The Role of Resource Profiles in Creating Competitive Heterogeneity Within Strategic Groups

Peter O. Foreman
Illinois State University

Randall E. Westgren
University Of Missouri, Columbia

This paper posits an integrated view of intra-industry competition, in which one can define the competitive strategy of any individual firm in terms of a combination of competitive positioning in the product/market space and profiles of key resources. We examine this by analyzing the patterns of firms' commitments with respect to these two dimensions of competitive strategy, in the form of product/market-based and resource-based configurations—i.e. strategic groups—within an industry. The two types of strategic groups are found to be nearly orthogonal, supporting our contention and suggesting that intra-industry competition can be depicted as an integration of these two key firm strategy decisions.

INTRODUCTION

The strategic group concept has been the subject of much debate over the past twenty-five or so years. Researchers have found varying degrees of support for the robustness and stability of strategic groups and for the relationship between group membership and performance, leading many to question the validity of the construct and its usefulness in strategic management research (Barney & Hoskisson, 1990; Hatten & Hatten, 1987; Ketchen et al, 1997; McGee & Thomas, 1986; Tang & Thomas, 1992; Thomas & Venkatraman, 1988). However, supporters of the strategic group concept remain, and several studies have attempted to address critics by either: 1) developing more rigorous analytical methodologies; 2) arguing for more sophisticated, integrative conceptualizations; 3) proposing alternative approaches for identifying configurations which demonstrate higher "face" validity; and/or 4) using more fine-grained techniques for examining the elusive relationship between group membership and performance.

As a result, we now have more complex, multi-faceted frameworks of intra-industry structure, a seeming plethora of means for identifying configurations within and industry, a array of terminologies for those configurations, more rigorous processes for conducting such analyses, and multi-level approaches for identifying performance differences among and between groups. We can now talk about "competitor groups" (Porac et al, 1989), "competitive groups" (Leask & Parker, 2007), "cognitive groups" (Bogner & Thomas, 1993; Osborne, Stubbart, Ramaprasad, 2001), "cognitive communities" (Nath & Gruca, 1997), "resource groups" (Mehra, 1996), and "strategic scope groups" (Hoothoofd & Heene, 1997), in addition to the traditional "strategic groups." Sometimes these groups represent common strategies, sometimes they are meant to reflect patterns of competitive interaction, and sometimes they are intended to encompass both.

Furthermore, some researchers have linked together these efforts and argued that strategic groups should be modeled and examined through multiple means, that there should be congruence across these alternative configurations, and that such congruence should be associated with performance differences across groups (Nath & Gruca, 1997; Osborne et al, 2001; Short et al, 2007). Others have integrated the resource-based view into the strategic group concept and its basis of mobility barriers, arguing that stable strategic groups only exist when the two are codetermined (cf. Bogner, Thomas, & McGee, 1996; Maijoor & van Wittelstoon, 1996; Mehra & Floyd, 1998).

Taken as a whole, a broader picture emerges from this recent work – that theoretically robust and practically meaningful strategic groups should display convergence across various configurations: whether they be derived from structural product/market variables, perceptual measures of firm attributes, assessments of inimitable resources, networks of directly-identified competitors, or content analysis of cognitive themes. In addition, convergence across alternative configurations should be associated with performance differences between strategic groups.

In this study, we respond to this emerging development in strategic group theory and propose an alternative view. In particular, the assumption that the theoretical concept of strategic groups necessarily implies or is contingent upon the kind of convergence outlined above is questioned. Common strategic positioning in the product market space of the industry is not assumed to have an association with archetypal bundles of firm resources and capabilities, as some have suggested (Mehra, 1996; Leask & Parker, 2007). In fact, if firms in the same strategic group have the same or very similar sets of resources upon which they are competing, then these resources cannot be considered "inimitable," at the least, and cease to be truly "rare" if they are too widely shared. The consequence is that the economic rents earned by a resource unprotected by rarity and inimitability become dissipated in the market, and the supernormal profits that are the visible evidence of competitive advantage disappear. A more logically consistent theoretical view is that, in an industry earning sustained economic rents, firms with similar resources and capabilities cannot be closely juxtaposed in their market position. That is, firms that are competing in the same product/market space must have different bundles of resources upon which they compete, or their rents would be dissipated by rivalry.

As others have previously argued (e.g., Barney & Hoskissen, 1990; Bogner et al, 1996), we believe that the strategic group concept has been too closely associated with industrial-organization-[IO]-derived notion of mobility barriers (Caves & Porter, 1977; Mascarenhas & Aaker, 1989), such that the two constructs have become nearly inseparable and synonymous. Several scholars have aimed to supplant this IO-perspective with a resource-based view of strategic groups (Amit & Shoemaker, 1993; Bogner et al, 1996; Mehra & Floyd, 1998), arguing that commitments of unique resources are a more valid proxy for delineating and differentiating strategic groups and their performance differences (Cool & Dierickx, 1993; Rumelt, 1984). This study builds on these works, arguing that firms make several different types or categories of strategic decisions and commitments and that these are not necessarily codetermined. More specifically, we frame firm-level competitive strategy as consisting of two separate issues: i.e., that a firm's decision regarding its product market positioning is a separate decision from the way in which it will employ its unique resources and capabilities to compete in that product market space. To the degree that both of these issues are components of firm-level strategy, and to the degree that there may be patterns or similarities in these two types of decisions across an industry, the idea of strategic groups should be seen as at least a two-dimensional construct.

That is, one strategic group configuration can be derived that meaningfully represents similarities in how firms position themselves in the product market space of an industry, while another very different set of strategic groups can be derived that accurately reflects archetypal commitments to and deployments of resources and capabilities. Furthermore, because both differences in how firms position themselves as well as what unique resources they employ may affect the competitiveness of the firm, both factors should influence performance. In fact, rents will only be sustainable in an industry when these two configurations have minimal overlap or convergence. Firms within an industry that choose to compete with one another in the same markets and with the same products or services, with business models based

on similar profiles of resources, are engaging in direct competition, and the end result would likely be diminished returns for all parties involved.

