Alliance portfolio characteristics and firm performance

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ABSTRACT

Alliances are used for a number of purposes, including market access, strategic positioning, and organizational learning. Most alliances are opportunistic and focused on a single objective, such as introduction of a new product or an R&D milestone. However, the value of a firm's alliances is enhanced if they are viewed as a portfolio that can be managed over time to reflect the generic competitive strategy of the firm and the dynamic nature of the firm's industry.

This paper develops a model relating firm performance to the fit of alliance portfolio characteristics with generic strategies and industry dynamism. Two portfolio characteristics are associated here with learning in alliances and firm performance: the ratio of exploration to exploitation alliances and the balance between equity and non-equity alliances. The model associates these portfolio characteristics with the types of learning required by different generic strategies and levels of industry dynamism. After developing theoretical support for the hypotheses, an approach to empirically testing the hypotheses is described, followed by a discussion of areas for further study.

Keywords: Alliance Portfolio, Alliance Fit, Exploration Alliances, Exploitation Alliances, Alliance Governance, Industry Dynamism

INTRODUCTION AND BACKGROUND

Several distinct perspectives are taken in developing this theory of alliance portfolio characteristics and firm performance. The first perspective is an organizational learning perspective, where the primary purpose of an alliance is to access and acquire new knowledge. Secondly, a portfolio perspective is taken, where the firm's alliance portfolio is defined as current and prior direct alliances (Wassmer, 2008). Alliances here are also viewed from the resource-based-view (RBV) perspective as a unique and valuable source of a long-term competitive advantage (Das & Teng, 2000). As part of the RBV, alliances are also viewed as one way of attaining a strategic "fit" between internal resources and capabilities and the external environment. The final perspective is a longitudinal, dynamic view of fitting the portfolio characteristics with changes in the firm's strategy and with changes in the external environment.

In developing a portfolio of alliances, management has the opportunity to choose both the learning focus and the governance structure of the alliances. These choices should be made in light of the firm's competitive strategy and the dynamism of the firm's industry. In addition, management can address the level of fit between these choices over time as the level of industry dynamism changes and as the firm's generic strategy adapts to the external environment.

ALLIANCE PORTFOLIO CHARACTERISTICS

From an organizational learning perspective, alliances are classified by the learning focus of the alliance and the governance structure of the alliance. This discussion reviews learning objectives - exploitative and exploratory - and the governance structures of alliances.

Governance Structure - Equity and Non-Equity Alliances

The governance structure of an alliance can be classified as an equity-based joint venture, a minority equity arrangement, or a non-equity agreement (Powell, Koput, & Smith-Doerr, 1996; Teng & Das, 2008). Joint ventures are typically new legal entities with joint equity by the alliance partners, while minority-equity alliances can cover a wide range of alliance types, such as R&D alliances. Non-equity alliances can be a preliminary step to a more formal, equity-based arrangement, or they can be downstream agreements such as marketing or distribution alliances (Teng & Das, 2008).

Equity alliances most closely approximate the structure of the firm, as there is generally a board of directors and a definitive reporting structure (Pisano, 1989). In some ways the structure of an equity alliance is more controlled than a firm, as the partners agree a priori on budgets, contributions, and ownership of the projected results of the alliance (Oxley & Sampson, 2004).

The control mechanisms of an equity alliance that are established for contributions and management reporting also apply to the flow of information and knowledge. In minority-equity alliances there is less formal control, and non-equity alliances are generally regarded as one step above a market-based, contractual arrangement. Here we are focused on the two extremes of governance, equity and non-equity alliances.

Learning Focus - Exploration and Exploitation Alliances

Exploration and exploitation are often positioned as two very different types of learning activities. As defined by March (1991, p. 71), "Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation." Levinthal and March (1993) add to this broad definition of exploration by stating that it involves "a pursuit of new knowledge" (p. 105). On the other hand, exploitation includes such things as "refinement, choice, production, efficiency, selection, implementation, and execution" (March, 1991, p. 71).

Several studies have classified the learning focus of alliances as exploitation or exploration. Lavie and Rosenkopf (2006), in studying exploration and exploitation, code alliances as knowledge-leveraging (exploitation) or knowledge-generating (exploration), finding that firms tend to balance the categories of alliances over time. Rothaermel and Deeds (2004) categorize biotechnology alliances as exploitation alliance for products in development and existing products, finding support for a product development path that starts with exploration and continues with exploitation alliances.

In summary the alliance portfolio is enhanced if the characteristics of learning focus and governance are managed to fit with the firm's generic competitive strategy and with the level of industry dynamism.

