Ecological Analysis of Strategic Groups: An Interactive Perspective between Organizational Ecology and Strategic Management

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Abstract

This study uses theoretical perspectives and models from organizational ecology to examine the dynamics and viability of strategic groups. Integrating the ecological perspective and the contingency theoretical view of strategic management, this study developed propositions demonstrating the impact of environmental density and variation on the effectiveness of strategic groups. Justifications for linking ecological perspectives to strategic management theory are discussed and the importance of the integrative approach to strategic management is highlighted.

keyword strategic groups, environmental variation, strategic management, organizational ecology, integrative approach

Ⅰ. INTRODUCTION

The emergence of the strategic group concept has drawn increasing attention from researchers in strategic management area since it promotes understanding of performance differences across firms within an industry. A strategic group, which is also called as strategy typology or taxonomy (Harrigan, 1985), refers to the group of firms in an industry following the same or similar strategy along the strategic dimensions (Porter, 1980). Strategic groups clearly have implications for the patterns

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of competition within industries (McGee & Thomas, 1986).

Organizational ecologists have developed a stream of analogous research that distinguishes groups of organizations in terms of their organizational forms (Boeker, 1991; Freeman & Boeker, 1984). Organizational forms are defined as 'blueprints for organizational action' (Aldrich, 1979; Carroll, 1984; Hannan & Freeman, 1977). The collection of all the organizations that have a common form is defined as a p opulation of organizations (Carroll, 1984; Hannan & Freeman, 1977). Thus, the concept of organizational form represents a population of organizations pursuing the same strategy (Boeker, 1991; Freeman & Boeker, 1984).

Organizational ecologists see competition and environmental characteristics as having an interactive effect on the success of a given strategic approach (Boeker, 1991). Organizational ecology uses organizational survival as the outcome variable of primary interest but some models such as life history strategies and niche width clearly have efficiency interpretations (Carroll, 1993). In these models resource constraints and environmental conditions set the stage for some organizational forms to outperform others (Carroll, 1993), making such models well suited for the examination of competition between strategic groups.

This study use theoretical perspectives and models from organizational ecology to study the dynamics and viability of strategic groups. Specifically, Miles and Snow (1978) typology and Rumelt's (1974) diversification typology are selected as strategic groups in this study since these two typologies share many similar characteristics and issues with the ecological models of life history strategies and niche width. A major focus of this study is to investigate how the environmental variation affects the effectiveness of those strategic groups from the ecological perspective and to develop relevant propositions based on the analysis.

II. THEORY AND PROPOSITION DEVELOPMENT

1. ENVIRONMENTAL VARIATION

Organization and strategy theorists emphasize that organizations must adapt to environmental variation if they are to remain viable (Duncan, 1972). As a result, environmental variation has been treated as one of the most critical variables in organizational theory and strategic management (Child, 1972; Hannan & Freeman, 1977; Milliken, 1987; Wholey & Brittan, 1988). The concept of environmental variation has been defined as measures of volatility, dynamism, or instability with a single dimension. But several researchers (Dess & Beard, 1984; Miles, Snow & Pfeffer, 1974; Milliken, 1987; Scott, 1981; Wholey & Brittan, 1988) pointed out that it is important to distinguish between the rate of environmental change and degree of uncertainty or unpredictable change. Such a difference is well captured by Miles, Snow and Pfeffer's argument: "It is possible to have rapid but largely predictable change in the environment, and in such a situation, the organization does not really confront uncertainty, as it knows reasonably well what environmental conditions it will face in the future" (1974: 248).

Organizational ecologists (Brittan & Freeman, 1980; Freeman & Hannan, 1983; Hannan & Freeman, 1977, 1989) suggested the systematic decomposition of environmental variation into three components: variability, grain, and convexity-concavity. Variability is defined as the probability that an environment will be in a given state (Hannan & Freeman, 1977). A grain is defined as the frequency of changes among environmental states over time (Brittan & Freeman, 1980). A fine-grained environment is one which changes are frequent. The reverse is a coarse-grained environment. Finally, the convexity/concavity of environmental variation denotes the compatibility of environmental states (Brittan & Freeman, 1980). An environment is convex when the demands of the different environmental states are similar; otherwise, it is said to be concave (Hannan & Freeman, 1977).