THEORETICAL BACKGROUND

As stated above, this paper is, in large part, a response to the decade-long expansion in the variety of ways of conceptualizing intra-industry structure – and more specifically, recent attempts to re-examine the strategic group concept and bolster its relevance by proposing and demonstrating convergence across different types of groups or alternative methods of forming such groups. These ideas largely assume an integration of firms' competitive positioning in the product-market space, their resource commitments and core capabilities, and their identity or reputation relative to the cognitive maps of managers. We argue that there is not necessarily a strong theoretical argument to support such a synthesis. Instead, we propose that these various structures should be decoupled and studied as separate-but-related phenomena, which may or may not overlap and interact with one another.

To fully explicate the situation and provide a rationale for our research, a brief review of recent work is required. To begin with, some have simply interpreted the problem with strategic group research as rooted in methodological issues, arguing for more careful selection of variables and more rigorous analytical techniques (e.g., Ketchen et al, 1997; Wiggins & Ruefli, 1995). As such, some scholars have attempted more sophisticated and fine-grained means of parsing out performance effects at different levels of analysis, the results of which demonstrate general support for strategic group configurations (Hoothoofd & Heene, 1997; Maijoor & Van Witteloostuijn, 1996; Nair & Kotha, 2001; Ruefli & Wiggins, 2003; Short, et al, 2007).

Other researchers have conceptualized intra-industry structure in multiple ways, proposing more nuanced views of strategic groups. In particular, some have argued for integrating the resource-based view (Barney, 1991), so that the strategic group represents common profiles of resources and capabilities (Bogner & Thomas, 1993; Mehra, 1996). Interestingly, the execution of such an approach often fails to completely incorporate these intentions. In one typical example, Bogner, Thomas, and McGee (1996) examined strategic groups that incorporate managers' "evaluations of resources"; and yet most of the variables chosen were related to structural, product-market characteristics of the firm's strategy.

Along similar lines, and often inter-related with the idea of integrating the resource-based view, several scholars have re-examined the relationship between strategic groups and inter-firm rivalry (Cool & Schendel, 1988; Lawless, Berg, & Wilsted, 1998; McNamara, Deephouse, & Luce, 2003; Smith et al, 1997). Much of this work shows that rivalry within groups is more significant than rivalry between groups, suggesting that rivalry and intra-industry structure should be decoupled. These studies typically leave the traditional IO notion of strategic groups relatively intact, but propose that rivalry is best modeled at the level of the firm and its resources.

Other researchers have expanded the conceptualization of strategic groups by grounding such configurations in managers' shared mental maps of the industry (Porac, Thomas, & Baden-Fuller, 1989; Reger & Huff, 1993). This line of research repeatedly demonstrates that such consensual maps of industry structure do exist (McNamara et al, 2003; Osborne et al, 2001). However, these configurations tend to largely reflect patterns of rivalry—rather than archetypal strategies or resource profiles, and as such are typically called "competitor groups."

Finally, a few scholars have argued for and demonstrated convergence across different types or means of forming strategic groups. Nath and Gruca (1997) propose that inherent in the definition of strategic groups is that firms in a given group follow a similar strategy, and that this similarity should manifest itself in a variety of ways. Thus, firms with similar scope and resource commitments should share similar cognitive structures, and these two configurations should converge with maps of similar competitors. Similarly, Osborne et al (2001) argue for and demonstrate convergence between group structures derived from "performance-based" measures and "cognitive mental models". Mehra and Floyd (1998) provide some theoretical logic to buttress such arguments for convergence, arguing that theoretically meaningful strategic groups will only exist when there is sufficient product-market heterogeneity in the industry and

such product market positions are associated with unique configurations of inimitable resources. Furthermore, they state that "absent the existence of relatively inimitable resources underlying a group's position … there will be no significant performance differences between any groups" (1998: 518).

In sum, although there has been an increasing recognition of multiple ways of conceiving of intra-industry structure, there is still a relative lack of consensus over how to model such plurality within strategic groups. In general, research has advocated either a plurality of methodology or a plurality of constructs, or sometimes both, but not multi-dimensionality of the strategic group construct itself. Some researchers have articulated multi-faceted views of industry structure, but take groups formed on the basis of a common strategy (i.e., strategic groups) and compare them to groups representing constructs such as "competition" (Leask & Parker, 2007), "strategic scope" (Hoothoofd & Heene, 1997), or "core versus secondary positions" (McNamara et al, 2003). Thus, a firm's "strategy" is but one basis for configurations of groups within an industry, and additional or alternative configurations are grounded in other constructs, such as rivalry or niche width or reputation.

We argue that a more logical and straight-forward approach is to see strategic groups as a *multi-dimensional construct*, such that there are multiple aspects of firm-level strategy which lend themselves to common configurations. More specifically, we begin with the recognition that there are at least two very significant dimensions to firm strategy: competitive positioning in the product-market space and value creation through a set of resources and capabilities. This fairly straightforward argument has been largely overlooked and unincorporated in research on strategic groups. Scholars have either failed to conceptualize intra-industry structure in such a two-dimensional manner, or they have imposed an artificial requirement of congruence on such multi-dimensionality, as noted above. To complicate matters, there is the assumption that strategic groups, however they are conceived, necessarily imply performance differences.

We propose that what is needed is a framework that defines strategic groups on the basis of multiple aspects of strategy. By that we mean, the term "strategic group" needs a qualifier: what type of strategic group are we referring to? To be sure, some attempts have been made to conceptualize intra-industry structure at multiple levels or along multiple dimensions, as we noted in our prior discussion, but these have tended to reflect different levels of abstraction (e.g., Hoothoofd & Heene, 1997) or different aspects of the value chain (e.g., Mehra, 1996).

