MANAGERIAL AND DECISION ECONOMICS, VOL. 11, 99-109 (1990)

Strategic Groupings as Competitive Benchmarks for Formulating Future Competitive Strategy: a Modelling Approach

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Previous studies on strategic groups have examined issues such as the identification of strategic groups, the relationship between strategic groups structure and industry performance, and the movement of strategic groups over time. In contrast to previous studies, this paper uses the analytical concepts of game theory to explore the question of what strategic groups will exist in the future. These benchmark (future) strategic groups represent long-run strategic positions available within an industry and thus reference points for firms in developing sustainable competitive strategies. The benchmark strategic groups are discussed and comments are offered to illustrate how firms can use the benchmark information to redirect their strategic positions in order to survive and remain competitive in the long run.

INTRODUCTION

Since Hunt (1972) coined the term 'strategic groups' in his study on the home appliance industry, a growing body of empirical literature has adopted this concept to analyze industry structure and to identify competitors and competitive positions available within the industry (McGee and Thomas, 1986; Porter, 1980; Cool, 1985). Current empirical studies demonstrate that strategic groups exist within industries such as brewing (Hatten, 1974), petroleum (Newman, 1978) and drugs (Cool & Schendel, 1987), as well as for a sample of fifty US manufacturing industries (Hergert, 1983).

Several studies have examined the strategic groups structure and its relationship to average industry profitability. Newman (1973, 1978) hypothesized that heterogeneous strategic groups within an industry complicate oligopolists' agreement on a common set of market goals and reduce their degree of adherence to a tacit agreement. Also, the introduction of the concept of strategic groups has improved the predictability power of the structure-conduct-performance paradigm. For example, Hergert (1983) explored the structure-performance linkage for fifty US manufacturing industries and confirmed Newman's theory that performance would not be homogeneous across the industry. More specifically, when the 'conduct' of the industry was represented by the number and tightness of the strategic group structure, and the distance between and within the groups, it was found that 'conduct' had a strong impact on average industry profitability. Researchers such as Hatten (1974), Dess and Davis (1984), Harrigan (1985), Hawes and Crittenden (1984), Patton (1976), Porter (1979), Cool and Schendel (1987) and Fiegenbaum (1987) have also found that performance differences

0143-6570/90/020099-11$05.50

exist across strategic groups within the same industry.

Indeed, Porter (1979) used the concepts of strategic groups and mobility barriers to develop a theory that explains interfirm performance differences. According to this theory, the configuration of strategic groups (number, size, etc.), the location of the strategic group relative to other strategic groups, the location of the firm within the strategic group and the ability of the firm to implement its strategy will affect firm performance. In addition, the existence of mobility barriers (Caves and Porter, 1977) affects the process of rivalry within an industry and explains why persistent performance differences exist across strategic groups. Mobility barriers protect superior strategic groups from the expected invasion of firms from inferior strategic groups.

Finally, another more recent stream of research has looked at some dynamic characteristics of strategic groups. For example, Cool and Schendel (1987) and Fiegenbaum *et al.* (1987) found that the number of strategic groups changed over the time period of their studies, with certain transient groups emerging (and then disappearing) around more stable long-run strategic groups. It was also found, however, that there was a relatively low level of firm movement across strategic groups (see also Oster, 1982).

Yet, while the preceding review has demonstrated the potential usefulness of the strategic groups concept in the context of industry analysis and competitive interaction, there is still much debate about how strategic groups should be identified (Cool, 1985; Fiegenbaum, 1987). While previous studies have used exploratory multivariate techniques such as cluster and factor analysis to identify strategic groups, this paper introduces a theoretical approach based on game theory concepts to explore such important questions as what possible sets of strategic groups may exist in the future, how many there will be and a derivation of their location on the strategic space. The advantage of this approach is that the future structure of strategic groups (i.e. the long-term viable positions noted by Cool, 1985, and Fiegenbaum, 1987), rather than the past and present structure typically presented in existing research studies, can be identified. This game-theoretic approach can therefore complement and enrich other methods for studying competitive strategy and strategic groups. Taken together with multivariate perspectives, it should provide richer insight into the reasons for the existence of the available strategic positions in the overall competitive space.

