Joint Ventures in the Information Technology Sector: An Assessment of Strategies and Effectiveness

Jeongsuk Koh

N. Venkatraman

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Massachusetts Institute of Technology
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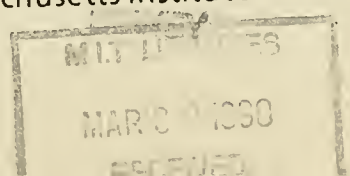

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ABSTRACT

This paper examines the strategies and effectiveness of joint ventures in the information technology sector using an event-study methodology. Joint-venture effectiveness is further calibrated by comparing joint ventures with other forms of cooperative arrangements in terms of abnormal returns of the parent firms. Further, we identify the differential role of five strategic choices -- role of joint venture in terms of influencing the product/market scope; degree of relatedness with the focal parent's portfolio; degree of relatedness between the parents; size differences between the parents; and national origin of the parents -- on the effectiveness of joint ventures for the parents.

Introduction

The shape of the modern corporation is steadily undergoing significant transformation. In early decades of this century, forward integration was the predominant form of strategic change (Chandler 1962), while diversification activities assumed major proportions in the decades after World War II (Rumelt 1974). The more recent decades appear to be characterized by both corporate integration (via merger) and disintegration (via divestiture), coupled with a marked escalation in the frequency and complexity of several kinds of cooperative arrangements (Teece, Pisano, and Russo 1987). These agreements between firms link distinct processes and activities of their businesses, but fall short of a formal merger. These arrangements are best viewed as falling in the center of a continuum between market and hierarchy and are variously referred to as strategic alliances, strategic partnerships, coalitions (Porter and Fuller 1986) or strategic networks (Jarillo 1988). The specific forms include joint ventures, equity participation, licensing, cross-licensing, technology exchange, subcontracting, and marketing/supply agreements.

The importance of these cooperative arrangements for both theory and practice of strategic management can be argued from four points of view. First, as noted by Hergert and Morris (1986), the frequency of the formation of such arrangements has sharply increased since 1980. Second, the prototypical arrangement prior to the mid-70s was a sharply asymmetric partnership, while in recent years, we observe a much greater symmetry between partners in terms of technological capabilities (Hladik 1985). Third, the arrangements now tend to be more concentrated in sectors characterized by emerging technologies (Ghemawat, Porter, and Rawlinson 1986) as opposed to the arrangements prior to the mid-70s that were formed in mature technology sectors (Stopford and Wells 1972). Finally, the contemporary

arrangements involve a broader spectrum of activities than previously and range from joint technology development through joint manufacture as well as joint marketing (Harrigan 1985).

This paper focuses on one type of cooperative arrangements, joint ventures -- in one sector of the economy, the "information technology sector." A joint venture is defined as "a partnership in which two or more firms create a new entity with shared ownership and shared managerial control[1]." This is an important type of cooperative arrangement given that between 1972 and 1982, over 2000 joint ventures were reported in the quarterly roster of joint ventures published by the Mergers and Acquisitions.

Research on Joint Ventures

Joint ventures have received attention from different perspectives[2], but it appears that the research attention can be categorized along two dimensions: (a) the dominant theoretical perspective, i.e., strategic behavior or transaction cost perspective; and (b) the research focus, i.e., whether the focus is on the motives for the formation of a joint venture or on the effectiveness of joint ventures[3]. Although not collectively exhaustive, the four types of studies shown in Figure 1 illustrate the major research questions and the underlying theoretical arguments.

(Insert Figure 1 about here)

Studies from Type A are grounded in industrial economics/strategic management paradigm and seek to analyze the strategic motives of joint-venture formation based on a firm's ability to offer products/services in order to compete effectively in its markets. The motives described in these studies can be synthesized into two major ones[4]: market-power enhancement and efficiency enhancement. Market-power enhancement is argued as the principal motive by Fusfeld (1958), Mead (1967), Pate (1969), Boyle (1968), and

Pfeffer and Nowak (1976) and efficiency enhancement is focused on by Backman (1965), Berg and Friedman (1977, 1981), Rockwood (1983), and Stuckey (1983). Anchored in the same theoretical framework, research from Type B deals with two general questions: (a) Are joint ventures effective?; and (b) Under what conditions are joint ventures effective? However, few empirical studies fall into this category (McConnell and Nantell 1985; Harrigan 1986).

Grounded in the transaction cost framework (Williamson 1975), Type C explains the formation of joint ventures based on minimization of production and coordination (transaction) costs of alternative modes of governance structure (Hennart 1988). Kogut (1988, p. 321) argues that:

> "the critical dimension of a joint venture is its resolution of high levels of uncertainty over the behavior of the contracting parties when the assets of one or both parties are specialized to the transaction and the hazards of joint cooperation are outweighed by the higher production or acquisition costs of 100 percent ownership."

Examples of empirical studies include Shan (1986) and Teece, Pisano, and Russo (1987). There are no empirical studies following Type D which emphasize the effectiveness of joint ventures based on the transaction cost framework.

The study described in this paper is positioned in Type B and focuses on the effectiveness of joint ventures for the participating parents. The aim of the research is to: (a) assess the effectiveness of joint ventures in the information technology sector for the parents using an "event-study" methodology; and (b) identify the differential role, if any, of five strategic factors -- role of joint ventures in terms of influencing the product/market scope; degree of relatedness with the focal parent's portfolio; degree of relatedness between the parents; size differences between the parents; and national origin of parents -- on the effectiveness of joint ventures for the

parents.

This paper is divided into four sections. The first section develops the theoretical perspectives underlying this study, leading up to the specification of hypotheses. The second section describes the sample and statistical methodology employed in the analysis, while the third section presents the results supporting or rejecting the hypotheses. The final section contains a summary and some concluding remarks.

Theoretical Perspectives

Research Question One: Effectiveness of Joint Ventures

According to the strategic behavior perspective, joint ventures provide a set of benefits with a set of costs (Harrigan 1985; Contractor and Lorange 1986; Porter and Fuller 1986). To the degree that benefits associated with joint ventures outweigh potential costs, joint ventures are expected to be effective for the participating firms.