Wholey and Brittan (1989) argued that those three dimensions of environmental

variation organizational ecologists suggested are identical to three variables which Child (1972) suggested as constituting environmental variation: (1) the degree of irregularity in the overall pattern of change; (2) the frequency of changes in relevant environmental factors; and (3) the degree of difference involved in each change. Similarly, Wholey and Brittan suggested that environmental variation be treated as a wave function characterized by predictability, frequency, and amplitude. They empirically showed that those three components are independent dimensions of environmental variation and well captured the three dimensions of environmental variation identified by organizational ecologists, that is, variability (unpredictability), grain, and convexity-concavity. Thus, the three-dimensional scheme of environmental variation suggested by organizational ecologists reveals a highly valid indicator of environmental variation, as supported by the theoretical and empirical studies noted above.

2. LIFE HISTORY STRATEGIES AND MILES AND SNOW TYPOLOGY

Brittan and Freeman (1980) identified two types of life history strategies (Hannan & Freeman, 1989): r-strategists and K-strategists. 'r' and 'K' are parameters indicating the population's intrinsic (natural) growth rate and carrying capacity, respectively, in the logistic model of population growth[1] (Hannan & Freeman, 1977, 1989). r-strategists are organizations that move quickly to exploit resources as they first become available (Brittan & Freeman, 1980). Thus, r-strategists depend on first-mover advantages for success and are characterized by low levels of capital investment and flexible structures.

On the other hand, K-strategists are organizations which maximizes the ability to expand even in the face of dense competition (Hannan & Freeman, 1989). K-strategists are capital-intensive and depend on production efficiency for the competitive advantages (Brittan & Freeman, 1980). Extensive investment provides K-strategists with the ability to withstand competitive pressures, but at the expense of lowering greatly the speed with

1) The logistic equation of population growth is: $dN/dt = rN(K-N/K)$, where N denotes a size of the population.

which new opportunities can be exploited (Hannan & Freeman, 1989).

Miles and Snow (1978) identified three generic strategies: prospectors, defenders, and analyzers. Prospectors devote themselves to the entrepreneurial task by locating and developing product and market opportunities with heavy expenditure on product R&D and marketing practices. Changing product line is a major tool for the prospector to gain a competitive advantage and it requires a good deal of flexibility in its technological and administrative system. Thus, prospectors are conceptually identical to r-strategists (Boeker, 1991; Romanelli, 1989).

On the other hand, defenders devote themselves to the engineering task with great fixed asset intensity and capacity utilization (Hambrick, 1983). Operational efficiency is a key success factor to the defender since it focuses on serving a narrow product-market domain and producing outputs on a predictable and continuous basis (Miles, Snow, Meyer & Coleman, 1978). The defender maintains the mechanistic technological and administrative system to ensure efficiency. Due to these characteristics defenders correspond to K-strategists (Romanelli, 1989). The analyzer combines the major strengths of the prospector and defender types and represents a viable alternative strategic type to the other two strategies.

Miles and Snow typology's generic characteristics ignore industry and environmental peculiarities (Hambrick, 1983). Miles and Snow stressed that any of the three generic strategies is equally likely to perform well, given that they respond to adaptive cycles in a consistent fashion (Conant, Mokwa & Varadarajan, 1990). While some studies (e.g., Conant et al., 1990) confirmed Miles and Snow's supposition about performance tendencies of the three generic strategies, other studies (e.g. Hambrick, 1983) reported conflicting results. Hambrick (1983) found that prospectors and defenders differed in their performance tendencies, depending on the nature of the environment. This conflicting study results may suggest a need for systematically investigating the impact of environmental factors on the effectiveness of Miles and Snow's different strategic types.

Previous ecological studies examining competition between organizational populations have most often focused on density or the number of organizations in the environment (Boeker, 1991). Hannan and Freeman (1977) and Brittan and Freeman (1980) described the effect of density on ecological processes of growth and decline as density dependence

(Boeker, 1991). When density is low relative to environmental carrying capacity, competition is minimal (Hannan & Freeman, 1989). Ecological studies have also defined organizational carrying capacity in terms of the relative level of resources available to an organization within its environment (Aldrich, 1979; Scott, 1981). The low density generates the environment with abundant resources, which is typically characterized by nascent or growing industries. Brittan and Freeman (1980) claimed that the success of r-strategies depends on first-mover advantages obtained from temporarily rich environments. Similarly, Miles and Snow (1978) argued that the prospector's core competence lies in finding and exploiting new product and market opportunities, which typically holds for the low-density environment characterized by abundant resources.