FIT OF ALLIANCE PORTFOLIO CHARACTERISTICS

The concept of strategic fit is one of the earliest tenets of the management literature. The external environment dictates fit with internal resources (Van de Ven, 1979), and the firm's strategy drives the organizational structure (Chandler, 1962). Strategy serves the purpose of matching and aligning organizational resources with the opportunities and threats of the external environment (Andrews, 1971; Porter, 1980).

The concept of fit extends to multiple elements of both the internal and external environments. All of the internal elements of the organization must be in congruence (Randolf & Dess, 1984), and multiple elements form a "gestalt" (Miller, 1981; Miller & Frisen, 1978).

Fit is applied here by matching multiple elements of the alliance portfolio to the firm's competitive strategy and industry dynamism. Several studies (Oxley, 1997; Pisano, 1989) have addressed the concept of governance from a transaction cost perspective, where control over the knowledge flow and contract costs are the primary criteria for fit. Here, organizational learning is the primary criteria of fit – for example, does a non-equity alliance provide a better learning environment for a cost strategy than an equity alliance? The fit of the portfolio characteristics is examined first from a static perspective and then from a dynamic perspective.

Fit of Governance Structure with Competitive Strategy

One of the most critical decisions in developing an alliance is the choice of a governance structure (Parkhe, 1993; Teng & Das, 2008). The level of equity, and the attendant control and support mechanisms of the alliance, influence the alliance's learning characteristics, and therefore determine the fit of the governance structure with the firm's competitive strategy and external environment.

The structure of an alliance affects the transfer of knowledge in an alliance. Knowledge in an alliance can be either tacit or explicit (Nonaka, 1994). For an alliance, tacit knowledge

resides in the members of the alliance as well as with the partner employees, while explicit knowledge is transferred by the reporting structure and by the activities of the alliance.

The flow of tacit and explicit knowledge in an alliance is governed by the structure and control mechanisms of the alliance, with increasing control provided by escalating levels of equity participation and formal structure. The control structure of an equity alliance provides a pre-set path for the transfer of knowledge through joint management routines and through reporting against alliance milestones. Equity alliances also share knowledge through informal interaction of the individuals within the alliance. In an equity alliance, the partners' employees most often staff the new entity, and those employees often rotate jobs back and forth from the alliance to the home company (Sampson, 2007). Non-equity alliances have much less structure and may not have informal employee channels for the exchange of knowledge.

Several authors have postulated that corporations follow generic competitive strategies that lead to superior performance. Miles, Snow, Meyer, and Coleman (1978) suggested that there are four general strategic types of organizations: prospector, defender, analyzer, and reactor organizations. Other classifications include Rumelt (1974) on diversification strategies and Lieberman and Montgomery (1998) with the strategy of first-mover advantage. Porter (1985) develops three generic strategies that can be used to create a defendable competitive position – cost leadership, differentiation, and focus. Porter theorizes that failure to choose between cost leadership and differentiation will result in below-average performance. As Porter's competitive strategy is widely accepted as a baseline model, it is the strategic framework used in this paper.

Porter's generic strategies imply different organizational arrangements, control procedure, and inventive systems. Differentiation strategies are more likely associated with R&D and the development of knowledge that is more distant from the individual partners' knowledge base (Sampson, 2007). Cost improvement strategies are more associated with refinement of the current value chain (Porter, 1980) and are therefore more likely to be associated with manufacturing and distribution alliances. Thus, companies following cost strategies are generally focused on alliances directed at manufacturing improvements and at reducing the costs of distribution and customer support. Alliances in support of differentiation strategies are generally directed at exploring new knowledge through R&D or marketing partnerships.

R&D and marketing alliances involve more tacit information, and there is general agreement that the best structure for R&D and marketing alliances is an equity alliance, proving more structure and control (Kogut, 1998; Teng & Das, 2008). An equity alliance is also superior when the technical diversity of the partners is high (Sampson, 2007). Manufacturing alliances and distribution alliances are usually less knowledge-intensive than R& D alliances and involve the transfer of explicit knowledge, requiring less structure.

Therefore from a learning perspective, equity alliances provide the best structure for transfer of tacit knowledge, while non-equity alliances are better suited for the transfer of explicit knowledge. Several authors agree with this conclusion (Grant & Baden-Fuller, 2004; Inkpen, 1998; Sampson, 2007; Schoenmakers & Duysters, 2006), although others have argued that the rigid structure of the equity alliance results in transferring only the knowledge that is specified by the agreements (Pangarkar & Klein, 2001). Contracts can also limit the flexibility in pursuing new knowledge (Wu, Wu, & Lin, 2004) and in the freedom to combine knowledge (Grant & Baden-Fuller, 2004). Managers of equity alliances have overcome these learning issues by using adaptable contracts (Oxley & Sampson, 2004), and through the rotation of equity alliance employees.