THE BENCHMARK MODEL

Kumar (1987) proposes a game-theoretic model of a monopolistic competitive industry and shows how strategic groups may arise even though firms are identical in cost structures and preferences.[1] This model is very similar to those developed by Karnani (1982, 1984a) in the strategy literature. In the Kumar model, the identification of strategic groups requires the explicit knowledge of the firms' utility functions specified in terms of the set of strategic controllable and uncontrollable variables (as is the case in Karnani, 1982, 1984a). Unfortunately, the estimation of utility functions is an immensely difficult task, and consequently the game-theoretic model has minimal practical significance from a strategy-formulation perspective.

An alternative model for prediction of the possible set of strategic group structures in an industry is presented in this section. The model base is essentially similar to that of Kumar (1987) but drops the stringent requirement of specific functional forms. The results derived from this model provide possible strategic groupings that are called theoretical benchmarks (or reference points). These benchmarks signify generic groupings that could emerge in the process of industry evolution. Recognizing these generic groupings and the current industry structure, a firm can choose to redirect itself into the most favorable generic strategy position.

The basic elements used to model the strategic behavior of firms in an industry include goals/objectives (personified by a utility function), possible actions, scope or resource decisions (involving controllable strategic variables, say, in the areas of marketing, finance and manufacturing) and environmental constraints (in the form of non-controllable variables) chosen to describe the competitive nature of the industry. For the sake of model exposition the strategic controllable variables will be assumed to be marketing strategy MK, measured by the sales-to-marketing expenditure ratio, manufacturing strategy MF, measured by the sales-to-invested capital dollars ratio, and financial strategy FN, measured by the inverse of the weighted average cost of capital.[2] It is also assumed that they can be computed and controlled by firm-level strategists. The non-controllable variables, depicting competition, will be assumed to be industry average marketing strategy AMK, industry average manufacturing strategy AMF and industry average financial strategy AFN.

A reasonable behavioral assumption for the controllable variables is that strategists should exhibit increasing preference over the strategy variables; i.e. they prefer a higher value for the sales-to-marketing expenditure ratio, a higher value for the sales-to-invested capital dollars ratio, and a higher value for FN since a lower weighted average cost of capital value is preferred. It is also assumed that each of these variables is measured on an ordinal scale, relative to the corresponding uncontrollable variable or industry average variable. More specifically, the number of classes on the ordinal scale will be restricted to 3, namely, above average, average, below average. (See Hall, 1980, for an application of this type of measurement.)

Valid Efficient Frontiers or Benchmark Strategies

Given the above assumptions, a strategy for a firm is defined by the triplet (MK, MF, FN) where the values of MK, MF and FN are measured as belonging to one of three classes: (1) below average, (2) average, and (3) above average. For example, the vector (3, 1, 3) represents a strategy denoting above-average marketing and financial strategies, and below-average manufacturing strategy.

The above definitions dictate that every firm choose a point in a cube, each lattice point referring to a unique strategy. Given the assumption of monotonic firm preferences over the strategic variables, the vector (3, 3, 3), which represents above-average strategies in marketing, finance and manufacturing, is the ideal strategy at any given point in time.

The next assumption is that the viable strategies, in any strategic grouping structure, must be those on the efficient or current technology frontier. Essentially, this implies that the frontier strategies are not dominated by others on the frontier while, at the same time, the frontier forms a dominated pair with every other strategy not on it. To make these concepts precise:

Definition: Strategy i, namely (MK_i, MF_i, FN_i), is said to be *superior* to strategy j, namely (MK_j, MF_j, FN_j) if and only if

$$MK_i \geqslant MK_j, MF_i \geqslant MF_j, FN_i, \geqslant FN_j$$

with, at least, one strict inequality. In this case, strategy j is said to be *inferior* to strategy i. The pair of strategies (i, j) is said to form a *dominated pair*.

Definition: Two strategies are *mutually compatible* (non-dominated) if neither is superior (or inferior).

Definition: An efficient or current technology frontier F is a set of strategies $\{(MK_1, MF_1, FN_1), \ldots, (MK_n, MK_n, FN_n)\}$ such that

Condition (a) Each strategy in F is mutually compatible with every other strategy in F;

Condition (b) All the strategies not in F are either superior or inferior to some strategy in F i.e. for every strategy not in F there is, at least, one strategy in F which forms a dominated pair.

Condition (a) represents the idea that only those strategies that are preference-comparable, from the firm's perspective, can survive in any strategic group structure. Condition (b) ensures that all the other available strategies for the firm form dominated pairs with the efficient frontier; i.e.