But at high density, competition is expected to intensify (Aldrich, 1979; Castrogiovanni, 1993; Hannan & Freeman, 1989) and become more of a zero-sum game as environmental opportunity declines (Castrogivanni, 1993) as a result of limited resources in the environment. Such lean environments will reward the organizations which are efficient in the use of resources (Aldrich, 1979). Brittan and Freeman (1980) contended that K-strategists depend on production efficiency for the competitive advantages and are expected to proliferate at the expense of r-strategists as density increases. Romanelli also argued that efficiency-oriented K-strategists will dominate an industry when capacity is saturated and density is high. Similarly, Miles and Snow (1978) claimed that technological efficiency is central to the defender's success since the defender focuses on a narrow product-market domain within the industry which is difficult for competitors to penetrate. All these arguments lead to the following proposition.

Proposition 1 In low-density environments prospectors are likely to outperform defenders, but in high-density environments defenders are likely to outperform prospectors.

Prospectors faced with the high-density environment will be given two options to be viable. One is to modify their structures to become defender. But both organizational ecologists and theorists of strategic groups suggest that the strategic change is highly unlikely due to structural inertia (Hannan & Freeman, 1977, 1984) and mobility barriers (Porter, 1981; McGee & Thomas, 1986). A logical strategic alternative is to move into a

new niche. Thus, the inclination of existing prospectors to move into a new niche will depend in part on the level of density in the niches they already occupy (Brittan & Freeman, 1980).

Hannan and Freeman (1989) argued that the viability of life history strategies depends on the environmental variation. They suggested that environments which change rapidly and irregularly favor r-strategists, whereas environments which change slowly and regularly favor K-strategists. In industries with rapidly changing products and developing technologies, r-strategists ate able to quickly exploit opportunities. But the capital-intensive structures generating production efficiency prevents K-strategists from making the rapid adjustments to capture first-mover advantages. Brittan and Freeman (1980) also argued that for r-strategists to remain viable the pattern of resource availability must shift frequently and with some variability. Where critical resources are available with regularity, 'exploitive' strategies may be outcompeted by organizations emphasizing competitive efficiency, that is, K-strategists (Brittan & Freeman, 1980)

Similarly, the prospector protects itself from a changing environment through product and market innovation (Miles et al., 1978). Miller (1988) contended that the strategy of product and market innovation is more effective in dynamic and unpredictable environments, where products change frequently and customer needs and preferences are difficult to anticipate. Hambrick (1983) also empirically showed that in innovative industries prospectors outperformed defenders in terms of market share gains. However, in stable and predictable environments where customers want a standard product, innovation is not often needed but it may represent a costly luxury (Miller, 1988). The prospector's structural and technological flexibility permits a rapid response to a changing domain (Milles et al., 1978). But the defender is unable to respond to a frequent shift in its market environment due to its mechanistic structure oriented to technological efficiency. Thus, the defender is more suitable to the stable and predictable environment. Based on the reasoning and arguments above the following hypothesis is set forth.

Proposition 2 In variable and fine-grained environments prospectors are likely to outperform defenders, but in stable and coarse-grained environments defenders are likely to outperform prospectors.

3. NICHE THEORY AND DIVERSIFICATION STRATEGY

The concept of niche plays a central role in ecological theory. A niche[2] is defined as the resource space within which a population outcompetes all other local populations (Hannan & Freeman, 1977). Populations that have a broad niche, that is, depend on a wide range of resource space for survival are called generalists. In contrast, populations that have a narrow niche, that is, exploit a limit range of resource space for survival are called specialists.

The concept of generalism as defined by organizational ecologists is similar to Rumelt's (1974, 1982) categorization of firms by the extent of their diversification (Boeker, 1991). Since Rumelt's pioneering study, diversification strategy has attracted more attention than any other area of strategic management research. Especially, the relationship between a firm's diversification and its economic performance has been an issue of considerable interest to both academics and practitioners (Palepu, 1985).

Much strategic management literature assumes that diversification and profitability has a positive relationship due to efficient internalization of resource allocation (Grant, Jammine & Thomas, 1988) and reduction in the overall risk (Keats & Hitt, 1988). Yet, the empirical literature provides no consensus as to the impact of diversification on performance. Studies by Rumelt (1974, 1982), Montogomery (1982), and Christensen and Montgomery (1981) report a systematic relationship between a firm's diversification strategy and economic performance. But other studies by Palepu (1985), Keats and Hitt (1988), and Varadarajan and Ramanujam (1987) demonstrated no or little significant relationship between diversification and performance.