Benefits. Based on the available literature, the various benefits can be classified into four categories: (a) economies of scale -- through sharing of distinct activities of the parents under one entity (e.g., joint ventures in the aluminum and bauxite (Stuckey 1983) and the commercial aircraft (Moxon and Geringer 1985) industries); (b) access to complementary assets -- through pooling of the complementary assets of the partners such as production & marketing and design & manufacturing (e.g., joint ventures in such diverse industries as petrochemicals (Backman 1965), chemicals (Berg and Friedman 1977, 1981), electronics (Harrigan 1985), biotechnology (Shan 1986), and telecommunication equipment (Teece et al. 1987)); (c) risk sharing -- through joint projects in areas characterized by extremely high development costs coupled with uncertain demand and/or short product- or technology-life cycle (e.g., Rockwood 1983; Harrigan 1985); and (d) shaping the scope and basis of

competition -- by coopting existing or potential competitors within regulatory constraints (e.g., Fusfeld 1958; Pfeffer and Nowak 1976; Vickers 1985).

Potential Costs. Joint ventures also involve potential costs to the participating parents that should be recognized. Porter and Fuller (1986) classify them into three categories: (a) coordination costs -- given the need for ongoing coordination between the partners that could be difficult under the conditions in which divergent interests between partners may complicate the joint pursuit of a strategy (e.g., Moxon and Geringer 1985); (b) erosion of competitive position -- given the possibility of making some existing competitor more formidable through the transfer of proprietary expertise and market access as well as lowering entry barriers; (c) creation of adverse bargaining position -- when one partner may be able to capture a disproportionate share of the value created by the joint venture due to the other partner's adverse bargaining position resulted from specialized and irreversible investments.

Premise. The general set of reasons pertaining to relative benefits and costs appears to be valid across a variety of industries. Thus, there are strong reasons to expect that these conditions apply at least equally well to the "information technology sector." Thus, we expect joint ventures -- in general -- to be effective. However, this requires a more specific clarification of the term "effectiveness," which is discussed next.

Assessment of Effectiveness. There are several alternative approaches to the assessment of joint-venture effectiveness. As shown in Figure 2, the alternative approaches can be distinguished along two dimensions: (a) time frame -- ex-ante versus ex-post; and (b) focus, i.e., the target organization in the analysis of effectiveness -- parent firm versus joint venture. Within this framework, prior empirical work on joint-venture effectiveness can be

positioned. Examples of empirical studies in category A include McConnell and Nantell (1985) and Balakrishnan and Koza (1988) and examples in category D include Harrigan (1986), Killing (1982, 1983), and Kogut (1986). To our knowledge there is no empirical study in category C.

This study focuses on the parent firms with the ex-ante perspective. The ex-ante perspective can be assessed using an event-study methodology as shown in studies of mergers and acquisitions (Jensen and Ruback 1983). Given that joint ventures merely represent one of a variety of ways in which firms can combine resources to accomplish some objective, a complete analysis may require one to compare various types of intercorporate combinations of resources in terms of their impacts on the valuation of the participating firms. The choice of the ex-ante perspective ensures a more common basis for comparison than otherwise.

(Insert Figure 2 about here)

Hypothesis. Based on the preceding discussion, we hypothesize that joint ventures are value-creating activities, meaning that the pooling of the resources of the partners gives rise to "synergies" which take the form of economies of scale, the combining of complementary resources, risk sharing, and shaping the basis and scope of competition. Thus, the first hypothesis is formally stated as:

> H1: The abnormal returns associated with the event of joint venture are expected to be positive for the parents.

In a general sense, the hypothesis offered here is intended to serve as a replication of McConnell and Nantell's (1985) study with differing time-frame and a minimum degree of overlap in joint venture industries. However, their aim was to provide evidence as to whether the source of the gain to stockholders from mergers is due to synergy or management displacement[5]. In addition, this paper would provide the first formal test of this hypothesis

within one relatively homogeneous sector of the US economy.

Research Question Two: Factors Leading to Joint Venture Effectiveness

If research question one is supported, then it is particularly interesting to explore conditions under which some partner firms derive more benefits from joint ventures than other partner firms. This question is important since a general observation that joint ventures are value-creating activities, by itself, is of limited use for both theory and practice. As strategic management researchers, it is necessary to identify strategies that lead to best value under different conditions. As in research question 1, the focus of the effectiveness evaluation is on the parent and not on the joint venture, and is consistent with our reliance on the event-study methodology.

Based on the available literature on joint ventures, we have considered five strategic choices pertaining to joint-venture formation for assessing their differential effects on joint-venture effectiveness, if any. The first two choices are considered to determine whether "relatedness" is a source of value creation from joint ventures. The other three choices are concerned about the partner asymmetry. These five strategic choices are discussed below individually with a view to developing specific hypotheses.

Hypotheses on Relatedness as a Source of Value Creation

It has been observed in studies of diversification and mergers that combinations of resources in a related manner create more value than in an unrelated manner -- "relatedness hypothesis" (e.g., Rumelt 1974; Bettis and Hall 1982; Singh and Montgomery 1987). The theoretical underpinning is that when a firm operates in a set of related businesses, it is possible for the firm to exploit its "core factor" leading to economies of scale and scope, efficiency in resource allocation, and opportunity to utilize particular technical and managerial skills (Rumelt 1982).

Along with empirical findings in studies of diversification and mergers, the "relatedness hypothesis" provides a conceptual basis for the hypothesis that related joint ventures are expected to outperform unrelated ones. Two strategic choices pertaining to relatedness are discussed below.

Role of Joint Venture in Influencing Product/Market Scope. This role can be conceptualized along two dimensions: (a) product expansion -- adding new products; and (b) market expansion -- serving new customers, which builds on Ansoff's (1965) matrix as adapted by Salter and Weinhold (1979). Figure 3 is a schematic representation, where in the identical category, parents and joint ventures are in the same product/market segments; in the related-supplementary category joint ventures provide parents with access to new customers and markets rather than new products; in the related-complementary category, they provide parents with new products rather than access to new markets; and in the unrelated category, parents and joint ventures are in the different product/market segments[6].