(1) If an available strategy is inferior to one in F, then it cannot be on that efficient frontier.
(2) If an available strategy is superior to any strategy in F, then, assuming F is the current state of the technology, that strategy is not yet achievable and cannot be on that efficient frontier.

The two conditions (a) and (b) are similar to the definition of the stable set solution concept used by Von Neumann–Morgenstern in game theory (Owen, 1968, p. 166).

For example, strategy (3, 3, 3) is an efficient frontier set (consisting of one strategy) but it cannot be considered a valid frontier since if this is what the entire industry chooses, then this is also the industry average. Clearly, it cannot be above average in all the strategies! Therefore, to make the concept of industry averages compatible with efficient frontiers, we define:

Definition: A valid efficient frontier F^* is an efficient frontier that satisfies condition (c), namely:

Condition (c) Each variable represented in F^* must, at least, take on the values of above average and below average in F^*.[3]

Each of the strategies in F^* are considered to depict a strategic group and the entire set F^* is considered to be a proxy for an equilibrium. The rationale behind this is that the market demand may be distributed among the various strategies (in F^*) in such a way as to allocate equal utility to each strategy in F^*. In such an event, no firm has any inclination to change its strategy (or its membership in any group) to another in F^*, which makes F^* a self-sustaining equilibrium strategy frontier. This equilibrium concept is a close approximation to the notion of the Nash equilibrium used by Karnani (1982, 1984a) and Kumar *et al.* (1984).

F^* is a local equilibrium in the sense that each firm is indifferent between the strategies in F^*. There is an incentive for all firms to achieve a strategy that dominates those in F^* since, then, the other strategies may become dominated, leading to higher gains to the firm achieving the dominant strategy.

The Benchmark Model Applied: Example of Benchmark Concepts

Let us consider some simple numerical examples that should explain the logic underlying these concepts. The set $\{(3,2,3), (3,3,2)\}$ is an efficient frontier but does not satisfy condition (c) and hence is not a valid efficient frontier. The set of strategies $\{(1, 1, 3), (1, 3, 1), (3, 2, 2)\}$ is a valid efficient frontier with three strategic groups. The first strategic group of firms, using strategy (1, 1, 3), adopt above-average financial strategy (while being below average in the other two); the second group, using strategy (1, 3, 1), adopt above-average manufacturing strategy (while being below average in the other two) and the third strategic group, using strategy (3, 2, 2), adopt above-average marketing strategy while achieving the industry average in the other two. No group dominates any other group and the concept of average is maintained. If the market allocates values to the three strategic variables in such a way that the utility achieved by each of the strategies is the same, then the valid efficient frontier is a local strategic group equilibrium; i.e. no firm has any incentive to move to another strategic group. There is, however, an incentive to break out of this equilibrium to a more dominant position; e.g. a firm using strategy (3, 2, 2) could direct its resources to increasing its manufacturing competence, i.e. move to strategy (3, 3, 2). If it does achieve this, then it will eventually eliminate any firm using its previous strategy (3, 2, 2), since it is dominated. It also effectively dominates the group using strategy (1, 3, 1) but strategic group (1, 1, 3) is not dominated. Also, $\{(1,1,3), (3,3,2)\}$ is an efficient frontier but not a valid one (since all firms have average or above-average financial competence). This implies that, with the exit of firms and changes in associated strategic group positions, new averages have to be computed and a redistribution of firms within the strategy cube becomes necessary.

Results Derived from the Benchmark Model

Since the strategic space defining the domain of feasible strategies (i.e. the cube) is finite (in fact, 27 possible strategies in the expository case) and the frontier is clearly defined, the valid efficient frontiers can be completely enumerated. This was done using a computer program and the entire list appears in the appendix. The following characterization emerges from analyzing the list:

Result 1: There are 113 possible valid efficient frontier sets F^*. Of these six have cardinality 3, 40 have cardinality 4, 57 have cardinality 5, nine have cardinality 6 and one has cardinality 7.

Result 1 lists all possible valid frontiers that may have the local optimum property; i.e. no firm will desire to move to another existing strategic group. This is very similar to the Nash equilibrium concept in non-cooperative game theory. Further refinements in this equilibrium position could be addressed in the following way. Which of these strategic group equilibria will persist if the utility function (i.e. preferences, demand distribution, cost structures) is perturbed by a small amount? If the equilibrium persists following perturbation, then it is said to be structurally stable (similar to the continuous space version in Kumar, 1987).

