

Capturing strategic alliance outcomes: an analysis of motives, objectives and outcomes

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Abstract: Strategic alliances are increasingly important to the overall strategy of firms and may be entered to increase competitive advantage. Strategic alliances can include a wide variety of inter-organisational agreements, with a wide range of motives and possible outcomes. Although research suggests that more than half of the alliances fail and that measures of outcomes lack consistency and comparability across the range of alliances. This study proposes a framework and measure that allows a diverse range of alliances, with a wide range of objectives and outcomes to be evaluated for success or failure.

Keywords: empirical; motives; objectives; strategic alliances; strategic alliance formation.

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1 Introduction

Small firms, technology-based firms and in particular biotechnology firms, form a great deal more strategic alliances than other firms or industries (Hamilton and Singh, 1992; Lang, 1996). Studies show an estimated 35–70% of alliances failing (Geringer, 1990; Burgers and Hwang, 1996), yet the mechanisms for capturing the success or failure of alliances is an area that has received relatively little attention. Although the potential positive outcomes from alliances are many, there is little understanding amongst practitioners concerning the formation process, the dynamics of these relationships and the factors that determine outcomes of alliances (O'Farrell and Wood, 1999). There is also great difficulty in separating out the factors affecting success and performance and the disparity in performance measures (Todeva and Knoke, 2005).

There are significant barriers to capturing the outcomes of alliances, which include the diversity of alliances, the length of relationships, the differences in expectations between alliance partners and, most importantly, the broad range of alliance objectives combined with the possibility of unexpected yet positive outcomes (Pett and Dibrell, 2001). The first is the diversity of possible alliances, which range from a complex long-term development project to a simple joint marketing agreement. The second is the issue of time; there may be several years between the formation of an alliance and the time at which measurable outcomes are evident. This delay leads to problems including changes in the expectations of partner firms or the possibility that the people responsible for forming the alliance have left before measurable outcomes are evident. To further complicate matters, some alliances are by nature short-lived (Todeva and Knoke, 2005) and the termination of the alliance relationship does not necessarily denote failure but possible success (Gulati, 1998).

Third is the potential disparity between alliance partner perceptions of outcomes. If one organisation has benefited more than the other, then how is that alliance to be judged 'successful'? Fourth is that although companies may enter alliances with clear objectives, it may be that the alliance relationship results in unexpected but still 'successful' outcomes.

The breadth of alliances together with the possibility of unexpected yet positive outcomes makes assessing alliances extremely difficult. This diversity of possible outcomes means that relatively simple measures of alliance outcome, either objective (profitability, longevity) or subjective (perceptual measures of satisfaction or success), cannot adequately capture the complexity of the relationship between firms. Furthermore, in order to make comparisons between different alliance outcomes some form of comparable measure is required. While measuring both partners' perceptions of a large number of alliances over a long period of time might be the best approach to determining this; limitations of time, cost and the requirement for large quantities of data in order to generalise, all contribute to the methodological difficulties.

A comprehensive review of literature reveals no single adequate measure of success of alliances (Kauser and Shaw, 2004). In previous research, subjective measures have been used (e.g. Killing, 1988; Mjoen and Tallman, 1997; Johnson, 1999, Kauser and Shaw, 2004). Whilst subjective measures leave themselves open to bias, not all alliances can be measured using financial measures (Johnson, 1999). Alliances may also result in substantial non-financial or transformational outcomes (Human and Provan, 1997). Therefore, the purpose of this study is to develop and evaluate a framework to describe alliance outcome and to develop a measure for capturing this. In doing so, this study

addresses two gaps in the literature. The major objective is to develop a single measure of alliance success, which has been identified as currently lacking (Kausser and Shaw, 2004). Since the outcomes of strategic alliances are inextricably linked to the initial objectives and motives for forming an alliance, it is also necessary to capture the theoretical and managerial reasons for their formation. Therefore, a secondary objective is to capture the overall process of strategic alliance formation, a gap identified by Pett and Dibrell (2001).