A recent study by Leask and Parker (2007) has offered a somewhat similar argument, stating that within an industry there are "competitive groups" which "are made up of firms that compete in the same market segments and that offer direct substitutes for one another," and strategic groups, which represent differences in strategic commitments and actions. The authors see the former as "demand-side" groupings, based on product market space and competition for customers, and the latter as "supply-side" groupings, which reflect commitments of resources and capabilities and mobility barriers that restrict firms from imitating their rivals. However, only one of these configurations was considered to reflect a firm's "strategy" – the other was meant to represent common competitors.

This study seeks to build on Mehra's (1996) initiative and the recent work by Leask and Parker (2007), conceptualizing strategic groups along two distinct dimensions, while providing a more complete examination of the degree of congruence between these two types of configurations. We identify two strategic group configurations within a somewhat unique and yet aggressively growing industry: ornamental horticulture or nursery growers. Using firm-level structural variables (e.g. size, scope, product mix, and market channels), we develop *product/market-based strategic groups*. In addition, using managers' evaluations of their firm's resource-based strategies, we develop *resource-based strategic groups*. Our analysis of these product/market and resource group structures responds to recent criticisms of the use of cluster analysis in strategic group research. Furthermore, we introduce a novel approach for comparing different group structures and evaluating the degree of similarity or congruence across these configurations.

METHODS

Researchers have noted several problems with strategic group research methods, in general, and with the use of cluster analysis, in particular (Barney & Hoskisson, 1990; Ketchen & Shook, 1996; Thomas & Venkatraman, 1988; Wiggins & Ruefli, 1995). Following guidelines suggested by these and other researchers (Aldenderfer & Blashfield, 1984; Romesburg, 1984), we endeavored to enhance the reliability of both the product/market-based and resource-based strategic group solutions by performing multiple analyses and comparing their results. Specifically, we compared configurations derived using different subsets of variables, both standardized and unstandardized versions of those variables, two distance measures, and three clustering algorithms. Furthermore, we implement a process for visually examining and statistically testing the level of congruence among these various solutions.

With respect to our resource-based strategic groups, although the resource-based view has become increasingly more theoretically refined, researchers have made little progress in operationalizing constructs for measuring potentially inimitable resources and capabilities. Many have used archival measures as proxies for such resources (e.g., Leask & Parker, 2007; Maijoor & Van Witteloostuijn, 1996; Miller & Shamsie, 1996), but this does not necessarily reflect the inherently "behavioral" nature of the resource-based approach (Penrose, 1959; Wernerfelt, 1984) and also fails to capture intangible resources and capabilities (Hall, 1993; Itami & Roehl, 1987). Thus, we derive our resource-based strategic groups using managers' ratings of an array of tangible and intangible resources and capabilities.

Context

To examine the relationships between product/market groups and resource groups, we conducted a survey of the ornamental horticulture (nursery) industry in a Midwest US state. Nurseries grow a variety of ornamental plant products (primarily trees, shrubs, and groundcovers) which are sold to an array of end-users (homeowners, landscapers, builders, municipalities, etc.). We found this industry to be particularly appropriate for study because it is highly segmented and has been characterized by industry leaders as having a high degree of strategic diversity (Mehra & Floyd, 1998). In addition to this apparent intra-industry heterogeneity, the industry had been experiencing continuous growth and profitability.

The survey was sent to the presidents or CEOs of 350 nurseries in the state. We believe that, as Hambrick and Mason (1984) have argued and others have agreed (e.g., McNamara et al, 2003; Mehra & Floyd, 1998; Porac et al, 1989), top managers are best equipped to provide the kind of data that captures the firm's strategic posture and intentions. This sample was randomly drawn from a complete list of over 600 nursery growers licensed by the state's Department of Agriculture. We received 130 responses for a total response rate of 37%. After removing surveys with significant amounts of missing information, there were 108 useable surveys for an effective response rate of 32%. Although this response rate is not unusual for such industry surveys, there is the possibility of response/non-response bias. However, comparisons with Census of Agriculture data suggest that the sample is representative of the state's nursery industry. Specifically, the combined acreage of field-grown nursery stock for the 108 respondent firms represents 58% of the total acreage in the state, the acreage of sod grown by respondents constitutes 55% of the state total, and the area of greenhouse production is 50% of the state total.

Measures

To form the two types of strategic groups, we employed two very different sets of measures. For the product/market-based groups, we used quantitative indicators of product/market-based strategic decisions; and for the resource-based groups we used managers' ratings of resource-based priorities and commitments. As noted above, both sets of data were gathered via surveys completed by CEOs or top-management-team members; however, the first set of questions elicited straightforward facts about the firm, while the second part of the survey consisted of perceptual evaluations.

First, we assessed product-market groups using measures of a firm's business scope and their deployment of assets: size characteristics (acres, locations, employees, etc.), product and service lines (field stock, greenhouse plants, sod, etc.), and distribution channels (retail v. wholesale). We build on the

logic offered by recent researchers (Leask & Parker, 2007; Mehra & Floyd, 1998; Osborne et al, 2001) and argue that these measures capture the degree of business diversification (or lack thereof), as well as the firm's relative emphasis on scale and scope versus differentiation. Second, we derived our resource-based groups using managers' evaluations of key strategic factors (cf. Mehra, 1996; Nath & Gruca, 1997). We asked managers to rate the relative importance of several kinds of tangible and intangible resources and capabilities for their firm's strategy. Factor analyses of these variables placed them in five "bundles" of resources and capabilities, and the factor scores were then used as the basis for forming resource-based groups. Descriptive statistics for the product-market and resource-based variables are provided in Table 1.

Third, we collected information on firm's competitive groups by asking managers to identify up to five of their closest rivals (Nath & Gruca, 1997; Osborne et al, 2001), and 87 of 108 firms (81%) identified at least one key competitor (the modal response was two and the median was three). We used this data essentially to validate the strategic groups derived from the other forms of data, rather than as the basis for actually forming group structures.