It is claimed that those valid efficient frontiers that have strategies that are identical in one dimension and perfectly inversely correlated in the other two strategies are not stable under perturbation. For example, consider $F^* = \{(1,1,3), (1,3,1), (3,2,2)\}$, in which the strategies (1, 1, 3) and (1, 3, 1) are equivalent in terms of marketing strategy and symmetric but inversely correlated (i.e. (1, 3) and (3, 1)) in terms of manufacturing and financial strategies. If F^* is to be an equilibrium, then the utility associated with these strategies is exactly the same or there is an imputed symmetric valuation of the manufacturing and financial strategies. If we perturb this valuation in favor of either of these dimensions (say, manufacturing) then utility equalization can only be potentially regained (assuming only the lower utility group, i.e. (1, 1, 3) moves) by the configuration (1, 2, 3) and (1, 3, 1), i.e. an improvement in manufacturing strategy by the first strategic group. However, then $F^* = \{(1, 2, 3), (1, 3, 1), (3, 2, 2)\}$ is no longer efficient—it needs the strategy (3, 1, 3) to make it a valid efficient frontier. This shows that the nature of the strategic group completely changes with just a minor perturbation. This leads to Result 2, which indicates all the structurally stable valid efficient frontiers:

Result 2: The only *structurally stable* valid efficient frontiers (i.e. benchmark strategic group structures) F^{**} are 12 in number and are:

(1) {(1, 1, 3), (1, 2, 2), (3, 1, 2), (3, 3, 1)}
(2) {(1, 1, 3), (1, 3, 2), (2, 1, 2), (3, 3, 1)}
(3) {(1, 1, 3), (1, 3, 2), (3, 2, 2), (3, 3, 1)}
(4) {(1, 1, 3), (2, 3, 2), (3, 1, 2), (3, 3, 1)}
(5) {(1, 2, 2), (1, 3, 1), (3, 1, 3), (3, 2, 1)}
(6) {(1, 2, 3), (1, 3, 1), (2, 2, 1), (3, 1, 3)}
(7) {(1, 2, 3), (1, 3, 1), (3, 1, 3), (3, 2, 2)}
(8) {(1, 3, 1), (2, 2, 3), (3, 1, 3), (3, 2, 1)}
(9) {(1, 3, 3), (2, 1, 2), (2, 3, 1), (3, 1, 1)}
(10) {(1, 3, 3), (2, 1, 3), (2, 2, 1), (3, 1, 1)}
(11) {(1, 3, 3), (2, 1, 3), (2, 3, 2), (3, 1, 1)}
(12) {(1, 3, 3), (2, 2, 3), (2, 3, 1), (3, 1, 1)}

A rationale for studying stable frontiers is that one might be looking at the mature stage of the industry life cycle, where there is potentially the most stable industry structure with relatively minor environmental perturbations. This model would therefore predict that for industries in the mature stage of their life cycles (given the three strategic dimensions of marketing, manufacturing and financial strategies), only the above stable frontiers F^{**} can emerge.

Some features of the stable frontiers are worth mentioning:

(1) Essentially, there exist only *four generic stable frontiers*. The other eight are permutations in terms of the dimensions. For example, given stable frontiers (1)–(4), we can generate (5)–(8) by interchanging the Manufacturing and Finance dimensions and (9)–(12) by interchanging the Marketing and Finance dimensions.
(2) The cardinality of all the stable frontiers is exactly 4. This fits with the instability theorem in Kumar (1987) which states that given three strategic dimensions, only three plus one or four strategies, at most, can occur. Further, it is conjectured that this result is independent of the arbitrary measurement of the strategic dimensions within three classes.
(3) In all the stable frontiers there is always one strategic dimension that is present only in above- and below-average classes while the other two appear in all three classes.
(4) In line with (2), the strategy (2, 2, 2) or average in all three dimensions is not a stable strategy. This implies that in any mature industry, firms probably have to specialize; i.e. be superior in at least one dimension, be it marketing, manufacturing or finance. This is consistent with Porter's (1980) argument about generic strategies.
(5) There is equi-preference shown across the twelve stable frontiers. Therefore it is impossible to predict which strategic group structures may obtain in the future. These twelve strategies, however, provide stable valid efficient frontiers and thus serve as the basis for the development of the four generic stable benchmark structures.

The relationship of Results 1 and 2, in particular, and the benchmark model, in general, to industry analysis and strategic management is discussed in the next section.