This study also provides a comprehensive review of previous research concerning the motivations, objectives and outcomes of strategic alliances. Initial empirical evidence from an international survey of Dedicated Biotechnology Firms (DBFs) is used to evaluate the framework and to capture opinions on the success of strategic alliances. The biotechnology industry was chosen as it has a high proportion of strategic alliances. Although the results of this study are most relevant to DBFs and other technology-based firms, the framework and outcome measure developed in this study aims to be one which can be used in many industries. The results lead a discussion on implications (managerial and theoretical) of delineating strategic alliances objectives and outcomes.

2 Strategic alliances in biotechnology and other technology-based industries

Gugler (1992) reported that more than half of all 'high technology' firms had formed some form of alliance and in a later study of Canadian Biotechnology firms only 2% were not engaged in some form of cooperative agreement (Woiceshyn and Hartel, 1996). DBFs form a diverse range of strategic alliances. This diversity includes the *type* of agreement, the *functional areas* of the alliance and the *motives* and *objectives* of firms forming alliances. The *type* of agreement that formalises a strategic alliance may vary considerably from informal spoken agreements to detailed legally binding contracts (Lorange, Roos and Bronn, 1992). The *formality* of the agreement may be affected by the technological characteristics of the industry, for example, Barley, Freeman and Hybels (1992) found that the most common form of alliance involved some form of equity stake, whilst Hagedoorn and Narule (1996) found that joint ventures were more common in relatively mature industries and contractual agreements were common in high-technology industries.

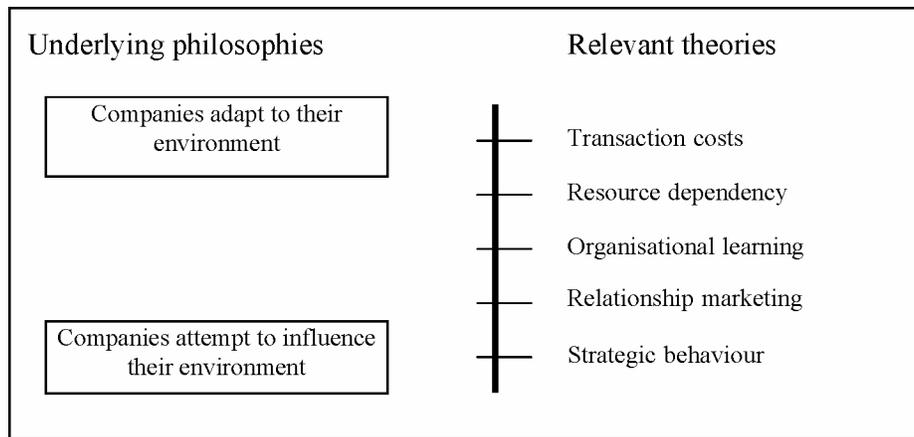
Strategic alliances can incorporate different functional areas (Howarth, 1994; Vyas, Shelburn and Rogers, 1995; Deeds and Hill, 1996). In a study of high-technology firms, 67% involved R&D, 50% involved marketing and 36% involved manufacturing (Woiceshyn and Hartel, 1996). Forrest (1990) also notes that *types* (with regard to functional input) of strategic alliances formed may change over the lifespan of the firm *and* the industry.

There is no widely accepted definition of the term 'strategic alliance' (Kausser and Shaw, 2004), so for this study, strategic alliances are defined as inter-organisational collaborative agreements, whose intention is to enable *each* partner organisation to meet a *strategic* objective. Therefore, this includes equity and non-equity agreements and a wide variety of collaborative arrangements.