We also asked for self-report estimates of several measures of performance. Since all of the firms in the nursery industry are privately-held, there are no publicly available financial data. As a result, we were restricted to gathering performance data strictly via primary sources. Furthermore, many leaders in the industry suggested that asking managers to provide specific information (e.g., actual business volume or net profits) would jeopardize the response rate of the survey. Thus, following Venkatraman and Ramanujam (1986), we gathered indicators of both financial performance (sales/revenue) and operational performance (market share and efficiency), by asking respondents to indicate by what percentage did their firm's gross sales, market share, and operating cost structure increase or decrease over the previous year. While we recognize that this is not an ideal measures of performance, it is consistent with past research that has noted the reliability and validity of using top-managers' self-reports in the absence of objective indicators (Dess & Robinson, 1984; Venkatraman & Ramanujam, 1986).

Cluster Analysis Procedures

As noted above, all cluster analyses were performed following guidelines suggested in prior research (Aldenderfer & Blashfield, 1984; Romesburg, 1984; Thomas & Venkatraman, 1988). In particular, Ketchen and Shook (1996), identified several critical factors which can enhance the reliability of the analyses and the validity of the final group structures: 1) performing analyses on different sets or combinations of variables, 2) analyzing both standardized and unstandardized forms of these variables, 3) conducting analyses using multiple similarity measures, 4) developing cluster solutions based on several clustering algorithms, and 5) performing both inductive (bottom-up) and deductive (top-down) types of cluster analyses. To the degree that the consequential cluster solutions are consistent across all of these permutations, the robustness and reliability of the group structures is enhanced. Interestingly, relatively few studies have thoroughly executed such an approach (see Leask & Parker, 2007; Osborne et al, 2001; Short et al, 2007, for notable exceptions). Following Ketchen and Shook (1996), we incorporated all of their guidelines and assessed the degree of consistency across the cluster solutions that resulted.

In our analysis, similarity matrices were computed using both the Euclidean distance and squared Euclidean distance resemblance coefficients. The similarities were calculated based on different combinations of variables, comparing the resulting cluster solutions to determine which set produced the most stable outcomes. Additionally, the analyses were performed on both standardized and unstandardized data. Finally, the cluster solutions were formed through a two-stage process, beginning with an inductive (hierarchical agglomerative – HA) analysis using three different clustering algorithms, the results of which were then confirmed via a deductive (iterative partitioning – IP) clustering technique. The HA cluster solutions were formed using the three most common algorithms: the unweighted pair-group, complete-linkage, and Ward's methods (Aldenderfer & Blashfield, 1984; Romesburg, 1984). There was a strong degree of similarity in results across the three methods. Following standard guidelines (Aldenerfer & Blashfield, 1984; Ketchen & Shook, 1996: Romesburg, 1984), we used both visual inspections of dendograms and gaps in the agglomeration coefficients to determine which HA cluster

solutions were most accurate. Then, the cluster means from the HA analysis served as initial centroids for the IP cluster analysis.

Reliability of Cluster Analyses

As noted, to make a final determination about the number of clusters and to assess the robustness and reliability of our group structures, we compared the cluster memberships of a wide range of solutions (across the five factors outlined above), assessing the degree of congruence between them. While scholars have suggested performing these different analyses and assessing the consistency of the results as a means of producing more reliable cluster solutions, there are no definitive mechanisms for making comparisons among cluster solutions. To address this issue, we introduce a two-part process. First of all, we use sunflower plots as graphical means of assessing the degree of congruence between any two cluster solutions (see e.g., Figure 1). In these plots of one set of group memberships against another set, instances where group memberships coincide will appear as "flowers" – with each case being a "petal" on the flower.

Secondly, we use two related measures of association for nominal variables – Goodman and Kruskal's *lambda* and *tau* (Leibetrau, 1983; Reynolds, 1984), as statistical tests of such congruence. The two measures evaluate "the relative usefulness of one variable in improving the ability to predict the classification of the members of the population with respect to a second variable" (Leibetrau, 1983:17). Although there are several other measures of association of nominal variables, and Osborne et al. (2001) use Cramer's V, we use *lambda* and *tau* for three main reasons: 1) they have asymptotic distribution properties that permit significance tests; 2) they can be used to assess tables with unequal rows and columns (as is often the case when comparing cluster solutions); and 3) they are among the most conservative and robust measures of association (Leibetrau, 1983; Reynolds, 1984).

Performance Differences and Validity of Cluster Analyses

As previously noted, the argument among many researchers is that *post-hoc* tests for performance differences are a necessary condition for assessing the validity of strategic group structures, regardless of the types of groups or the basis upon which they are formed. We conduct such tests, performing a Kruskal-Wallis non-parametric ANOVA on the three self-report performance measures described above, for both product/market- and resource-based strategic group configurations. We also compared the two types of strategic groups with patterns in firms' self-identified "closest competitors", in a process very similar to Osborne et al (2001), as a means of assessing the validity of these structures. Due to the facts that, 1) firms were only asked to identify up to five of their most significant competitors, 2) a few firms (less than 20%) declined to identify any competitors, and 3) some of the identified competitors (e.g., Wal-Mart) were not included in the sample, we could not use this data as an accurate indicator of validity, nor could we use it to generate a separate group structure in and of itself.

RESULTS

In the analyses of both product/market- and resource-based strategic groups, stable cluster solutions emerged, using the multi-stage analytical process detailed above. As a means of providing additional support for the discriminant validity of both types of strategic groupings, we performed MANOVAs on several variables that were held out from any of the other analyses (e.g., number and ratio of personnel categories) and found significant differences across the groups (Thomas & Venkatraman, 1988).