STRATEGIC MANAGEMENT IMPLICATIONS

In the previous section a specific model form was used to illustrate how the concept of dominated strategies could develop valid efficient frontiers F^*. These frontiers were refined, using structural stability concepts, to derive the benchmark strategic group structures F^{**}. This section shows how these frontiers can be useful in formulating firms' future competitive strategy. In performing this task we first describe how to identify and formulate the relevant competitive strategy space and how to define the efficient frontiers. Second, we will analyze the various strategies that firms should consider in order to position themselves on these frontiers in order to survive in the long run.

Formulating the Strategy Space

Researchers in the area of business policy/strategic management have taken different approaches to formulate strategic groups. Thomas and Venkatraman (1987) have identified and classified the dominant perspectives in the treatment of strategic groups based on a two-dimensional scheme, namely, the operationalization of strategy and the approach adopted for the development of the group. The description of this classification is summarized in Fig. 1.

The choice of the first dimension, the operationalization of strategy, reflects the idea that the value of strategic groups as a competitive construct depends on the manner in which the strategy concept is operationalized (see also McGee and Thomas, 1986). In viewing this dimension, Thomas and Venkatraman (1987) distinguish between those studies that have operationalized strategy in *narrow* terms (focusing on one functional area or one dimension) versus those that view strategy in relatively *broader* terms (focusing on multiple functional areas or multidimensional). This approach is consistent with other strategic management researchers that distinguish between the 'parts' versus 'holistic' view (Hambrick, 1980) or the 'undimensional' versus 'multidimensional' (Porter, 1980) view of strategy.

The second dimension of the scheme focuses on the methodologies used to identify strategic groups. Thomas and Venkatraman point out that some researchers specify the characteristics of the group *a priori* based on theoretical explanation, whereas other researchers have used statistical techniques to identify group members. For example, Porter (1979) used market share to assign *a priori* group members while Harrigan (1985) employed the cluster analysis technique to develop strategic groups based on strategic postures involving several strategic variables simultaneously.

Based on this two-by-two matrix, four different strategies exist to formulate strategic groups. Each approach has its own set of assumptions, goals, strengths and limitations. Our recommendation is that since strategy formulation is a complex task, especially when strategists have to confront future strategies, a multiple-perspective approach may often be appropriate and sensible. More specifically, each of the four strategies should be considered and alternative strategic groups scenarios should be explored and examined. This is consistent with Porter's (1985) request for scenario analysis in strategic management as a means of identifying sustainable competitive strategy positions.

Another important question raised by this research is whether the strategic dimensions that characterize strategic groups will differ in the future from those relevant either now or in the past. Most strategic-group studies assume that these dimensions do not change over time. It is known, however, that firms use different ways to compete over time. For example, the literature on technological change (e.g. Freeman, 1983) suggests that innovation encourages firms to look for different strategies, whether to exploit first-mover advantages or other technical capabilities and skills. Our recommendation is that these aspects should also be

NARROW ('parts') (unidimensional)	*Description. A priori* definition using a narrow conceptualization of strategy, and may be empirically supported (I)	*Description.* Empirical development using a narrow conceptualization of strategy (II)
BROAD ('holistic') (multidimensional)	*Description. A priori* definition using a broader conceptualization of strategy, and may be empirically supported (III)	*Description.* Empirical development using a broader conceptualization of strategy (IV)
	A priori (Theoretically specified and may be empirically supported)	*A posteriori* (Empirically derived)

APPROACH TO GROUP DEVELOPMENT

Figure 1. Classificatory scheme for strategic groups research. (Source: Thomas and Venkatraman, 1987)

considered as part of the scenario analysis recommended earlier.

In summary, once the strategy space is identified existing methodologies can be used to identify past and current strategic groups. Then, the methodology developed in this study can be adopted to identify benchmark strategic groups that focus on the future benchmark group positions. Based on this procedure, firms should consider different strategies in order to move toward the sustainable benchmark groups. These strategies will be considered next.

Strategic Moves

As noted in the model discussion, the efficient frontier is an isoprofit curve, meaning that the firm is indifferent about the choice of where to position itself as long as it is on the curve. Two factors should condition such choices. First, the costs associated with strategic moves and, second, the sequential moves that may be available after the relocation of the firm on the efficient frontier.