3 Theoretical approaches to understanding strategic alliance formation

In order to better understand why organisations form strategic alliances, a review of theories explaining firm behaviour is included. Several of these have previously been used as a basis for explaining strategic alliance formation: transaction cost theory, resource dependency theory, organisational theory, relationship marketing and strategic behaviour theory. These are positioned with respect to the underlying philosophies of firms reacting to or changing their environment, as shown in Figure 1. There are also ‘non-strategic’ theories of strategic alliance formation such as mimetic behaviour (Kogut, 1988) or convenience (Samli, Kaynak and Sharif, 1996), but these have not been included in this framework.

Figure 1 Positioning the underlying philosophies and theories relevant to strategic alliance formation



Transaction cost theory (Williamson, 1979) suggests that companies form alliances in order to minimise their costs and/or risks. Forming an alliance represents an internalisation process for a firm, thereby reducing price vagrancies of the marketplace and risk. Thus, forming an alliance represents one way a firm adapts to an uncertain world. *Resource dependency theory* states that firms have specific resources and that few companies are self-sufficient in these (Glaister and Buckley, 1996) and therefore must depend on others for important resources.

Both relationship marketing and strategic behaviour theory propose that firms form strategic alliances as a means of acting pro-actively and in so doing, alter their environments. *Relationship marketing* refers to the tendency of firms to form strong relationships with their customers and suppliers (Arndt, 1979). In order to provide superior customer value. Within this approach, alliances are seen as a less-risky but effective means of providing services/products that will enhance the customer relationship (Webster, 1992). *Strategic behaviour theory* is a managerial, rather than a marketing approach. Companies are expected to form cooperative agreements if they believe that these arrangements will better enable them to meet their strategic objectives with the focus being on maximising profits (Kogut, 1988).

Lying somewhere between these extremes or indeed complementing these theories is that of *organisational learning*, which differentiates between tacit and specific knowledge. Although specific knowledge can be transferred through licensing, tacit knowledge is that knowledge embedded in an individual, which can only be transferred by learning alongside the individual (Levitas, Hitt and Dacin, 1997; Kogut, 1988). Many organisations enter alliances with great expectations of organisational learning (Todeva and Knoke, 2005).

Each of the above-mentioned theories explains *some* alliances better than others and can be seen as complementary rather than competing. In reality, strategic alliances are complex, often with many driving forces and differing outcomes.

4 Practical approaches to strategic alliance formation

In an attempt to better explain the complexity of alliance formation and outcome, a framework developed by Hynes and Mollenkopf (1998) is adapted to delineate the steps taken in the process of alliance formation and to structure the extant literature. This separates out antecedents, motives and potential objectives of firms entering alliances.

Central to this framework is the assumption that strategic alliances are *strategic*, i.e. that companies have strategic objectives which they aim to meet through a conscious choice to enter an alliance. Building on the strategy/structure/performance model (Chandler, 1962), it is proposed that companies form strategic alliances as means by which they can alter their structure to fit their strategy and that they do so in order to meet both long- and short-term objectives.

4.1 Antecedents

Antecedents are simply precursors to any strategic alliance formation; although they can pre-dispose a company to form a strategic alliance, there is no implied causal relationship. Antecedents can be exogenous (including product-, market- or industry-related factors), or endogenous (e.g. a company having prior involvement in an alliance, or a culture conducive to collaborative behaviour).

4.2 Motives and objectives

The terms 'objectives' and 'motives' are often used interchangeably and ambiguously in the literature. For clarification purposes, a motive is defined as a variable that activates the behaviour and provides purpose and direction to that behaviour (Beatty and Smith, 1987), whereas an objective is concerned with the outcome of the process. Motives, therefore, describe the reason *why* companies want to form an alliance in preference to alternative means of achieving the desired objective.