Product/Market-Based Strategic Groups

Strategic groups based on product-market positions were identified through a cluster analysis of seven business structure variables: specifically, indicators of production capacity and product mix (field stock, sod, container, and greenhouse products) and business diversification (wholesale plant sales, retail plant sales, and related landscaping distribution channels). Several iterations were run excluding one or two of these variables, with only minor effects on group membership. The dendogram plots of cluster

memberships indicated that a nine-cluster solution provided enough fine-grained detail, and the clusters were robust across various clustering permutations. Specifically, the Goodman-Kruskal *lambda* and *tau* statistics comparing various nine-group clustering solutions (using different subsets of variables, resemblance coefficients, and clustering algorithms) were significantly higher (> .840; $p < .000$) than those for the seven, eight, and ten group solutions, suggesting that a nine-group structure was, in fact, the most reliable and robust solution.

Additionally, we performed an IP cluster analysis, using the HA cluster means as initial centroids. A sunflower plot comparing cluster memberships computed by the HA and IP methods showed only eight "off-diagonal" observations (four "centers" and four "petals") that correspond to differences in group membership between the two analyses. Thus, the strategic group solutions appear to be congruent, and the Goodman-Kruskal *lambda* and *tau* statistics were highly significant (> .820; $p < .000$).

We also examined these product/market group memberships (displayed in Table 2) to establish their "face validity". Using the self-identified competitor data, we found that: 1) firms which are known or perceived to be competitors typically fell into the same product/market group; 2) in over half of the groups, firms explicitly indicated that other group members were their key competitors; and 3) in all groups, members indicated either common or highly similar competitors. For example, eight of the ten members of Strategic Group 3 listed the exact same firm as their most significant competitor, all of the firms in Groups 6 and 8 identified at least one group member as a competitor, and almost all of the firms in Group 5 identified a major discount retailer, such as Wal-Mart or Builder's Square, as a key competitor.

Finally, we examined differences across groups with respect to the three performance measures - changes in sales, market share, and costs, using the Kruskal-Wallis non-parametric ANOVA procedure. Not only were the overall chi-square statistics for all three measures not significant, but pairwise comparisons of all group means using the Mann-Wilcoxon procedure showed no significant differences. Thus, while the rigorous cluster analyses produced product/market groups that were robust and had high face validity, there were no significant performance differences between these groups. This is consistent with prior studies which have shown a lack of performance variations across strategic groups. It suggests that the ways in which firms positioned themselves in the industry had little effect on the level of competition and consequential performance.

Resource-Based Strategic Groups

The responses to the resource-based survey items were first factor analyzed to determine the underlying structure of the data. The 20 items loaded on five factors, accounting for 72% of the overall variance among the items. These five factors represent "bundles" of resources and capabilities upon which we derived our resource-based strategic groups. Reliability measures (Cronbach's *alpha*) for three of the factors were moderate to high, ranging from .681 (Marketing) to .916 (Social Complexity). The Economics and Physical Assets factors, however, had more modest reliabilities of .534 and .560 respectively (see Table 1).

The actual values of the five factor means were not the basis for clustering. Rather, we were concerned with a firm's *relative weighting* or pattern of prioritization across the five factors, because individual managers will likely have a framing bias that will cause their responses to be unevenly dispersed. To remove the effects of this bias, we standardized all of the factor means by case. Clusters were then formed following the same multi-stage process used for the product/market-based analysis.

The dendograms indicated that a six or seven cluster solution had the best balance of differentiating between firms while providing ease of interpretation. As in the case of the product/market groups, various solutions based on different subsets of variables, resemblance coefficients, and clustering algorithms were compared to each other for a six- and seven-cluster model. Also, the group factor means for both six- and seven-cluster solutions were used as initial centroids for an iterative partitioning analysis, and the HA and IP solutions were compared to one another. A six-cluster solution provided the highest *lambda* and *tau* (> .900; $p > .000$).

Additionally, we compared the resource group cluster memberships (shown in Table 3) with the self-

identified "closest competitors" data. Unlike the product/market-based groups, there was very little commonality in identified competitors - i.e., firms in a given cluster indicated a diverse array of competitors. Thus, although the multi-step cluster analysis procedure produced robust resource-based strategic groups, the lack of congruence between these resource groups and the identified competitors raises interesting questions about what these groups represent and implicate, which we discuss at length below.

Finally, we assessed performance differences across the resource-based strategic groups. In contrast to the results from the product/market groups, the resource-based configurations displayed significant differences across groups for all three measures: change in sales ($F = 2.983$, $p < .015$), change in market share ($F = 3.585$, $p < .005$), and change in costs ($F = 2.962$, $p < .016$). Interestingly, Group 6, the "isolated" resource-based cluster, reported the greatest increases in sales and market share, while Groups 2 and 4, the "economics-focused" and "production-focused," had the lowest increases (see Table 4). In fact, the firms in the "production-focused" group were the only ones that reported *decreased* sales and market share. These findings have several significant implications with respect to sustainable competitive advantage and inter-firm rivalry, and we discuss them more fully below.

Comparisons of Product/Market and Resource Groups

Finally, we compared the memberships of the two types of strategic groups (see Figure 1). We were interested in examining the degree to which the firms that made up a given product/market group, who had adopted a similar strategy of positioning in the product-market space, were also members of a common resource-based group, and thus were competing on the basis of similar commitments of resources. Because the number of product/market groups (nine) is greater than the number of resource groups (six), there obviously cannot be a one-to-one correspondence. Here the Goodman-Kruskal measures become particularly important as means of measuring association, in that their accuracy is not affected by asymmetric tables.

On both axes of the sunflower plot in Figure 1, the memberships represent the IP (as opposed to the HA) cluster solutions. If members of product/market-based groups were also members of the same resource-based groups, they would plot in the same "flower". Instead, the graphical comparison indicates very little congruence between the two types of strategic groups. Furthermore, the *lambda* and *tau* statistics are statistically insignificant ($p < .400$). Taken together, these analyses indicate that firms in each of the product/market-based groups employ a wide range of resource-based strategies. Conversely, members of a given resource group are competitively dispersed throughout the product-market space.