In summary, the learning aspects of equity alliances are a better fit with tacit knowledge transfer and differentiation strategies, while non-equity alliances are a better fit with explicit knowledge transfer and cost strategies. From an organizational learning perspective and strategy perspective, this fit is associated with firm performance. At the portfolio level of analysis, managers should make governance choices so that the fit is consonant with the choice of generic competitive strategy, leading to above-average long-term performance. Hence:

> Hypothesis 1a: For a firm pursuing a generic cost strategy, an alliance portfolio composed primarily of non-equity alliances is associated with above-average firm performance.
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> Hypothesis 1b: For a firm pursuing a generic differentiation strategy, an alliance portfolio composed primarily of equity alliances is associated with above-average firm performance.

Fit of Learning Focus with Competitive Strategy

In addition to the choice of governance structure, managers can also enhance the value of an alliance portfolio by tailoring the fit of the learning mix of exploration/exploitation of the portfolio to the firm's generic strategy and to the dynamism of the industry. As with the discussion on governance structure, the fit is determined from an organizational learning perspective.

Initial scholars posed that the firm should try for a balance between exploration and exploitation, since too much exploration will lead to aimless churning and excessive exploitation will cause strategic stagnation (March, 1991). A balance between exploration and exploitation is required for effective learning and performance improvement (Gupta, Smith, & Shalley, 2006; March, 1991). However, later researchers recognized that the proper mix of exploration and exploitation is contingent on a number of factors, including the strategy and the external environment.

Exploration is concerned with knowledge that is distant from the focal company's base, while exploitation focuses on knowledge that is close or that is a refinement of existing knowledge. An increase in variation and search breadth is associated with exploration, while exploitation is directed at local search and search depth. Exploration is riskier, and has a longer time frame than exploitation (March, 1991).

In examining the generic knowledge strategies in the pharmaceutical industry, Bierly and Chakrabarti (1996) distinguish between internal versus external learning, and radical versus incremental learning. A similar distinction between internal versus external and familiar versus new is made by Rosenkopf and Nerkar (2001), who define four types of exploration from a technology boundary and organizational boundary perspective.

Exploratory alliances cross both technology and organizational boundaries, while exploitation alliances just cross the organizational boundaries with external partners. The knowledge base of exploratory alliance partners has an inverse-U-shaped relationship with alliance learning and performance – in other words, the partners should have related knowledge bases, but not too related (Sampson, 2007).

Determining the fit between the exploration/exploitation balance of an alliance portfolio and the firm strategy of cost or differentiation is quite straightforward. The majority of alliances for a company with a cost strategy are focused on improving the existing value chain or lowering cost by altering the value chain. The partner knowledge of these alliances is close to the existing

knowledge base of the focal firm – it is local search from a learning perspective – and the partners can specify a desired goal for the alliance. These alliances are usually associated with distribution or manufacturing and are exploitation alliances.

On the other hand, an alliance portfolio for a firm with a differentiation strategy should primarily be exploratory alliances, focused on new products and markets or a shift in the firm's technology base (Hoffman, 2007; Rosenkopf & Nerkar, 2001; Schildt, Maula, & Keil, 2005). These alliances are usually R&D and marketing, exploratory alliances.

> Hypothesis 2a: For a firm pursuing a generic cost strategy, an alliance portfolio composed primarily of exploitation alliances is associated with above-average firm performance.
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> Hypothesis 2b: For a firm pursuing a generic differentiation strategy, an alliance portfolio composed primarily of exploration alliances is associated with above-average firm performance.

Fit of Governance Structure with Industry Dynamism

A dynamic industry environment is characterized by rapid changes in the underlying technologies (Harrigan, 1988) as well as changes in economic, cultural, and competitive factors (Suarez & Lanzolla, 2007). In this environment, organizational learning is closely associated with firm performance (Brown & Eisenhardt, 1997; Teece, Pisano, & Shuen, 1997), and alliances are a primary source of external learning (Hoffman, 2007).

Environmental dynamism, i.e. the pace and nature of external change, has been described by number of different authors and labels including turbulence (Siggelkow & Rivkin, 2005), uncertainty (Hoffman, 2007), dynamism (Dess & Beard, 1984), velocity (Eisenhardt, 1989), and hypercompetition (Ilinitch, D'Aveni, & Lewin, 1996). In all cases the breadth and depth of knowledge required to manage in these environments has increased, plus the connection among knowledge, action and performance become less certain (Bourgeois & Eisenhardt, 1988). In addition, the external environment has become more complex and interdependent (Siggelkow & Rivkin, 2005).