Through the resource partitioning model, Carroll (1985) showed that specialist organizations outcompete generalist organizations even in a concentrated industry contrary to conventional strategic theory, which advises specialism is a viable strategy only in fragmented or relatively unconcentrated industries (Porter, 1980). Therefore, it has been

2) A fundamental niche is defined as the resource space within the population can expand given a lack of competition. A realized niche represents a subspace of the fundamental niche shaped by the effects of environmental constraints and competition with other populations. Thus, for purposes of this study, the definition here represents a realized niche.

frequently suggested that the diversification-performance relationship may be a spurious one (Ramanujam & Varadarajan, 1989).

Several studies (Christensen & Montgomery, 1981; Rumelt, 1982) included the market or industry structure in explaining the diversification-performance relationship. Christensen and Montgomery (1981) showed that the differences in profitability between strategic categories could be attributed mainly to industry effects. Only a few studies (Grinyer, Yasai-Ardekani, & Al-Bazzaz, 1980; Keats & Hitt, 1988) have examined the impact of environmental variation on the effectiveness of diversification but in a limited way. This provides a strong incentive to systematically investigate the effect of environmental variation on the diversification-performance relationship.

Niche theories are formulated to explain how environmental variatin affects the viability of specialists and generalists (Freeman & Hannan, 1983). Specialists concentrate their fitness on a very narrow band of environmental variation in return for security (Aldrich, 1979; Hannan & Freeman, 1977). Thus, as long as the environmental variation remains within the range, specialists will outcompete generalists.

Part of the efficiency resulting from specialism is derived from the lower requirements for excess capacity (Hannan & Freeman 1977) or excess resources (Teece, 1982) which are commonly called organizational slack (Bourgeois, 1981). Specialists commit most of their resources to a few tactics for dealing with the specific environmental states. But generalists preserve spare resources and unexploited opportunities as a buffer against bad times or turbulent environments (Bourgeois, 1981; Teece, 1982). In stable environments those excess resources can be considered wasteful due to the unused productive capacity, making generalists less efficient than specialists. Therefore, the following proposition might be suggested.

Proposition 3 In stable environments, specialized firms are likely to outperform diversified firms.

The conventional wisdom dictates that in variable or unpredictable environments diversified firms will get a competitive advantage by spreading the overall risk across markets (Keats & Hitt, 1988). But niche theory predicts that only in coarse-grained as

well as variable environments will generalists prosper (Freeman & Hannan, 1983). When the environment changes frequently, the costs of generalism will be significant due to considerable structural adjustment and management. But the less frequent environmental changes will make it unnecessary for generalists to spend considerable energy and costs in adjusting or altering their structures. Thus, the following proposition may be proposed.

Proposition 4 In variable and coarse-grained environments diversified firms are likely to outperform specialized firms:

Rumelt's (1974, 1982) categorical system distinguishes between related and unrelated diversification. Related diversification strategies build on their core factors leading to economies of scope and efficiency in resource allocation (Rumelt, 1982). In contrast, unrelated diversification strategies provide few operating synergies. Instead, they can achieve benefits through financial synergy and market monopoly power (Palepu, 1985). Much of the strategy literature (e.g. Palepu, 1985; Rumelt, 1974, 1982) presumes that related diversification is more profitable than unrelated diversification due to operating synergies. Palepu (1985) contended that the benefits which unrelated diversification strategies can be realized through financial synergy and market monopoly power are only marginal since financial synergy is based on the existence of efficient markets which are rare and market monopoly power is considerably reduced by the presence of antitrust regulations.

However, a prolific stream of empirical studies on performance differences between related and unrelated diversification has also shown the conflicting results (Keats & HItt, 1988). Rumelt (1974,1982), Montgomery (1982), and Christensen and Montgomery (1981) showed that related diversification strategies outperform unrelated diversification strategies. On the other hand, Grant, Jammine, and Thomas (1988) and Varadarajan and Ramanujam (1987) found that relatedness was not associated with firm profitability.

Niche theory identifies 'polymorphism', a variant form of generalism, which indicates a mixture of specialist organizations. That is, the polymorphism denotes a supraorganization in which a heterogeneous collection of specialist organizations is loosely joined, each of which is optimally fit for one state of the environment (Aldrich, 1979). The concept of

polymorphism is identical to conglomorate or unrelated diversification (Aldrich, 1979; Freeman & Hannan, 1983).