(Insert Figure 3 about here)

Essentially, each of the four kinds of roles represents different types of resource combinations, and therefore different opportunities for value creation (Shelton 1988). Opportunities for value creation increase if the joint ventures are related to their parents in terms of product and/or market scope. Thus, this theoretical perspective allows us to hypothesize that joint ventures in the identical, related-supplementary, and related-complementary categories are expected to outperform those in the unrelated category.

Based on the market-power argument that monopoly gains are most likely when parents' and joint ventures' product/market segments overlap, we further hypothesize that joint ventures in the identical category are expected to outperform those in the related-supplementary and related-

complementary categories. Duncan (1982, p. 340) argues that:

> "gaining access to specialized knowledge, be it technological or geographical market characteristics, cannot be done without some sacrifice in profitability. The supplier of the knowledge (the other partner), for example, is in a superior bargaining position and can extract more rents for his knowledge."

Given a lack of strong prior theory, an a priori comparison between related-supplementary and related-complementary is not made in terms of opportunities for value creation[7].

The hypothesis is formally stated as:

H2: While parents forming joint ventures in the identical category will, on average, earn the highest abnormal returns, parents forming joint ventures in the unrelated category will, on average, earn the lowest abnormal returns.

Degree of Relatedness with the Focal Parent's Portfolio. This theoretical perspective also allows us to examine the division of benefits from the joint-venture formation between parents within the same joint venture. Suppose that parent 1 and parent 2 equally own a joint venture and that while all of parent 1's product/market segments are related to the joint venture's business, very few of parent 2's are related to the joint venture's business. Then, it can be argued that the joint venture will provide parent 1 with more opportunities for value-creation so that the joint venture will be more beneficial for parent 1.

Thus, the formal hypothesis is as follows:

H3: The parent with the higher sales portion in businesses related to the joint venture's business will earn higher abnormal return.

Hypotheses on Partner Asymmetries

Three kinds of partner asymmetries are analyzed in terms of the degree to which each influences the effectiveness of joint ventures: (a) related versus unrelated partner; (b) large versus small partner; and (c) domestic versus foreign partner. Our rationale is that the analysis of the impacts of

these partner asymmetries on joint-venture effectiveness will provide insights on the appropriate strategies for the selection of partner(s).

Related versus Unrelated Partner. The first type of partner asymmetry is concerned with the degree to which the partners are operating in related businesses. As Harrigan (1986) suggests, significant asymmetries between the partners are expected to be harmful to venturing performance because their heterogeneity exacerbates differences in how the partners value their joint venture's activities. Implicit in this argument is the premise that the more distant the partners are in relation to each other, the less strategic and organizational compatibility they have. Having a related partner may enhance joint-venture effectiveness by facilitating strategic as well as operational coordinations in the joint venture.

The following hypothesis is, therefore, developed:

H4: Firms with related joint-venture partners will, on average, earn higher abnormal returns than those with unrelated partners.

However, there is a competing hypothesis grounded in the transaction cost framework. Balakrishnan and Koza (1988) argued that joint ventures are superior to markets and hierarchies when the costs of valuing complementary assets are nontrivial. They hypothesized that the investors will respond less favorably to joint ventures between the related partners that are well informed about each other's business. Their interpretation was that a joint venture is not the value-maximizing mechanism under these conditions where the costs of valuing and acquiring complementary assets are trivial. The parents' management should have preferred acquisition and the failure to dc so is a signal to the market about either the inefficiency of the management or the managerial motives behind the decision. It may be some value, despite the differences in underlying theoretical perspectives between the present study and their study, to compare the results.

Given that "none of the studies explicitly tested the effect of horizontal joint ventures between firms from the same industry on firm rates of return" (Kogut 1988, p. 327 emphasis added), it seems worthwhile to test the "market-power argument" that the parents can enhance market power through their joint ventures when parents' and/or parent-joint venture industries overlap. In his investigation of joint ventures in the aluminum industry, Stuckey (1983, p. 153) commented that:

> "A joint venture offers the opportunity for cooperative and collusive behavior between an industry's going firms, during both planning and operation. In the aluminum industry, joint venture management committee meetings provide a (presently) legal occasion for "competitors" to air ideas about the future, particularly the timing and location of expansions to capacity and determination of the group's optimal pricing policy."

Thus, two hypotheses are developed:

H5: Parents from the same industry will, on average, earn higher abnormal returns than those from different industries.

H6: Parents from the same industry forming the joint venture within their industry will, on average, earn higher abnormal returns than those in other cases.

Large versus Small Partner. An important choice variable in joint venture formation pertains to the relative size of the partner. As reported in Hlavacek, Dovey, and Biondo (1977) and Roberts (1980), there has been an increasing trend of joint ventures in which large and small firms join to create a new entry into the marketplace. While it is common to see the small partner firm providing the technology with the large partner contributing capital and marketing capability, other arrangements of pooling complementary resources also exist.

There is a body of literature on the "relative size hypothesis" that provides evidence that the abnormal return of the acquired firm (small firm) in a merger is larger than that of the acquiring firm (large firm), but the gains in dollar value are approximately equal (Asquith, Bruner, and Mullins

1983; Bradley, Desai, and Kim 1983)[8]. Asquith, Bruner, and Mullins (1983) argue that the failure of most studies of mergers to detect any effect of the merger on the acquiring firms is due to the fact that in most cases, the acquiring firms are significantly larger than the acquired firms. Thus, if the dollar value of gain in a merger is divided evenly between the acquiring and acquired firms and if the acquiring firm's market value is 10 times that of the acquired firm, then a 10 percent abnormal return to the shareholders of the acquired firm will translate into an 1 percent abnormal return to those of the acquiring firm (McConnell and Nantell 1985).