Many authors provide discussions of motives for companies forming strategic alliances (e.g. Kogut, 1988; Howarth, 1994; Varadarajan and Cunningham, 1995). Glaister (1996) provides a very comprehensive review of motives, which can be summarised into five generalised motives:

- *Reducing cost*: for example, lowering of marketing, development or production costs.
- *Reducing risk and uncertainty*: This risk and uncertainty is shared between the alliance partners.
- *Organisational learning*: Alliances allow tacit learning; that is, the acquisition of knowledge that cannot be bought or licensed.
- *Managing industry structure*: Through collaboration the partner firms can change the forms of competition or channel structures.
- *Timing (speed)*: An alliance is judged to be the fastest method for achieving a particular strategic objective.

For small firms, a sixth motivating factor might possibly be maintaining independence. Slowinski, Seelig and Hull (1996) argue that maintaining independence may be desirable from the small firm's perspective in order to retain the company culture. Indeed, there is evidence that large companies prefer not to buy out incubating firms because, when they do so, the incubating firm loses many of the properties that made it initially successful (Anonymous, 1998).

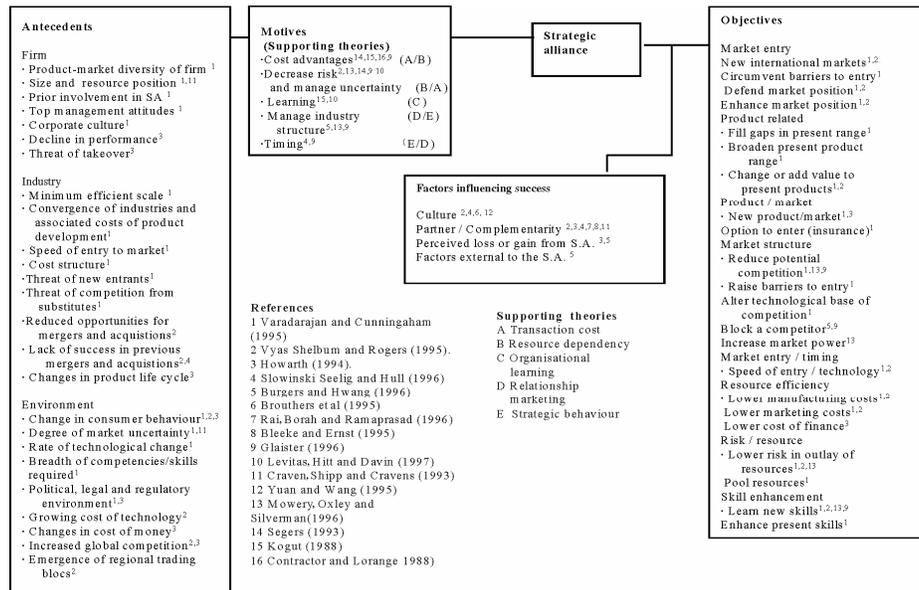
These groups of motives relate fairly closely to the theories of firm behaviour, but are more applicable to some than others. For example, transaction cost economics is proposed to be the best theory to explain why cost advantages motivate companies to form strategic alliances. Resource dependency theory best explains why decreasing risk and managing uncertainty are motivating factors. Companies requiring assets can obtain them in several ways including developing them in-house or forming strategic alliances. Decreasing risk could be argued to be the main motivating force in using strategic alliances to meet their resource needs. Knowledge could also be argued to be a dependent resource although the growing stream of research into organisational learning provides its own theoretical basis. Managing industry structure and timing can both be explained by relationship marketing and strategic behaviour theory, since each suggests that companies will pro-actively attempt to influence their environment through forming relationships. Table 1 places the theories and motives of firm behaviour in the context of technology-based industries.

Objectives are the desired outcomes of strategic alliances. Although there may be some apparent overlap between types of motives and objectives, they are not necessarily the same for any one alliance. For example, a small biotechnology company is developing a new drug. To cover the development costs associated with this drug, it needs to commercialise in worldwide markets yet lacks the resources to handle this. In order to speed up commercialisation it forms a number of alliances. In this example, the strategic objective could be long-term profit, or new market entry; however, the company could have achieved this objective in a number of ways (e.g. acquisition/organic growth/alliances) and therefore the motivation for alliance formation might be a combination of speed and or perhaps a desire to remain autonomous. This example illustrates how alliances may be multifaceted in terms of motives and expected outcomes. This is summarised in Figure 2, which shows antecedents, motives and objectives for strategic alliance formation and the supporting literature.