Niche theory predicts that in the variable, coarse-grained and concave environment, the polymorphism will be a more effective form. Since in the variable, coarse-grained, and concave environment, different environmental states impose mutually exclusive adaptive contingencies on organizations for a relatively long period in an unpredictable way, unrelated diversification will be more effective and less risky than related diversification by maintaining loosely coupled structures. Although the unwieldy structures imposed by federation may be more costly to operate, at least a portion of the amalgamated organization will do well in such environmental conditions (Aldrich, 1979; Hannan & Freeman, 1979, 1989). Thus, the following proposition is suggested.

Proposition 5 In variable, coarse-grained and concave environments, unrelated diversifiers are likely to outperform related diversifiers.

In relation to the proposition above, Hannan and Freemen (1979) argued that there are no other situations in which such federated organizations or polymorphisms have a competitive advantage. This argument reflects the circumscribed efficiency rationale for the conglomerate or unrelated diversification (Teece, 1982).

III. DISCUSSION AND CONCLUSION

A major focus of this study is to investigate how the environmental variation affects the effectiveness of strategic groups using ecological perspectives and theories. Aligned with the ecological perspective, this study employed environmental density and three independent dimensions of environmental variation as key variables affecting the performance of strategic groups. Miles and Snow (1978) typology and Rumelt's (1974)

diversification typology were selected as strategic groups since they share many similar characteristics and issues with the ecological models. Integrating the ecological perspective and the contingency theoretical view of strategic management, this study developed propositions demonstrating the performance consequences of the fit between different strategic types and environmental characteristics. Especially, the propositions suggested in relation to diversification strategy indicate a great deal of potential to compromise the conflicting research results on the diversification-performance relationship.

Strategic adaptation in response to environmental conditions was partially mentioned through previous discussions regarding the concept of structural inertia and mobility barriers. Both organizational ecologists and theorists of strategic groups shared the view that strategic change is disruptive due to structural inertia and mobility barriers, respectively. Structural inertia represents a limitation on the ability to adapt (Hannan & Freeman, 1977). Mobility barriers are structural deterrents to a shift in strategic position of firms within the industry (McGee & Thomas, 1986). In particular, with regard to the concept of strategic groups, McGee and Thomas (1986) argued that the strategic choices on which strategic groups are based are essentially long-term in nature and costly to reverse.

Although both theorists appear to take the same view of strategic adaptation, they hold inherently different assumptions about the relationship between strategy and environment. Organizational ecologists view strategy as a necessary reaction to intractable environmental fores (Hannan & Freeman, 1977). They assume that environmental factors select those organizational characteristics that best fit the environment (Aldrich & Pfeffer, 1976). But theorists of strategic groups presume that the environment is actively enacted through strategic managerial choice. Such a strategic choice view is strongly taken by Miles and Snow (1978). Miles and Snow contended that each of the three generic strategies enacts an environment which is compatible with its own structure and process and would yield the same results if internal consistency among the various activities of the organization is maintained.

Thus, the incompatible assumptions about the strategy-environment relationship between organizational ecology and strategic management theory may make this study appear contradictory and unreasonable. However, Astley and Van de Ven (1983) and Hrebiniak

and Joyce (1985) argued that the unproductive controversy between strategic choice and environmental determinism (Aldrich, 1979; Aldrich & Pfeffer, 1976) diverts research inquiry away from the crucial interactive nature of organization-environment relationship in the adaptive process. To construct a more balanced perspective, Hrebiniak and Joyce (1985) suggested that choice and determinism represent two independent variables rather than polarities on a single scale and that the interaction or interdependence of the two must be studied to explain organizational behavior.

Miller (1988) supported Hrebiniak and Joyce's view by arguing that dual causal directions between the environment and strategy interact in an iterative process. Bourgeois (1984) also argued that dialectical thinking, which is described as interactive tension between the inertia of environmental forces and the kinectics of strategic choice, is required to facilitate such a reciprocal causality. These arguments clearly allow for the integration of organizational ecology and strategic management research.

Jemison (1981) emphasized the importance of an integrative approach to strategic management research. He claimed that research findings will be richer if strategic management scholars develop mid-range theories that draw from the existing knowledge vase of other disciplines. He further suggested that common links between strategic management and other disciplines must be perceived by researchers if 'cross-fertilization' of research in strategic management is to occur.

Several researchers (Boeker, 1991; Freeman & Boeker, 1984; Romanelli, 1989) have already noted common links between organizational ecology and strategic management. This study provides a systematic application of ecological perspectives and theories to strategic management theory in line with the necessity and importance of cross-fertilization of research in strategic management. Future studies will need to empirically examine the suggested propositions. The empirical confirmation of those propositions will provide a solid base for expanding ecological perspectives and theories into the field of strategic management.

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