It is appropriate to determine the validity of the "relative size hypothesis" in joint ventures. Obviously, the way in which benefits from the formation of the joint venture are divided between the smaller and larger partners provides some insight on the importance of the relative size in the selection of partner(s).

Based on theoretical and empirical research on mergers, the following hypothesis is developed:

> H7: The abnormal return of the smaller partner in an equally-owned joint venture will be, on average, higher than that of the larger partner, but the dollar value of their gains will be approximately equal.

Domestic versus Foreign Partner. Given that the information technology sector becomes globalized so that firms tend to be less ethnocentric in selecting their joint-venture partners, this factor appears noteworthy. This type of asymmetry has to do with cultural distance between partner firms. This concept is related to what Jemison and Sitkin (1986) call the "organizational fit" of the two firms. They define organizational fit as the match between administrative practices, cultural practices, and personal characteristics of the two firms.

Because differences in national cultures have been shown to result in

different organizational and administrative practices and employee expectations, it can be expected that the more culturally distant two countries are, the more distant their organizational characteristics on average will be (Bendix 1956; Lincoln, Hanada, and Olson 1981). It can be argued that partner firms from culturally-distant countries will attach greater costs to the coordination within joint ventures than those from culturally-similar countries.

Thus, the formal hypothesis is as follows:

H8: Parents with domestic partners will, on average, earn higher abnormal returns from joint ventures than those with foreign partners.

Methods

Sample Frame

The specific sector considered for the study is broadly characterized as the "information technology sector" -- which is growing in importance over the last decade. For the purpose of this research, a broad definition of the information technology sector is adopted. We include the sectors of the economy that are directly and/or indirectly dealing with products and components such as electrical and electronics machinery, equipment, and supplies (SIC: 36), measuring instruments and optical goods (SIC: 38), communication (SIC: 48), computer and data processing (SIC: 73) as well as electronic imaging and video (SIC: 78).

The sample includes joint ventures which were reported in the Wall Street Journal and were referenced in the Wall Street Journal Index over the period between 1972 and 1986. In order to be included in the final sample, the common stock returns for at least one of the parents had to be available on the daily returns file of the Center for Research in Security Prices (CRSP) over a period beginning 270 days prior to the announcement of the joint

venture. The sample was finally screened to eliminate the parents which made announcements regarding earnings, dividends, mergers, or other important firm-specific information during the arrangement announcement period.

This search and screening procedure yielded a sample of 239 firms involved in 175 joint ventures. Table 1 provides descriptive data on joint ventures by SIC codes.

(Insert Table 1 about here)

Analytical Methodology

The primary analytical methodology used to test hypotheses is the standard residual analysis technique based on the market model. The procedure described here follows the methods used by Dodd, Dopuch, and Hollhausen (1984) and Brown and Warner (1985).

The day on which the initial article describing a joint venture appeared in the Wall Street Journal is numbered event day t=0. The trading days prior to that day are numbered event days t=-1, t=-2, and subsequent trading days are numbered event days t=+1, t=+2, and so on.

Daily market model parameters are estimated for each firm using 200-day returns beginning with event day t=-270 and ending with event day t=-71.

$$R_{it} = a_i + b_i R_{mt} + u_{it} \qquad t=-270 \text{ to } t=-71 \qquad (1)$$

where

R_{it} = common stock return of firm i on day t

R_{mt} = rate of return on the CRSP value-weighted index on day t

a_i and b_i = ordinary least squares estimates of market model parameters

u_{it} = market model errors.

A firm is included only if it has a minimum of 100 days of returns. The

daily abnormal return, e_{it} , for each firm i on the day t during a conventionally chosen event period is computed as

$$e_{it} = R_{it} - (\hat{a}_i + \hat{b}_i R_{mt})$$

where $\hat{a}_i$ and $\hat{b}_i$ are the market model parameters estimated by (1).

For each firm i, the time-series abnormal returns, e_{it}'s, are computed from event day t=-D through t=+D. The sample cross-sectional average of abnormal returns for each day t, AR_t, is computed as

$$AR_t = \sum_{i=1}^{N} e_{it} / N$$

where N is the number of firms in the sample and t=-D...+D. Cumulative average abnormal returns for period i through j, CAR_{ij}'s, are also examined and are computed as

$$CAR_{ij} = \sum_{t=i}^{j} AR_t.$$

The impact of the announcement on the security's price is measured over the two-day trading period consisting of day t=-1 and day t=0. Henceforth, this two-day trading interval is referred to as the announcement period. The announcement period average abnormal return, $CAR_{-1,0}$, or the sum of $AR_{-1} + AR_0$ is the estimated "unexpected" change in stockholder's wealth associated with the public announcement of a joint venture. This announcement-period average abnormal return forms the basic statistics for evaluating the investor reactions to the event. The null hypothesis of no synergistic effect that the announcement period average abnormal return equals zero is tested using the following procedure.

It is assumed that AR_t is independent over time and distributed normal, i.e.,

$$AR_t \sim N(0, s^2).$$

An estimate of the variance, s^2_{AR}, is calculated for the 100 days from t=-70 through day t=-21 and day t=+21 through day t=+70 as

$$s^2_{AR} = \frac{1}{99} \{ \sum_{t=-70}^{t=-21} (AR_t - AAR)^2 + \sum_{t=21}^{t=70} (AR_t - AAR)^2 \}$$

where AAR is the mean average abnormal return for the 100 days of the variance estimation period. The estimation of abnormal return variance (s^2_{AR}) yields the test statistics $t=CAR_{-1,0}/s_{AR}(2)$, Student t with 99 degrees of freedom, where $s_{AR}(2)$ is the abnormal return standard error during the announcement period.

Additionally, as a check on the possibility that the announcement period average abnormal return is unduly influenced by outlier returns, two other statistics, which test the null hypothesis of no synergistic effect that the announcement period median abnormal return equals zero, are also employed. The first is the binomial z-statistic constructed based on the efficient-market assumption that the sign of the parent's abnormal return follows a binomial distribution with the probability of its taking a positive sign being 0.5^9 (Brown and Warner 1985). So, if the announcements of joint ventures have no significant effect on the returns to the shareholders of the parents, then the parents' abnormal returns during the announcement period would be normally distributed. That is, one half of the parents would have positive abnormal returns and the other half negative abnormal returns. The other test is the median signed rank (Wilcoxon) test which takes into account the magnitude as well as the sign of each parent's abnormal return (Hollander and Wolfe 1973).