Table 1 Motivations and theories of alliance formation and its applicability to DBFs/TBFs

Theory	Motive	Relevance to DBFs
Transaction cost theory	Reducing cost (also risk and uncertainty)	Short of finance and sometimes skills, yet require heavy investment in NPD processes (Magee, 1992; Lambe and Spekman, 1997). Evasion of small firm bargaining (Geyskens, Steenkamp and Kumar, 1996).
Resource dependency theory	Reducing risk and uncertainty (also cost)	Global, niche markets (Glaister and Buckley, 1996). Huge reliance on NPD yet low success rates (Gugler, 1992; Slowinski, Seelig and Hull, 1996).
Organisational learning	Tacit learning	High incidence of technology-transfer programmes (Hagedoorn and Schakenraad, 1994).
Relationship marketing	Managing industry structure	Importance of networking (Burgers, Hill and Kim, 1993; Gugler, 1992). First mover advantage (Hill, 1997; Forrest, 1996).
Strategic behaviour theory	Speed	New technological standards (Meyer and Roberts, 1988; Hill, 1997). Speed to market and discontinuous technology change (Lambe and Spekman, 1997).

Figure 2 Model of strategic alliance formation and outcome



4.3 Alliance success

In order to more effectively determine whether alliances have succeeded, a measure is required. Previous research has used objective measures such as the lifetime of the alliance, sales or other financial measures; Harrigan (1996) used a combination of duration, survival and managerial perceptions to capture the success of a group of joint

ventures. However, due to the diversity of alliances, objective measures are inapplicable to some agreements because traditional measures such as sales or profits do not capture the success of many forms of collaboration (Kogut, 1988) and are only relevant for strategic alliances that have specific financial objectives (Arino, 2003).

Other measures have included the overall managerial satisfaction with an alliance meeting its initial objectives (Parkhe, Rosenthal and Chandran, 1993; Cravens, Shipp and Cravens, 1993). One problem is that the goals of partners may change and this may happen during the lifetime of the alliance (Doz, 1996). This may result in alliances that have very positive yet unexpected outcomes, although this is an issue which has received little attention and has been identified as an area of future research (Todeva and Knoke, 2005). Although some argue that subjective measures are not as accurate as objective measures, a high degree of correlation has been shown between subjective measures of performance and more objective measures including accounting data (Geringer and Hebert, 1990), which reinforces the use of subjective measures.

In summary, the range of strategic alliances formed is very broad. They are formed for a wide variety of motives and have a wide variety of outcomes. Existing theories of firm behaviour are useful in explaining *some* of the reasons why companies form alliances but provide less scope for evaluating the success or failure of the alliance. In addition, the outcomes of alliances may take several years to be visible and in this time the expectations of the alliance partners may have altered. Determining the outcome of the alliance can lead to many methodological problems. Yet judging the success or failure of an alliance is of vital managerial importance, as well as in theoretical terms in order to further understand the dynamics of markets.

5 Methodology

Questionnaires were mailed to a sample of 1,307 biotechnology firms in the UK, the USA, Australia and Canada, drawn mainly from *The Biotechnology Directory* (Coombs 1997). A number of methods were used to increase the response rate, including sending reminder letters, guaranteeing anonymity and offering the respondent a summary of the research results. The questionnaire was pre-tested on a New Zealand sample and by the use of an expert panel. Data were examined for non-response and common method bias. No significant bias or inter-country differences were evident.