DISCUSSION

This paper set out to explore the fundamental structure of intra-industry competition by examining two aspects of strategies upon which individual firms attempt to compete within the nursery industry setting. Operating on the premise that there are particular configurations or archetypes of competitive strategy within an industry, we explored the structures of these strategic groups using two distinct approaches. The product/market-based approach, using market positioning variables, resulted in strategic groups that had a high degree of both internal consistency and external "face" validity, thus seeming to accurately map the competitive landscape of the nursery industry. The resource-based approach, using variables grounded in the resource-based view of the firm, produced a group structure that, although lacking the "face" validity of the strategic groups, was also internally reliable and robust. Interestingly, when plotted against one another, the structure of membership in product/market-based strategic groups was significantly incongruent with the structure of the resource-based groups.

The almost complete orthogonality of these two group structures challenges many of the assumptions of recent research, which has argued for congruence across different types of strategic groups. Instead, the results provide support for recent research which conceptualizes patterns of competition in more multi-multi-faceted ways. We argue that within a given product/market-based strategic group there may be an array of resource-based profiles upon which firms compete. To the extent that there are many such

resource-based strategies within a product/market group, there will be greater economic rents available to firms in the group. By extension, if all the product/market groups show such resource-based strategic heterogeneity, the industry overall will be healthy, profitable, and attractive.

Methodological Contributions

This study makes at least three significant methodological contributions to research on strategic groups. First of all, the analysis here explicitly compares two very different types of group structures - one based on product-market characteristics and the other derived from resource commitments. Given the relative paucity of resource-based examinations of strategic groups, particularly with respect to using measures grounded in the reality of the industry, this study provides a possible framework for subsequent analyses of resource groups.

Secondly, this study sought to ensure the reliability and validity of the competitive group structures that were obtained using cluster analysis. As previously stated, several researchers have suggested guidelines for improving the quality of cluster-analysis-based work. Specifically, Ketchen and Shook (1996) delineate at least eight distinct issues that researchers should address when using cluster analytic techniques. Unfortunately, only a few studies have implemented these suggestions (Mehra, 1996; Ketchen et al, 1997; Leask & Parker, 2007; Short et al, 2007). In this particular study, we responded to all eight of Ketchen and Shook's key issues and applied theirs and others' guidelines to our cluster analyses. By performing dozens of replications of the cluster analyses (using different subsets of variables, different resemblance coefficients, and different clustering algorithms), conducting both HA and IP analyses, and comparing these cluster solutions with external criterion variables, this study provides an example of how to follow recently-proscribed methodologies for cluster analysis.

Finally, a novel method for comparing multiple cluster solutions and evaluating their congruence was employed. Specifically, we used sunflower plots to visually depict similarity and the Goodman-Kruskal *lambda* and *tau* measures to statistically test such congruence. The use of these test statistics provided a means of assessing the robustness and reliability of the reported clusters of strategic archetypes. Moreover, the *lambda* and *tau* statistics were employed to show the degree of congruence (or lack thereof) between product/market-based and resource-based strategic groups.

Theoretical Contributions

This study also makes some theoretical contributions to research on both the strategic group concept and the resource-based view. First, the results of this study inform the current and growing interest in the resource-based view of the firm, by building on and extending Mehra's (1996) notion of "resource groups." Our findings support his contention that while firms may compete on the basis of inimitable resources, there appears to be, in some industries, very similar resource-based profiles which can be used to group firms and their strategies. Furthermore, the presence of significant performance differences across the resource-based groups in this study provides the confirmatory evidence demanded by critics of strategic groups (Barney & Hoskisson, 1990; Ketchen, et al 1997; Thomas & Venkatraman, 1988) and suggests that these resource-based configurations represent evidence of competitive advantage. Whether these resource-based profiles constitute a generalizable typology that would characterize firms in other industries is open to question. Further work needs to be done to see if resource groups exist in other industries and, if so, what factors differentiate these groups.

Secondly, the results of our investigation provide an alternative perspective on the strategic group concept of competitive advantage and intra-industry competition. While our data show that there are a common resource profiles that categorize firms and their approach to doing business in the nursery industry, the firms in a particular resource-based group do not reside in the same competitive niches as defined by product/market characteristics typically used in strategic group studies. In fact, the data strongly suggest that the degree of overlap between resource-based group membership and product/market-based group membership is minimal – at least in this industry. We see this heterogeneity as theoretically and intuitively consonant with how firms gain and maintain competitive advantage. If a firm is competing in nearly identical markets with nearly identical products as another firm, the first firm

will almost assuredly seek some resource-based strategy that will differentiate itself from its close rival. Conversely, if two firms have very similar resource profiles, and if these resources are crucial to the success of both firms, they would almost necessarily not be positioned in the same market niche. Dissipation of the rent-earning capability of their resource portfolios will occur and failure of one or both firms would follow.

Implications for Research and Practice

The results of our study thus provide interesting implications for the way in which strategy research has viewed firm-level strategy and intra-industry competition. First, while the volume of studies on strategic groups has consistently shown that firms in an industry cluster around a few unique configurations, these are at best incomplete proxies for firm-level strategy. Rather, as the resource-based view of the firm has suggested, firms within these groups likely pursue a strategy based on unique and inimitable resources, and there is a considerable diversity of resource-based strategies within each group.

Furthermore, as the plot of the resource-based groups by product/market-based groups indicates, firm-level strategy appears to be an amalgam of these two sets of factors, and further research should explore the relationships between the two. These findings lend support to Mehra's (1996) suggestions that a firm has two (or more) sets of competitors, existing in different realms and impacting the firm at different points in the value-chain, and the competitive strategies and actions of firms must take into account both sets of competitors in order to build and sustain competitive advantage. The orthogonality of competitive group structures in Figure is also consonant with Chen's (1996) argument that firms rarely have a complete overlap between their "market commonality" and their "resource similarity."