Results

Support for Research Question One

Estimated abnormal return and test statistics for joint ventures are

presented in Table 2. The two-day announcement period average abnormal return is 0.87 percent. The null hypothesis of no synergistic effect can be easily rejected at the 0.01 level of significance according to all three tests.

Another way to assess the impact of joint venture announcements on the shareholder wealth is to convert the average abnormal return to a dollar value. Thus, the two-day announcement period abnormal return for each firm was multiplied by the security's total market value as of event day t=-3. The cross-sectional average of the dollar values is $12.6 million. It is useful to note that the unexpected average change in wealth from joint ventures is greater than the total market of the equity of a significant fraction of all companies listed on the NYSE and ASE.

(Insert Table 2 about here)

Joint-venture effectiveness was further calibrated by comparing joint ventures with other types of cooperative arrangements in terms of the extent to which values (abnormal returns) are generated for the firms. Other forms include: licensing, technology exchange, marketing, and supply agreements[10]. Although not exhaustive, this classification is mutually exclusive and covers a significant realm of cooperative arrangements.

As discussed by Porter and Fuller (1986), Contractor and Lorange (1986), Contractor (1985), Harrigan (1985), Telesio (1977), and Wilson (1975), strategic motivations and potential costs behind these forms of cooperative arrangements are likely to be similar to those associated with joint ventures. Given such parallels between joint ventures and these other forms, the premise that these other forms are synergistic for the participating firms appears to be reasonable. This comparison is worthwhile from a strategic management perspective given that each form can be and should be considered as an alternative to a joint venture.

The same search and screening procedure described in the Methods section for joint ventures yielded a sample of 102 firms in 76 technology exchange agreements, 60 firms in 45 licensing arrangements, 91 firms in 77 marketing agreements, and 50 firms in 38 supply agreements.

Estimated average abnormal returns associated with these four types of cooperative arrangements are presented in Table 2. The average abnormal return during the announcement period for technology exchange agreements is 0.8 percent and is significant at the 0.01 level of significance. However, the binomial z-statistic and the Wilcoxon test do not reject the null hypothesis of no synergistic effects. This result indicates that the significant average abnormal return may have been due to a few outlier observations. On the other hand, all three tests indicate that licensing, marketing, and supply agreements do not seem to create any values for the participating firms. The cross-sectional averages of the dollar values for technology exchange, licensing, marketing, and supply agreements are $24.6 million, $37.9 million, $(-)24.7 million, and $(-)24.5 million, respectively. Since significant dollar gains for licensing agreements resulted from a few outliers, assessing the effectiveness of licensing agreements based on this dollar value is misleading.

The comparison made in Table 2 enables us to conclude that joint ventures are, on average, more effective for the participating firms than other types. However, it should be noted that since the comparison was made in an exploratory way to calibrate joint-venture effectiveness, the finding should not be taken as confirmatory. Rather, this exploratory finding may serve as a point of departure for future study to assess the relative effectiveness of various types of cooperative arrangements.

Support for Research Question Two

H2: Role of Joint Venture. The two dimensions, "adding new products"

and "serving new customers", construct the classificatory scheme concerning the role of joint ventures as shown in Figure 3. The key issue in the first dimension is the way in which new products are defined as opposed to products similar to parents' existing products. Here, the distinction between new and similar products was made depending on whether parents or divisions involved in joint-venture formation already have operations in the businesses with the same SIC codes at the four-digit level as the businesses of their newly-created joint ventures. The other dimension was operationalized according to whether joint ventures allowed their parent firms to expand into new geographic markets of parents' existing businesses or to serve customers in new industries (businesses). Based on these guidelines, the full sample was classified into four groupings: I (Identical, 91 parents), RS (Related-Supplementary, 54 parents), RC (Related-Complementary, 73 parents), and U (Unrelated, 17 parents) (Table 3). Because of inadequate information, four parents were excluded.

All three tests allow us to reject the null hypothesis of no synergistic effect at the 0.01 level of significance for the I sample. For the RC sample, the t-test and the Wilcoxon test permit the rejection of the null hypothesis at the 0.05 and 0.10 levels of significance, respectively. However, the null hypothesis cannot be rejected for the RS and U samples according to any of the three tests. Thus, the results indicate the following: (1) joint ventures, on average, create values for the parent firms using joint ventures to strengthen some existing product/market segments or to market new products in some existing markets; whereas (2) joint ventures, on average, create no values for the parents using joint ventures to build new customer bases served by some existing products or to enter into new product/market segments.

The finding basically confirms the hypothesis H2. Inconsistent with the

theoretical perspective is, however, the finding that the RS-type joint ventures, on average, create no synergies. Furthermore, this is clearly contradictory with Shelton (1988)'s finding that the combination of assets in a related-supplementary fashion creates the most values with the least variance. A possible explanation is that in the case of information-technology industries, tailoring products to the needs of customers in new geographic markets is often necessary and expensive so that such costs may outweigh benefits such as economies of scale. Examples include PBXs, mainframe computers, and communication services.

(Insert Table 3 about here)

H3: Relatedness with the Focal Parent's Portfolio. A subsample in which both or all parents were included in the full sample was identified. The parents in the same joint venture were then categorized as either the "parent-with-opportunity" sample or "parent-without-opportunity" sample according to the sales portion of the parent's businesses related to the joint venture's business. In the case of a joint venture involving more than two parents, parents which were more or less similar in the sales portion of related businesses were classified into the same sample. Any two businesses were classified as related if the two shared at least one of the following characteristics: (a) similar products and/or markets; (b) similar production technologies; and (c) similar science-based research[11]. The "parent-with-opportunity" sample contains 58 parents and the "parent-without-opportunity" sample 61 parents.