Respondents were asked to report on their 'most important' alliance with the proviso that it had been running for a minimum of a year in order that some definite outcomes had been seen. The words 'most important' were chosen in order not to bias the respondent into the most successful or the most unsuccessful alliance.

5.1 Capturing alliance outcome

In order to overcome the apparent weakness of using any single measure of alliance outcome, a measure developed by Gordon (1995) and a similar recent study by Kauser and Shaw (2004) was adapted for use in this study. Respondents were asked to describe how important certain desired outcomes of the alliance were at the time when the alliance was entered into and later in the questionnaire, to judge the outcomes of the alliance against a similar list. The first section included 16 possible independent objectives of strategic alliances, which were derived from a comprehensive literature review (Hynes

and Mollenkopf, 1998) and illustrated in Figure 2. For each objective, the respondent was asked to assign a rating from 'not at all important (1)' to 'very important (5)', or 'not applicable'. The mixture of responses to all of these questions was used to provide a picture of the desired outcome of the alliance.

The second section asked the respondent to rate how the position of the firm with regard to each possible objective had improved or worsened *as a result* of being in the strategic alliance. Most objectives (e.g. profitability, sales growth) were measured using a five-point Likert scale from 'much worse' to 'much better'. Several objectives could not be made into statements that fit this type of response and for these objectives the respondent was asked to complete a Likert-type scale from 'agree strongly' to 'disagree strongly' to statements such as: 'This alliance has reduced the risk and uncertainty our firm faces'.

This measure allows each alliance to be judged against its own criteria rather than pre-determined outcomes as called for by Stanek (2004). In addition, the measure can encompass both strategic and operational goals as well as short-term and long-term outcomes (Goold and Quinn, 1990). The advantages of this method are that it can be used to compare disparate types of alliances, can accommodate multiple objectives and allows alliances that have had positive yet unexpected outcomes which still are to be judged successful. Disadvantages with this method include the fact that the respondent is being asked for an *ex post* judgment on alliance motives and objectives and these may have altered since the alliance was formed, or the respondent's memory may be biased or not clear.

In addition, a simple measure of the perception of the alliance benefits was also included, which allowed more complex measures above to be validated. A three-item, five-point Likert-type scale was also included, with the following items:

- this particular alliance has met its initial objectives
- this alliance is / has been successful
- overall, our company has benefited from being in this alliance.

A single score of the degree of success or the strategic alliance was created by taking the sum of the responses to each of these three questions. The correlation between this simple score and more complex outcome measures was used to ascertain whether the complex score was measuring the same construct as the simple measure.

This simple scale is similar to that used in previous literature (e.g. Killing, 1988; Mjoen and Tallman, 1997; Johnson, 1999; Kauser and Shaw, 2004) and was checked for reliability using cronbach's coefficient alpha which was 0.90. Validity was examined by correlating this simple measure of outcome against the total outcome score and a high correlation between the two measures suggests that they are both capturing the success or otherwise of the alliance.

6 Analysis and discussion

The overall response rate, as shown in Table 2, was 7.5% after adjusting for non-deliverable questionnaires, consistent with other international survey response rates (Harzing, 1997). The pattern of responses varies from country to country but is consistent with prior research findings (Harzing, 1997). Because the sample was mainly drawn from

an international directory a certain percentage of the information was out of date and this was reflected in low response rates and the number of undeliverable questionnaires. The majority (77%) of respondents were CEOs/MDs with the remaining respondents all at a senior level.

Table 2 Survey response rates

<i>Country</i>	<i>Total mailed</i>	<i>Undeliverable</i>	<i>Usable responses</i>	<i>Non-usable responses</i>	<i>Response rate (%)</i>
Australia	77	9	9	1	13
Canada	156	27	11	2	8
UK	223	27	35	12	18
USA	851	96	32	6	5.0
Total	1307	159	87	21*	7.5

*includes three responses removed due to missing values.