The cost criterion indicates that the firm should choose the strategic pattern or posture that minimizes its movement costs. A cost analysis of the movement between the current strategic group position and any one of the strategic groups on the efficient frontier has to be calculated. The firm's resources, both in terms of tangible and intangible assets, should be examined leading to an analysis consistent with Wernerfelt's (1984) resource-based view of strategic redirection. In contrast, the sequential moves criterion emphasizes the alternatives available for the firm when it is positioned on the efficient frontier and considers potential future moves if the industry is impacted by a structural change.

For example, consider the strategic positions adopted in the US automobile industry in the 1970s and, particularly, the positioning of General Motors and Ford on three critical dimensions: cost, quality and innovative products. GM and Ford had achieved average levels of quality and innovative products but GM had a low-cost position. Clearly, Ford's strategy was dominated as evidenced by its declining performance. At about this time, the Japanese manufacturers entered the industry with average innovative products, lower cost than GM and above-average level of quality. Ford moved its strategy to produce at a higher level in terms of innovative products and quality while GM pursued lower cost and higher quality levels through technology acquisition. It appears that Ford's move was easier to achieve both in terms of cost as well as time; GM's move, at least in the short run, does not seem to have borne fruit while being extremely expensive (*Business Week*, 1988). Our analysis indicates that the alternative strategies facing GM (namely, more innovative products/improve quality and lower cost/improve quality) can be identified and management can then assess which route to take by considering criteria involving cost and future flexibility. Since this strategic moves analysis of the automobile industry may be criticized as being too simplistic, let us return to examples that illustrate similar arguments but in the context of the previously developed expository model used in the model results section.

By observing the benchmark strategic groups and also the current strategic groups, firms can make decisions as to what direction they should take. For example, suppose that the industry currently shows the following strategic groups structure, namely, $\{(1,1,2), (1,2,1), (1,2,3), (1,3,1), (3,1,3)\}$. Let us focus on the strategy of a firm in the strategic group $(1,2,1)$, which is in a disastrous position (since it is dominated by firms using strategies $(1,2,3)$ and $(1,3,1)$). It needs to spend resources improving its position *vis-à-vis* its competition. Which position should it aim for, given its current position? The groups $(1,2,3)$, $(1,3,1)$ and $(3,1,3)$ do not dominate one another and represent stable positions in benchmark groups 6 and 7 of Result 2. The easiest (and probably least expensive) action would be to aim for strategy $(2,2,1)$, which is the remaining element of benchmark group 6. This implies that the firm in group $(1,2,1)$ has to improve its marketing strategy.

Continuing this analysis further, a firm in the strategic group $(1,1,2)$ is in an equally disastrous position (being dominated by firms using strategies $(1,2,3)$ and $(3,1,3)$). It may choose to adopt as its objective the strategy $(1,2,3)$ rather than strategy $(2,2,1)$, since in the latter case it will have to worsen its financial strategy position, while in the former case, it will be building on its strengths. After the decision has been made, it must attempt to improve its manufacturing and financial strategies.

This type of matrix formulation to identify strategic postures of firms in an industry has been used by Hall (1980) in his well-known paper on survival strategies. Hall's research is a strategic analysis of two factors, i.e. cost and differentiation, in a variety of basic industries. In the heavy-duty truck industry (Exhibit, VII, pp. 81, Hall, 1980), Ford and Paccar form the efficient frontier, not dominating each other, with Ford having an edge in cost and Paccar in relative performance. All the other firms have strategies that are dominated and hence achieve lower financial performance. From a strategic management perspective, all the dominated firms should try to move, imitating either Ford or Paccar (assuming that cost and performance are the only dimensions of competition). As they move, the industry matrix structure will change and new analyses will need to be conducted.

While concurring with Hall's analysis in this context, our concept of efficient frontiers leads to different conclusions about the attainment of a dynamic equilibrium. Hall postulates that four industry strategic groups will exist ranging from leadership position to marginal/failing position. Our analysis (as well as that of Karnani, 1984b) claims that this cannot be an individually rational equilibrium since there is every incentive for the firms in the marginal positions to move from their current strategy (unless there are major mobility barriers erected between groups—more on this below). Karnani's analysis uses the concept of Nash equilibrium strategies which, by definition, leads to local stability in terms of individual firm strategies. Using our analysis, the *only* valid efficient frontier set is composed of the following strategies: (high differentiation, high cost), (low differentiation, low cost) and (average differentiation, average cost). This is not a stable valid efficient frontier.