Table 4 shows that no test rejects the null hypothesis of no synergistic effect for the "parent-without-opportunity" sample, whereas the t-test and the Wilcoxon test reject the null hypothesis at the 0.01 and 0.1 levels of significance for the "parent-with-opportunity" sample. It should be noted that

the relatively weak support provided by the binomial z-statistic and the Wilcoxon test stems from the poor sample as shown by significance levels associated with the binomial z-statistic and the Wilcoxon test for the full paired sample. This finding still supports that the parent with more businesses related to the joint venture's business reaps more benefits from the joint venture than the other parent.

(Insert Table 4 about here)

H4: Related versus Unrelated Partner. The parents in the full sample were categorized into either the "related-partner" sample (183 parents) or the "unrelated-partner" sample (53 parents) according to whether the partner or the partner's division involved in joint-venture formation has operations in related businesses. Relatedness was operationalized as in the test of H3. In the case of joint ventures involving multiple partners, parents with at least one related partner were categorized into the "related-partner" sample. Because of inadequate information, three parents were excluded.

As shown in Table 5, all three tests reject the null hypothesis of no synergistic effect at the 0.01 level of significance for the "related-partner" sample, whereas no test rejects the null hypothesis for the "unrelated-partner" sample. The finding is quite strong to support H4, as it appears that joint ventures involving related partners are more effective for the parents. This finding is at odds with Balakrishnan and Koza's (1988) competing hypothesis, and is an important area for further inquiry.

(Insert Table 5 about here)

H5 & H6: Market-Power Enhancement. The parents in the full sample were categorized into either the "same-industry" sample (73 parents) or the "different-industry" sample (163 parents) depending upon whether both parents or divisions were from the same industry at the four-digit SIC codes.

In the case of joint ventures involving multiple partners, parents with at least one partner from the same industry were categorized into the "same-industry" sample.

Table 6 shows that all three tests permit the rejection of the null hypothesis at the 0.01 level of significance for the "same-industry" sample, whereas only the t-test permits the rejection of the null hypothesis at the 0.05 level of significance for the "different-industry" sample. This result suggests that collusive gains are likely when the parents are from the same industry.

To further test the market-power enhancement effect of horizontal (within-industry) joint ventures between the parents from the same industry (H6), the "within-industry" sample (60 parents), in which both parents from the same industry formed the joint venture within their industry, was identified from the "same-industry" sample. The results in Table 6 provide a weak support for the market-power enhancement effect of horizontal joint ventures between the parents from the same industry.

(Insert Table 6 about here)

H7: Large versus Small Partner. A subsample of joint ventures in which both or all parent firms were included in the full sample was identified. The parents in the same joint venture were then categorized as either large or small partner according to the total market value of their common stock three trading days before the initial announcement of the joint venture. In the case of a joint venture involving more than two partners, partner firms which were more or less similar in size were categorized into the same sample. The "large-partner" sample contains 59 parents and the "small-partner" sample contains 60 parents. The remaining 120 parents in the full sample were placed into the "all-other" sample. This

third sample contains parents for which the partner's common stock was not listed on either the NYSE or ASE during the period of the study.

Table 7 shows that the shareholders of the smaller partner earn significantly positive abnormal return, while those of the larger partner earn insignificant abnormal return. This result is not consistent with McConnell and Nantell's (1985) finding that shareholders appear to gain when firms enter into joint ventures regardless of the relative size of their partner. Moreover, the result that smaller partners, on average, earn higher gains in dollar value ($19.2 million) than larger partners ($2.3 million) is not consistent with the "relative size hypothesis" of the merger studies. It may be argued that having a larger firm as a joint venture partner will be more beneficial.

For a small firm, having a large firm as the joint-venture partner benefits the small firm in various ways in addition to what the large partner is supposed to contribute toward the joint venture. One of the positive effects is the spillover of the large partner's reputation to the small firm. The fact that the large firm endorses the small firm as a partner may be a valuable asset. On the other hand, the asymmetry in size is likely to lead the smaller partner into an adverse bargaining position. In fact, the overall control over major decisions in the joint venture may be at the large partner's mercy.

(Insert Table 7 about here)

H8: Domestic versus Foreign Partner. The parents in the full sample were categorized into either the "domestic joint-venture" sample (147 parents) or the "international joint-venture" sample (91 parents) according to whether at least one foreign firm joined as a partner or not. Inconsistent with H8, Table 8 indicates that while all three tests reject the null hypothesis at the 0.01 level of significance for the "international joint-venture" sample,

only the t-test rejects the null hypothesis at the 0.01 level of significance for the "domestic joint-venture sample."

A possible explanation is that corporate cultural homogeneity (regardless of national origin) seems to be more important to venture success than symmetry in partners' national origin (Harrigan, 1986). For instance, Toyota's corporate culture may be more similar to that of General Motors than Ford's corporate culture may be. This explanation may be further supported by the evidence that more joint ventures between firms of differing national origins are being formed now than in the past because competitive necessity forces them to be less ethnocentric in their search for new products, customers, technologies, and resources than they once were (Harrigan 1984).

(Insert Table 8 about here)

Summary

Based on the strategic behavior perspective, this study attempts (1) to assess the effectiveness of joint ventures for the participating parents using an event-study methodology, and (2) to identify strategic choices influencing the effectiveness of joint ventures for parents. Table 9 provides a summary of hypotheses and the results obtained.

(Insert Table 9 about here)

The result suggests that joint ventures are, on average, effective (value-creating) intercorporate transactions for the shareholders of the parents. Moreover, an exploratory attempt to calibrate joint-venture effectiveness using other types of cooperative arrangements supported the conclusion that joint ventures are the most effective. Although not confirmatory, the comparison of this nature is meaningful from the strategic management standpoint given that each type of cooperative arrangements can

be considered as an alternative to a joint venture.

Two research implications of this analysis appear noteworthy. The first implication is that the results support the "relatedness hypothesis" -- one of the major issues in studies of diversification and mergers -- for joint ventures. It appears, therefore, that "relatedness" is a major source of value creation from intercorporate combinations of resources. The other implication is that there may be potential for market-power augmentation when the parents are from the same industry.