Of the 87 respondent firms only 49 (56%) had formed alliances, which was a much lower percentage than previously reported. Although this is a low number of alliances, the overall response rate for the survey is in line with other international studies (Harzing, 1997) and the survey was addressing a number of issues, not just strategic alliances. Of those firms that had not formed strategic alliances, there was no apparent pattern in age, size or country of location.

Of the 49 strategic alliances about which data were available, no clear pattern of functional inputs was found. Very few of the alliances relied solely on one functional input from either firm. In fact, only three out of the 49 alliances (6%) involved a single functional input (R&D) from both partners in the alliance. All other alliances involved two or more functional areas (marketing, R&D, production and/or finance) from both partners. The majority of the alliances involved R&D, with the second most common functional area being marketing. This suggests that the commonly held belief that as DBFs grow they seek out marketing or other expertise through strategic alliances may not be true or may be an oversimplification. It also raises questions about the motivation for forming alliances. There were no obvious patterns to the combination of inputs of each firm, either of overlap in functional areas or of complementarity. Table 3 shows functional inputs into alliances from the responding firm and the partner firm. The percentages add up to more than 100% because most of the alliances involved more than one function.

6.1 Alliance objectives

The 16 possible objectives were analysed to determine the rank in terms of importance of each possible objective. Of these, 'increasing the firm's sales' was the most commonly 'highly rated objective', with 92% of firms stating that they hoped to achieve this through participating in the alliance. Table 4 summarises the ranking of the objectives scores, which are calculated as the average response (on the likert scale of 1–5). Surprisingly, allowing employees to learn new skills was the least sought objective yet one of the reasons proposed in theory as a motivation for forming an alliance.

Table 3 Functional area involved in alliance

<i>Functional area</i>	<i>Respondent (%)</i>	<i>Partner firm (%)</i>
R&D	80	65
Production	65	57
Marketing	47	55
Finance	18	28
Other	2	8

Table 4 Ranking of alliance objectives

<i>Ranking</i>	<i>Alliance objectives</i>	<i>Mean score (max min 5)</i>
1	Increase our firm's sales	4.4
2	Improve our firm's profitability	4.2
3	Improve our firm's market share	4.0
4	Allow our firm to achieve a certain objective faster than any other strategy	4.0
5	Create a foundation for future alliances with this partner	3.6
6	Provide our firm with access to an important asset or resource	3.6
7	Reduce the risk and uncertainty our firm faces	3.4
8	Enhance our firm's technical capabilities	3.3
9	Create a foundation for future alliances with other partners	3.3
10	Reduce our firms costs	3.1
11	Allow our firm to retain its independence	3.0
12	Allow our firm to establish operations in a foreign market	2.9
13	Provide our firm with financing	2.8
14	Provide our firm with the opportunity to acquire or conform to a technical standard	2.4
15	Allow our employees to learn new skills	2.3
16	Enhance our firm's bargaining power with suppliers or buyers	2.1

Of the highest ranked objective (increasing sales), nearly 70% of firms believed that this objective had been met and that sales had increased as a result of the alliance. In fact, the majority of the objectives rated as important were at least partially met through being in the alliance. Only a few respondent firms felt that they were further from meeting their objectives *as a result* of being in the alliance. There was no clear pattern to the type of objectives that failed to meet their objectives. Even for objectives where some firms felt their situation had worsened, there were a greater number of other firms that felt that their situation had improved. This implies that although strategic alliances do not meet all parent firms' objectives all the time, there does not appear to be any particular objective that cannot be met. This is important because it would appear that strategic alliances can indeed fulfil a wide range of objectives.

Table 5 shows how often objectives and outcomes for an alliance were rated as important and how well each of the objectives were met.