In dynamic industries, the knowledge base of the partners is likely to be farther apart than in more stable environments, as the alliance is directed at reducing the complexity and uncertainty of the environment. The knowledge is also more likely to be tacit, as the complexity and rate of change makes explicit knowledge less valuable.

In order to effectively support learning in this environment, alliance partners rely on equity forms with structural coordination mechanisms, as well as the informal flow of information and knowledge among employees. If partners have developed technological expertise in the same fields, mutual learning will be easier with all else being equal, as firms are better able to absorb each other's knowledge. Under these circumstances, the need for sophisticated coordination mechanisms and the amount of the associated relation-specific investments are considerably reduced, as is the likelihood of resorting to equity modes.

Equity alliances allow firms to deal more effectively with rapid change in technological knowledge (Columbo, 2003). A number of empirical studies generally lend support to such predictions (Osborn & Baughn, 1990; Garcia-Canal, 1996; Gulati & Singh, 1998; Oxley, 1999).

In summary, the learning aspects of equity alliances are a better fit with dynamic environments and dynamic industries, and non-equity alliances are a better fit with less-dynamic industries. From an organizational learning perspective and strategy perspective, this fit is

associated with firm performance. At the portfolio level of analysis, managers should make governance choices so that the long-term fit is consonant with the choice of industry and associated dynamism, leading to above-average long-term performance. Thus:

> Hypothesis 3a: For a firm in an industry with lower industry dynamism, an alliance portfolio composed primarily of non-equity alliances is associated with above average firm performance.
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> Hypothesis 3b: For a firm in an industry with higher industry dynamism, an alliance portfolio composed primarily of equity alliances is associated with above average firm performance.

Fit of Learning Focus with Industry Dynamism

The interaction between a dynamic external environment and exploration has been extensively studied. Several studies have found an association between external exploration and increased learning and performance in dynamic environments (Brown & Eisenhardt, 1997; Hitt, Kitts, & Demarie, 1998). Miller and Friesen (1980), in a study of Canadian and US firms, find that the external environment moderates the relationship between innovation and performance and that successful firms increase the rate of innovation when environmental dynamism increases. Bierly and Daly (2007) examine the moderating effect of the external environment on both exploitation and exploration, finding that exploration has a higher impact on performance in high-tech dynamic environments than in stable, low-tech environments.

Therefore, an alliance portfolio for a firm in a dynamic external environment should primarily be exploratory alliances, and a firm in a lower dynamic environment should focus on exploitation alliances. Hence:

> Hypothesis 3c: For a firm in an industry with lower environmental dynamism, an alliance portfolio composed primarily of exploitation alliances is associated with above-average firm performance.
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> Hypothesis 3d: For a firm in an industry with higher environmental dynamism, an alliance portfolio composed primarily of exploration alliances is associated with above-average firm performance.

Dynamic Fit

As discussed above, the concept of fit has been one of the most widely ascribed and enduring concepts in strategic management (Venkatraman & Camillus, 1984) and is associated with performance improvements (Miles, et al., 1978). The concept and its applications originally implied fit or alignment at a point in time; that is, a matching of internal capabilities and resources to external environment as a static model of strategy. As strategy has become a more dynamic concept, the application of fit has been adapted to the concept of strategic change (Rajagopalan & Spreitzer, 1997). Strategic fit is also studied as a dynamic fit over time, involving multiple environmental factors and multiple organizational contingencies (Zajac, Kraatz, & Besser, 2000).

Allied with dynamic fit is the theory of dynamic capabilities, the ability to reconfigure assets in response to shifts in the dynamic external environment (Eisenhardt & Martin, 2000). Dynamic capabilities assist the firm in adapting over time and may include the ability to

rebalance the ambidextrous capability of exploring new opportunities and exploiting existing businesses (O'Reilly & Tushman, 2007).

Dynamic fit is defined as the change in internal assets and capabilities in the proper amounts and when they are needed, and organizations that apply dynamic fit are associated with above average long-term performance (Zajac, et al., 2000). A study of alliance portfolios over time (Columbo, 2003) confirms the association with performance for partner diversity, but concluded that a focused set of approaches to alliance governance is superior to a balance between equity and non-equity alliances.