Finally, although current thinking in the field might lead resource-based theorists to focus on the lack of performance differences across product/market groups vis-à-vis the presence of differences across resources groups as evidence that intra-industry competition is best conceptualized in terms of isolating mechanisms that are based on firm-specific characteristics. However, our results suggest exercising caution in this regard. The reliability and robustness of the product/market group solutions, coupled with the supporting evidence provided by self-identified competitors, suggest that Chen (1996) and earlier critics (e.g., Amit & Shoemaker, 1993) were correct in stating that the resource-based view does not adequately consider the external market or industry structure. Inter-firm rivalry appears to be a function of both the firm's positioning with respect to industry structure and its firm-specific resources, as a few studies have suggested (Houthoofd & Heene, 1997; Leask & Parker, 2007; Smith, Grimm, Wally, & Young, 1997).

Limitations

This study, while breaking new methodological and theoretical ground, has several limitations. First of all, absent the existence of definitive measures for defining resource-based groups, our RBV variables should be seen as experimental. In addition, the modest reliabilities of some of those measures suggest that the resource-based competitive group structures should be interpreted with caution. Further research, using these and other variables in a wide range of industries, is needed to explore how robust and generalizable these measures are. Along similar lines, because we used self-reported performance data, and because the data requested were percentages rather than actual numbers, the results from analyses of performance differences across both types of groups should also be viewed with some degree of caution. Ideally, measures such as this should be compared with archival data to check for convergence, but such information was not available in this case. In addition, because all of the variables came from self-reported data, there is the possibility of same-source bias in all of the measures. However, our interactions with industry leaders led us to believe that the combination of the nature of the survey, its academic sponsorship, and prevalent norms in the industry mitigated an excessive degree of self-report bias. Furthermore, with respect to the resource-based groups, by taking the factor means and standardizing them by case, we remove much of the multicollinearity in these data.

Conclusion

In summary, the results here suggest that recent efforts arguing for convergence among alternative methods for forming strategic groups may be overstated or over-emphasized. In fact, by decoupling groupings based on the strategic decisions a firm makes regarding its product-market positioning from groupings based on a firm's employment of certain critical resources and capabilities, strategic management researchers may be able to capture more information about the competitive dynamics in an industry. These results also suggest that in industries where sustainable rents are being earned, one is likely to find significant divergence across various means of forming strategic groups. In contrast, we speculate that those industries wherein product-market positioning is completely convergent with bundles of key resources and capabilities will likely exhibit minimal aggregate profits.

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TABLE 1
DESCRIPTIVE STATISTICS AND CORRELATIONS OF KEY VARIABLES

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Acres Sod	48.23	242.02												
2. Acres Field	93.30	185.03	-.048											
3. Acres Containers	7.99	30.20	-.035	.250										
4. Glass Area (sq ft)	3801.67	18312.33	.011	-.055	-.007									
5. Wholesale Channels	2.67	1.78	.178	.368	.252	.247								
6. Retail Channels	1.44	1.38	.070	-.167	-.072	-.065	-.123							
7. Landscape Channels	1.87	1.67	-.056	-.243	-.198	-.114	-.167	.494						
8. Social Complexity	6.17	.93	-.068	.077	.154	.118	-.017	.138	.163	*.916*				
9. Path Dependence	5.04	1.31	.033	.122	.174	.029	.023	.250	.218	.681	*.827*			
10. Marketing	5.45	1.08	-.071	.045	.156	.059	-.007	.170	.083	.504	.472	*.681*		
11. Economics	5.82	.99	-.159	.048	.089	.073	.014	-.082	-.027	.311	.205	.229	*.534*	
12. Physical Assets	5.37	1.31	.058	.183	.140	-.157	-.002	.094	-.075	.361	.474	.229	.257	*.560*

Note: All correlations > .195 are significant at $p < .05$; all correlations > .250 are significant at $p < .01$
Reliabilities (Cronbach's α) for RBV factors are on the diagonal cells and in italics

TABLE 2
PRODUCT/MARKET-BASED STRATEGIC GROUPS FROM CLUSTER ANALYSIS OF SELECTED VARIABLES (GROUP MEANS)

Strategic Group	n	Sod (acres)	Field Stock (acres)	Containers (acres)	Glass Area (sq. ft.)	Wholesale Channels	Retail Channels	Landscape Channels
1	13	50.00	45.69	2.12	3138.46	4.31	2.54	3.46
2	23	.22	16.83	1.51	117.39	1.43	.78	3.39
3	10	.00	330.90	2.10	1200.00	4.70	1.00	1.30
4	35	12.93	54.20	2.29	985.71	2.29	.66	.23
5	15	.07	16.57	1.61	905.33	1.13	3.80	3.33
6	4	.00	280.00	147.50	3000.00	4.75	1.00	.50
7	2	.00	1145.00	35.00	.00	4.00	.50	.00
8	3	.00	14.00	2.00	91666.67	4.67	1.00	1.00
9	3	1366.67	63.33	3.33	6666.67	4.67	2.00	1.33

Descriptions of Strategic Groups:

1: "Jack-of-all-trades": medium-sized, well-diversified firms, covering broad spectrum of products and services
2: "Small landscapers": small operations with vast majority of business in landscaping channels
3: "Medium growers": similar profile to major growers but smaller scale; primarily wholesalers
4: "Mom-and-Pop outfits": mostly small-town nurseries and Xmas-tree growers; small-scale, narrow scope
5: "Garden centers": retail-oriented businesses; small-town and suburban garden centers and landscapers
6: "Ground-cover growers": large wholesale growers of ground-covers and perennials; nation-wide market
7: "Major growers": large, diversified, multi-site firms; almost exclusively wholesale-focused production
8: "Greenhouse growers": most of production under glass; primarily wholesale channels
9: "Sod growers": large-scale sod growing operations; primarily for wholesale distribution

