffer effectively the cores in the three firms studied.

## IMPLICATIONS

The normative model of strategy formulation holds that the process starts with the assessment of a firm's internal strengths and weaknesses and its external opportunities and threats. While other perspectives exist, the normative model has undoubtedly been the most popular.

The results of this study have important implications for how strategies are formulated within firms. These findings suggest that an emphasis must be placed on group processes to resolve the differences between the individual managers—in particular, where managerial level differs—if the normative formulation process is to be used. However, when planning, many firms use group processes primarily among managers at similar levels. Also, where groups are used with participants from different managerial levels, status and power differentials often stifle open

discussions of 'true' feelings and differences in perceptions. Thus the normative, strategy formulation process may still be limited by the differences reported herein, even when group processes are used.

These results have consequences for both research and practice in strategic management. From a practical point of view, three issues are of immediate concern. First, should the normative model be modified to recognize differences between management levels and include processes to overcome them? Second, what is meant by 'strengths and weaknesses' and 'opportunities and threats'? Operationally, these terms are partially dependent on the level of management doing the assessment. The assessment cannot be divorced from the assessor. Third, these questions place strong emphasis on the group processes (both group membership and the process of group interaction) used in strategy formulation. These issues cut directly to the design of strategic planning systems and processes. Should systems be designed to focus on the union or the intersection or some other set of assessments? Can assessments be weighted and combined? How much and what kind of input should be sought from the various levels of managers? Questions such as these, largely absent in the normative model, become highly salient in light of the current research.

From a research perspective the current study raises several interesting issues. Among these are the fact that these results call into question the use of questionnaire approaches when conducting strategy research, wherein typically a single manager is asked to respond to questions about a firm, its strategy, its planning process, or its environment. Such studies obviously run a substantial risk of measuring the perceptions of a sample of individuals rather than the characteristics under study. But then one is still left with the philosophical issue of the 'true' response, given the difficulty of separating the assessment from the assessor.

An interesting research issue is the partition of the variance in perceptions of a particular variable such as strengths. For example, how much of it is due to industry effects, firm effects, managerial level, functional specialty, and individual differences? In this context the current work is merely a specialized study that raises the more general issue.

Overall the research reported herein suggests that much more investigation is needed in the role of perception and cognition in strategy formulation. How do managers involved in strategy formulation processes perceive and conceptualize important issues? What are the relationships between perceptions, conception and reality? How do schemas vary across firms and across managerial levels in a particular firm? What are the differences in the kinds of information evaluated by managers at different levels to determine a firm's strengths and weaknesses? Can 'objective' approaches to strategic management, independent of the particular manager, be developed? Finally, this study should be replicated in countries outside Latin America (e.g. Europe, the United States) to examine cultural effects, if any. These and related questions raise vital issues that are as yet only modestly understood and in need of substantial study.

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