Therefore, firms should be concerned with dynamic fit among alliance portfolio characteristics, generic competitive strategy, and industry dynamism. The ability to change the alliance portfolio fit by adjusting the mix of governance and learning objectives to match changes in strategy and industry dynamism is a dynamic capability that enhances the value of the alliance portfolio. Hence:

> Hypothesis 4: The adaptation of an alliance portfolio fit to changes over time in the firm strategy and changes in industry dynamism is associated with above-average long-term performance.

The relationships in the hypotheses are shown in the conceptual model in Figure One (Appendix).

POTENTIAL EMPIRICAL EVALUATION

The model summarized in Figure One relates the governance and learning characteristics of a portfolio of alliances to the firm's generic strategy and industry dynamism. The potential empirical evaluation of the model is described by defining the industries and the longitudinal nature of the study approach, describing the variables in the study and the data sources, explaining the analysis techniques, and providing an overview of the expected study results.

The study should use dynamic industry sectors – for example, telecommunications equipment manufacturing, biotechnology, business software services, chemical products, and pharmaceuticals. These industries have experienced varying amounts of global competition and technological changes, and have varying levels of technology intensiveness. In order to capture the dynamic adaption of the alliance portfolio characteristics, a longitudinal study is envisioned, using data for the years 1990 to 2009, a twenty-year study period.

Diversity of exploration/exploitation and equity/non-equity is calculated using a measure called the Blau Index, sometimes called the Herfindal-Hirschman index of homogeneity. For any given diversity variable $D = 1 - \sum (Pi^2)$ where P is the proportion for any given category. The Blau index results in a measure between 0 (no diversity) and 1 for a perfectly heterogeneous group.

Industry dynamism is commonly measured as the R&D intensity, the ratio of R&D to industry revenues. The National Science Foundation reports R&D intensity annually. A rolling three-year average of the variable is computed to smooth out yearly revenue variations.

The firm's competitive strategy – differentiation versus cost – is measured by the relative annual expenditures on R&D and marketing versus sales, general and administrative expenditures (Yamakawa, Yang, & Lin, 2001). The dependent variable is annual return on assets (ROA), with a three-year rolling average of the variable as the measurement. This data is available from the CompuStat database. Superior performance is defined here as relative to the

industry average of ROA. For all dependent variables, the firm data is compared to the industry average and the variable is measured as a percentage difference from the industry average.

SUMMARY AND DISCUSSION

This paper develops a model relating firm performance to the fit of alliance portfolio characteristics with generic strategies and industry dynamism. The value of an alliance portfolio is enhanced if managers dynamically adjust the fit of alliance governance choices and the mix of exploration/exploitation alliances to changes in strategies and the external environment.

An organizational learning perspective is taken at the portfolio level to evaluate the issues of fit. The governance structures of equity and non-equity alliances are compared in terms of their relative treatment of knowledge flows and learning between alliance partners. Likewise, the characteristics of exploitation and exploration alliances differ in terms of learning objective, scope and knowledge bases of the partners. These characteristics determine best fit between alliance governance choices and generic strategies, and between governance and the level of industry dynamism. Similarly, the best fit is evaluated between exploration and exploitation alliances with generic strategies and dynamism.

The resulting model hypothesizes eight relationships regarding fit. For each hypothesis the predominance of the portfolio fit between characteristics and generic strategy and industry dynamism is associated with above-average long-term performance. A final hypothesis associates firm performance with dynamic fit - the adaptation over time of the fit in the hypotheses above to changes in the firm's strategy and to changes in industry dynamism.

This paper has the potential to be of assistance to managers in evaluating alliances in a systematic manner as part of an alliance portfolio, instead of as one-by-one opportunities. Managers can view each alliance opportunity not only in terms of alliance objective and partnering potential, but also in terms of how the overall portfolio fits with the firm's generic competitive strategy and with the level of the firm's industry dynamism. For example, the model indicates that firms pursuing a differentiation strategy in a dynamic industry would benefit from a portfolio of predominately equity alliances and exploratory alliances.

Areas that could be strengthened in this model include broadening the scope of alliance characteristics, evaluating other generic strategy models, and adding other external factors. For example, the balance of domestic versus international alliances in a portfolio, the explorer and defender strategies, and level of industry competition could be evaluated as variables. This model shares a common issue in most alliance studies – the complexity of the field of study. For example, by taking the portfolio perspective of the mix of exploration and exploitation, the study ignores the evolution of an alliance over time at the dyad level. Finally, other aspects of a portfolio of alliance that affect learning, such as partner characteristics, were not included in this study.

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APPENDIX

Figure One – Fit of Alliance Portfolio Characteristics With Firm Performance