TABLE 3
RESOURCE-BASED STRATEGIC GROUPS FROM CLUSTER ANALYSIS OF RESOURCE FACTORS

|	Strategic Group	n	Social Complexity	Path Dependence	Marketing	Economics	Physical Assets
1	"customer/market - focused"	12	6.42	4.82	6.18	5.50	5.13
2	"economics - focused"	24	5.72	4.06	5.49	6.46	5.54
3	"intangibly - focused"	24	6.51	5.36	5.72	5.94	4.04
4	"production - focused"	17	6.00	5.29	4.37	6.26	5.79
5	"physical assets - focused"	18	6.12	5.24	5.22	5.25	6.39
6	"isolated"	9	6.56	5.72	5.81	4.44	5.61

Note: μ and σ represent group factor score mean and standard deviation

TABLE 4
SELF-REPORTED PERFORMANCE MEASURES FOR RESOURCE-BASED STRATEGIC GROUPS

Group Means

	Strategic Group	n	ΔSales		ΔMarket share		ΔCosts	
			μ	σ	μ	σ	μ	σ
1	"customer/market - focused"	12	6.00	0.85	5.36	1.12	5.33	0.78
2	"economics - focused"	24	4.55	2.17	4.09	1.77	5.29	1.23
3	"intangibly - focused"	24	5.42	1.64	4.73	1.20	4.92	1.25
4	"production - focused"	17	4.01	2.25	3.60	1.55	3.93	1.98
5	"physical assets - focused"	18	4.71	1.79	4.93	1.22	5.47	1.01
6	"isolated"	9	6.25	1.04	5.57	1.13	4.88	0.99

Note: values are group means of self-reported data, measured on a 7-point Likert-type scale, using responses to the questions below

FIGURE 1

COMPARISON PLOT OF PRODUCT-MARKET-BASED VERSUS RESOURCE-BASED STRATEGIC GROUPS
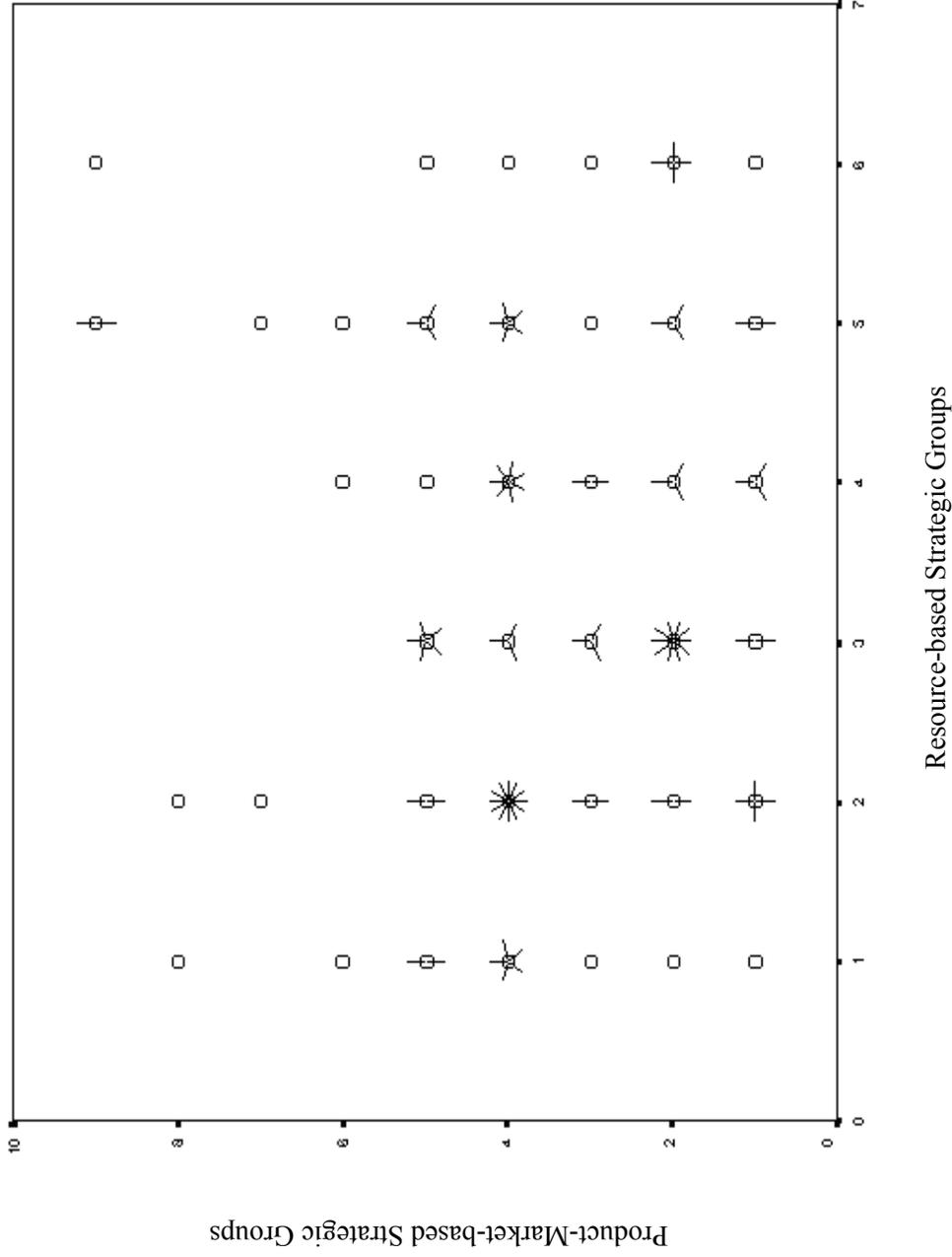
Note: Group memberships from Iterative Partitioning clustering procedures