It is important to note that all joint ventures are not equally effective for parents as reported in this study. Thus, the identification of strategic choices contributing differentially toward the effectiveness of joint ventures for parents can provide managers with a guideline to the joint-venture strategy.

Limitations and Extensions

Several limitations of this study and implications for future research can be mentioned. First, given that the joint venture's competitive environments may vary even within a sector of related industries, thus affecting the effectiveness of joint ventures, future work should reflect critical factors related to the joint venture's industry. Second, this study's bivariate analysis should be extended to a multivariate analysis. This will require one to elaborate meaningful surrogates measuring the key independent variables such as "relatedness". Finally, by using both ex-ante and ex-post perspectives, future research could assess the effectiveness of joint ventures for parents in a more complementary manner. In addition, employing the two perspectives may provide an opportunity to assess the construct validity of abnormal return as an effectiveness measure.

ENDNOTES

1. This definition is similar to Harrigan's (1985) definition of "operating joint ventures" and Kogut's (1988).

2. For an overview see Harrigan (1985) and Kogut (1988).

3. While the studies on effectiveness may use the motives for forming joint ventures as underlying theoretical anchors for explaining their results, it is important to note that studies focusing on motives do not necessarily extend their arguments to show a link to effectiveness.

4. Duncan (1982) argues that the primary motive for parent-parent and parent-joint-venture nonhorizontal joint ventures is entry into a new market (market-entry argument).

5. Their basic premise was that since the original management structures of the parents remain intact under the joint venture, investigation of gains from joint ventures provides an opportunity to isolate the management displacement hypothesis from the synergy hypothesis as the source of gains in mergers.

6. A pure related-supplementary role is horizontal integration while a pure related-complementary role is vertical integration. Shelton (1988) classified acquisitions based on this scheme.

7. Shelton (1988) argues that although related-supplementary and related-complementary fits both provide opportunities to reduce marketing and production costs, related-supplementary fits provide greater opportunities to use excess capacity in managerial creativity.

8. There is a body of literature on the "small firm effect" that provides evidence that small firms, on average, earn significantly higher risk adjusted returns than large firms. For instance, the June 1983 issue of the Journal of Financial Economics was devoted to the symposium on size and stock returns.

Based on "information hypothesis", some authors argued that small firms' stocks are riskier than those of large firms' because less information is available about small firms than large firms (Keim, 1983; Reinganum, 1983). On the other hand, Stoll and Whaley (1983) and Schultz (1983) attempted to explain size effect by showing that transaction costs are higher for small firms' stocks than for larger firms' stocks.

9. The p-value associated with the binomial sign test is defined as follows:

$$p(x \leq m) = \sum_{i=0}^{m} \left[\begin{matrix} N \\ i \end{matrix} \right] \left(\frac{1}{2}\right)^{i} \left(\frac{1}{2}\right)^{N-i}$$

where $\left[\begin{matrix} N \\ i \end{matrix} \right]$ is the number of combinations from N objects taken i at a time, m is the number of firms with a positive two-day abnormal return, and N is the total number of firms.

10. Licensing is an agreement in which the licensor firm grants the licensee firm rights to use its proprietary technology, whether product or process technology, in exchange for some types of compensation such as royalties. Technology exchange agreement is an arrangement that permits participating firms to barter their technologies. Cross-licensing agreements, allowing firms to trade licenses to gain the partner's technology, will be classified into this category. Marketing agreements refer to marketing by one firm for another or jointly by both firms. Finally, supply agreements are defined as sorts of procurement arrangements in which one firm supplies the other firm with intermediate goods or technology.

11. The line of business data of a parent firm were obtained through annual reports, 10K forms, Standard & Poor Register, and Moody's Industrial Manual.

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Table 1

Number of Participating Parents by Joint Venture Industry

Joint Venture Industry (SIC Codes)	Description	Number of Parents
36	Electrical and Electronic Machinery, Equipments, and Supplies	105
38	Measuring Instruments, Photographic, Medical, and Optical Goods	9
48	Communications (Radio, CATV, TV, Telephone)	73
73	Computer and Data Processing Services	24
78	Motion Pictures, Video	28
Total		239

Table 2

Abnormal Returns and Test Results for the Five Types of Cooperative Arrangements

Type (# of Firms)	Average Abnormal Return (t-stat.)	Positive ARs (B-stat.)	Wilcoxon (z-stat.)	$ Gain (million)
Joint Ventures (N=239)	0.87% (5.28)**	58% (2.52)**	(3.30)**	$ 12.6
Technology Exchange (N=102)	0.80 (2.66)**	57 (1.39)	(1.67)	24.6
Licensing Agreements (N=60)	0.40 (0.95)	48 (-0.26)	(-0.33)	37.9
Marketing Agreements (N=91)	0.01 (0.04)	37 (-2.41)**	(-3.21)**	-24.7
Supply Agreements (N=50)	-0.13 (-0.27)	46 (-0.57)	(-0.81)	-24.5

** p<0.01

Table 3

Role of Joint Ventures and Abnormal Returns

	I (N=91)	RS (N=54)	RC (N=73)	U (N=17)
Two-Day Announcement Period Average Abnormal Return (T-Stat.)	1.32% (5.20)**	0.60% (1.50)	0.68% (2.21)*	0.37% (0.80)
Firms with Positive Abnormal Returns (Binomial Z-Stat.)	62.6% (2.41)**	53.7% (0.54)	57.5% (1.29)	52.9% (0.24)
Wilcoxon Test (z-stat.)	3.15 **	0.71	1.68 @	0.29

@ p<0.10
* p<0.05
** p<0.01

Table 4

Pattern of Abnormal Returns: Relatedness with the Focal Parent's Portfolio

	Paired Full Sample (N=119)	Parent-with-Opportunity Sample (N=58)	Parent-without-Opportunity Sample (N=61)
Two-Day Announcement Period Average Abnormal Return (T-Stat.)	0.75% (3.01)**	1.40% (3.79)**	0.14% (0.44)
Firms with Positive Abnormal Returns (%) (Binomial Z-Stat.)	51.3% (0.28)	58.6% (1.31)	44.3% (-0.90)
Wilcoxon Test (z-stat.)	0.36	1.71 @	-1.17