Both Hall and Karnani motivate strategic positions with a balance between factors, in their case cost and differentiation. In Hall's analysis, the 'next best position' is slightly above-average differentiation, slightly below-average cost. In Karnani's analysis, the cross-elasticities between these two factors decide what the balance should be. In our framework there exists no stable valid efficient frontier with (average MK, average MF, average FN) strategy, i.e. no display of the 'stuck-in-the-middle' syndrome (Porter, 1980).

Our analysis procedure is designed to aid strategists (just as Hall's analysis). It formalizes Hall's procedures for cases with more than two strategic factors and introduces the concepts of domination (in lieu of equilibrium). While Karnani uses similar constructs of equilibrium, his analysis is more to provide insight (similar to Kumar, 1987) and not a formalized procedure for strategists to implement. It is difficult (as noted earlier) to obtain consumer utility functions and producer profit functions explicitly (especially with more than two strategic factors). Our concepts are valid for any number of dimensions and can be easily implemented (as shown by Hall).

An important element in considering strategic movement by firms (such as those that are dominated) is the existence of mobility barriers (see the Ford/Paccar example). The theory of mobility barriers (see Caves and Porter, 1977) argues that barriers not only protect firms in a strategic group from entry by firms outside the industry, but also provide barriers to firms within the industry in moving from one strategic group to another. Mobility barriers vary among strategic groups and they are not industry-specific. Mobility barriers are endogenous variables in an industry, and strategic group members are motivated to contribute to the building of mobility barriers. When mobility barriers are considered, the decision of what direction a firm should take becomes more complicated. As was noticed by Caves and Porter, the course of action that maximizes expected returns may involve a sequence of moves rather than a direct move.

SUMMARY

Research in the area of strategic groups and competitive strategy has concentrated mainly on describing the past and present structure of strategic groups. In contrast, this study has focused on trying to predict the future structure of strategic groups. These benchmark strategic groups should be the target for strategic planners in directing the entire firm into viable future positions.

The paper has argued that different approaches should be taken in order to formulate strategic groups. For each approach, current strategic groups as well as the efficient frontiers that represent benchmark strategic groups should be identified. Then, the firms' strategists should analyze the best direction to take considering two major factors: the costs associated with the movement and the 'sequential moves' alternatives associated with future redirection.

Future research in this area can be extended into two major avenues. First, on the theoretical side, analytical models can be developed in order to determine what is the optimal pattern for strategic redirection. Second, empirical studies that explore the efficient frontiers of industries, and how firms reposition themselves, should be encouraged. At this stage, our purpose has been to provide an aid to the strategic manager. We hope that this approach will highlight some new aspects to the many ongoing empirical studies on strategic groups.

APPENDIX

In this appendix, the problem formulation for the efficient frontier model is explained and also the listing of the valid efficient frontiers F^* is given.

The problém formulation is as follows:

strategy space $C = \{(i, j, k) \mid i = 1,2,3, j = 1,2,3, k = 1,2,3\}$

strategy $= (i, j, k) = (MK, MF, FN)$

where

$$\left.\begin{array}{l}\text{marketing strategy } MK\\ \qquad\text{(or)}\\ \text{manufacturing strategy } MF\\ \qquad\text{(or)}\\ \text{financial strategy } FN\end{array}\right\} = \begin{array}{l}1,\ \text{below average}\\ 2,\ \text{average}\\ 3,\ \text{above average}\end{array}$$

Enumerate

$F^* = \{(i_1, j_1, k_1), \ldots, (i_n, j_n, k_n) \mid$ they form valid efficient frontiers$\}$

There are 113 such valid efficient frontiers and these are listed in Table A1.

Table A1.

Number	Cardinality	Valid efficient frontier strategies				
1	3	113	131	322		
2	3	113	232	311		
3	3	122	313	331		
4	3	131	223	311		
5	3	133	212	331		
6	3	133	221	313		
7	4	113	122	212	331	
8	4	113	122	312	331	
9	4	113	131	222	311	
10	4	113	132	212	331	
11	4	113	132	221	312	
12	4	113	132	231	322	
13	4	113	132	322	331	
14	4	113	232	312	321	
15	4	113	232	312	331	
16	4	113	232	322	331	

Table A1. Continued.