@ $p<0.10$
** $p<0.01$

Table 5

Pattern of Abnormal Returns: Related Partner versus Unrelated Partner

	Related-Partner Sample (N=183)	Unrelated-Partner Sample (N=53)
Two-Day Announcement Period Average Abnormal Return (t-stat.)	1.05% (5.27)**	0.12% (0.36)
Firms with Positive Abnormal Returns (Binomial z-stat.)	61.7% (3.18)**	45.3% (-0.69)
Wilcoxon Test (z-stat.)	4.16 **	-0.89

* $p<0.05$
** $p<0.01$

Table 6

Pattern of Abnormal Returns: Market-Power Enhancement

	H5		H6	
	Same Industry Sample (N=73)	Different Industry Sample (N=163)	Within Industry Sample (N=60)	Across Industry Sample (N=176)
Two-Day Announcement Period Average Abnormal Return (t-stat.)	1.20% (4.00)**	0.68% (3.38)**	1.24% (3.64)**	0.70% (3.68)**
Firms with Positive Abnormal Returns (%) (Binomial Z-Stat.)	64.4% (2.46)**	55.2% (1.33)	63.3% (2.07)*	56.3% (1.69)@
Wilcoxon Test (z-stat.)	3.21 **	1.74@	2.69 **	2.17 *

@ p<0.10
* p<0.05
** p<0.01

Table 7

Pattern of Abnormal Returns: Large Partner versus Small Partner

	Full Sample (N=239)	Large Partner Sample (N=59)	Small Partner Sample (N=60)	All Other Sample (N=120)
Two-Day Announcement Period Average Abnormal Return (t-stat.)	0.87% (5.28)**	0.44% (1.38)	1.13% (3.18)**	0.94% (3.97)**
Firms with Positive Abnormal Returns (%) (Binomial z-stat.)	58% (2.52)**	39.7% (-1.58)	62.7% (1.96)*	64.8% (3.26)**
Wilcoxon Test (z-stat.)	3.30 **	-1.95	2.45 **	4.26 **
Gains in Dollar ($Million)	12.6	2.3	19.2	14.3
Average Market Value ($Million)	6,073	10,010	1,429	6,489
Average Sales ($Million)	8,227	12,387	2,367	9,150

* $p<0.05$
** $p<0.01$

Table 8

Domestic Joint Ventures vs International Joint Ventures

	Domestic Joint-Venture Sample (N=147)	International Joint-Venture Sample (N=91)
Two-Day Announcement Period Average Abnormal Return (t-stat.)	0.83% (3.84)**	0.93% (3.30)**
Firms with Positive Abnormal Returns (%) (Binomial z-stat.)	55.4% (1.32)	62.6% (2.41)**
Wilcoxon Test (z-stat.)	1.72 a	3.15 **

a p<0.10
** p<0.01

Table 9

A Summary of Hypotheses and Results

Statement of Hypothesis	Results
H1: Effectiveness of Joint Ventures	Joint Ventures were value-creating activities for parents.
H2: Role of Joint Venture	Roles of joint ventures were ranked in descending order of value creation as follows:identical, related-complementary, related-supplementary, and unrelated. Parents forming joint ventures in the related-supplementary and unrelated categories earned insignificant abnormal returns.
H3: Relatedness with the Focal Parent's Portfolio	The parent with more businesses related to the joint venture's business earned higher abnormal return than the other parent.
H4: Related versus Unrelated Partner	Parents with related partners earned higher abnormal returns than those with unrelated partners.
H5 & H6: Market-Power Enhancement	Collusive gains were likely when the parents were from the same industry. However, horizontal joint ventures between the parents from the same industry had a weak market-power-enhancing effect.
H7: Large versus Small Partner	The smaller partner earned higher abnormal return than the larger one.
H8: Domestic versus Foreign Partner	Parents with foreign partners seemed to earn higher abnormal returns than those with domestic partners.

Research Focus / Theoretical Perspectives	Motives for Joint Venture Formations	Effectiveness of Joint Ventures
Strategic Behavior Perspective	Type A Explanation of joint venture formation based on a firm's ability to offer products/services to compete effectively in its markets. Empirical studies Berg & Friedman(1977) Duncan (1982) Pfeffer & Nowak(1976)	Type B Expectation of higher performance when firms form joint ventures to maximize their ability to offer products and/or services to compete effectively in their markets. Empirical studies Harrigan (1986) McConnell & Nantell (1985)
Transaction Cost Perspective	Type C Explanation of joint venture formation based on minimization of production and coordination costs of alternate modes of governance. Empirical studies Shan (1986) Teece, Pisano, & Russo (1987)	Type D Expectation of higher performance when firms choose the modes that best minimize production and coordination costs. No empirical studies

Figure 1. Joint ventures: Theoretical perspectives and research focus.

Perspectives \ Focus	Parent Firms	Joint Ventures
Ex-Ante When joint ventures are announced.	Event-study methodology Empirical Studies Balakrishnan & Koza (1988) McConnell & Nantell (1985)	Not directly possible
Ex-Post When joint ventures are in existence for time period t.	Effectiveness assessed in terms of achievement relative to goals/motives using perceptual data on managerial assessment of the parents. No Empirical Study	Effectiveness assessed in terms of joint venture performance (i.e., profits) and/or stability/duration. Empirical Studies Harrigan (1986) Killing (1982; 1983) Kogut (1986)

Figure 2. Effectiveness of joint ventures: Alternative approaches.

Product Expansion	Market Expansion
Identical (I) Similar products Similar markets	Related-Supplementary (RS) Similar products New Markets
Related-Complementary (RC) New products Similar markets	Unrelated (U) New products New markets

Figure 3. Role of joint ventures in terms of influencing product/market scope

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