Number	Cardinality	Valid efficient frontier strategies				
17	4	122	131	221	313	
18	4	122	131	313	321	
19	4	122	213	231	311	
20	4	122	213	312	331	
21	4	122	231	313	321	
22	4	123	131	212	321	
23	4	123	131	213	322	
24	4	123	131	221	313	
25	4	123	131	313	322	
26	4	123	132	212	331	
27	4	123	132	221	313	
28	4	123	213	232	311	
29	4	123	232	313	321	
30	4	131	223	312	321	
31	4	131	223	313	321	
32	4	131	223	313	322	
33	4	132	223	231	311	
34	4	132	223	312	331	
35	4	133	212	221	311	
36	4	133	212	231	311	
37	4	133	212	231	321	
38	4	133	213	221	311	
39	4	133	213	221	312	
40	4	133	213	231	322	
41	4	133	213	232	311	
42	4	133	222	313	331	
43	4	133	223	231	311	
44	4	133	223	232	311	
45	4	133	223	313	332	
46	4	133	232	323	331	
47	5	113	122	131	212	321
48	5	113	122	131	221	312
49	5	113	122	131	312	321
50	5	113	122	212	231	311
51	5	113	122	212	231	321
52	5	113	122	231	321	321
53	5	113	131	22	312	312
54	5	113	132	212	221	311
55	5	113	132	212	231	311
56	5	113	132	212	231	321
57	5	113	132	222	231	311
58	5	113	132	222	312	331
59	5	113	122	131	212	321
60	5	113	122	131	222	312
61	5	113	122	131	312	321
62	5	113	122	212	231	311
63	5	113	122	212	231	321
64	5	113	122	231	312	321
65	5	122	131	213	221	311
66	5	122	131	213	221	312
67	5	122	131	213	312	321
68	5	122	213	231	312	321
69	5	123	131	212	221	311
70	5	123	131	213	221	311
71	5	123	131	213	221	312
72	5	123	131	213	222	311
73	5	123	131	222	313	321
74	5	123	132	212	221	311
75	5	123	132	212	231	311

Table A1. Continued.

Number	Cardinality	Valid efficient frontier strategies
76	5	123 132 212 231 321
77	5	123 132 213 221 311
78	5	123 132 213 221 312
79	5	123 132 213 231 322
80	5	123 132 213 322 331
81	5	123 132 222 313 331
82	5	123 132 231 313 322
83	5	123 132 313 322 331
84	5	123 213 232 312 321
85	5	123 213 232 312 331
86	5	123 213 232 322 331
87	5	132 232 313 322 331
88	5	132 223 231 312 321
89	5	132 223 231 313 321
90	5	132 223 231 313 322
91	5	132 223 313 322 331
92	5	133 213 222 231 311
93	5	133 213 222 312 331
94	5	133 213 232 312 321
95	5	133 213 232 312 331
96	5	133 213 232 322 331
97	5	133 222 231 313 321
98	5	133 223 231 312 321
99	5	133 223 231 313 321
100	5	133 223 231 313 322
101	5	133 223 232 312 321
102	5	133 223 232 312 331
103	5	133 223 232 313 321
104	6	113 122 131 212 221 311
105	6	113 132 222 231 312 321
106	6	113 122 131 212 221 311
107	6	123 131 213 222 312 321
108	6	123 132 213 222 231 311
109	6	123 132 213 222 312 331
110	6	123 132 222 231 313 321
111	6	133 213 222 231 312 321
112	6	133 223 232 313 322 331
113	7	123 132 213 222 231 312 321

NOTES

1. The results of that paper, namely, that the number of strategic groups is critically dependent on aggregated competitor strategies, remains valid when the stringent assumption of identical competitors (i.e. same form of utility function and parameters) is relaxed.
2. The marketing and manufacturing strategy variables involve measuring sales. Since sales for the next period is unknown and normally uncontrollable (i.e. not directly controllable except in a monopoly), the figure used could be sales for the last period or even forecasted sales for the next. The choice of the inverse of the weighted average cost of capital (WACC) rather than WACC itself, as the financial strategy variable, is to facilitate increasing preference over this variable value.
3. This condition also eliminates the possibility of all the strategies using the same average value for any variable. The reason for this is that this variable is no longer strategic; i.e. no firm differentiates itself from its competitors on this variable.
4. Here we are assuming that the industry being studied or analyzed has been in existence for some period of time.
5. For debates on the operationalization of the 'strategy' concept in the strategic management discipline, see Ginsberg (1984), Hambrick (1980), Snow and Hambrick (1980) and Venkatraman and Grant (1986).

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