Table 5 Summary of strategic alliance objectives and outcomes

<i>Alliance objectives</i>	<i>Rated as important</i>	<i>Worsened due to alliance</i>	<i>No change</i>	<i>Improved due to alliance</i>
Increase our firm's sales	91.5	0	30.2	69.8
Improve our firm's profitability	82.6	2.3	36.4	61.4
Improve our firm's market share	73.9	5.1	28.2	66.7
Allow our firm to achieve a certain objective faster than any other strategy	71.7	20.5	15.4	51.3
Create a foundation for future alliances with this partner	60.9	8.5	21.3	68.1
Reduce the risk and uncertainty our firm faces	58.1	15.2	21.7	60.9
Provide our firm with access to an important asset or resource	55.5	2.6	46.2	51.3
Create a foundation for future alliances with other partners	53.0	16.3	20.4	61.2
Enhance our firm's technical capabilities	50.0	2.3	39.5	58.2
Allow our firm to establish operations in a foreign market	47.2	2.6	52.6	44.8
Provide our firm with financing	45.2	6.4	14.9	78.7
Reduce our firm's cost	42.9	6.7	57	35.5
Allow our firm to retain its independence	39.6	6.3	12.5	77.2
Provide our firm with the opportunity to acquire or conform to a technical standard	22.7	2.6	63.2	34.2
Enhance our firm's bargaining power with suppliers or buyers	17.5	5.6	66.7	27.8
Allow our employees to learn new skills	15.5	2.3	51.2	46.6

In order to determine an overall 'success rate' for strategic alliances, two measures were used; the first simple mmeasure being the sum of the three-item scale. The second measure used a weighting system so that, for each alliance, a score was calculated based on initial objectives of the alliance (these were scored from 1–5 in importance) multiplied by the judged outcome of each of these objectives. The composite scores of alliance outcome were then calculated as follows:

<p style="text-align: center;">Desired Outcome of alliance (Do):</p> $\sum_{o=1}^n D_n O_n$ <p>D_n = weighting of each of the desired objectives (recoded) O_n = outcome of each objective n.</p>

The scores on this ranged from –8 to +125, with a mean of 44.3 and a standard deviation of 27.9.

As shown in Table 6 three alliances were clearly judged to be failures and a further one could also be judged not to have met its objectives. However, the majority of alliances clearly showed positive outcomes. The simple outcome was correlated against the more complex score in order to assess if each was capturing outcome and the two measures showed a Pearson correlation coefficient of 0.65 with a 2-tailed significance at the 0.01 level, indicating a significant relationship between the complex and simple measures of strategic alliance outcome.

Table 6 Outcome of strategic alliances

<i>Alliance overall score</i>	<i>Number of alliances</i>	<i>%</i>
Below zero	3	6.3
Zero	1	2.1
Zero – 44.3 (Mean)	20	41.6
Above 44.3	24	50

6.2 *Managerial and theoretical outcomes*

This study led to a number of findings of interest including the multifunctionality of alliances, the high success rate and, most importantly, the ability of firms to judge the performance of alliances against multiple objectives. The first is the evidence that alliances are not simple in terms of functional input from either partner. These alliances were multifunctional relationships requiring complex combinations of inputs from each partner firm, not simple ‘marketing alliances’ or ‘R&D alliances’. In general, the most common functional input seen in this study was R&D from both firms in the alliance, followed by production and then by marketing. This finding is in contrast to other studies of strategic alliances in DBFs/TBFs, such as Barley, Freeman and Hybel (1992) who found that the most common form of alliance involved some form of equity stake, with marketing agreements and licensing agreements being the next most common. As Forrest and Martin (1992) point out, the type of alliance will change over the life time of the firm and also over the life time of the industry. Over the past few decades, the availability and amount of venture capital accessible by biotechnology companies has increased rapidly. This has lessened the need for certain (financial or resource based) types of alliance and allows firms to seek out alliances for other reasons. It may be that the nature of alliances in this industry has changed significantly over time, or that these previous studies simply did not pick up on the complexity and multifunctionality of alliances formed by some companies. However, it seems more likely that when two organisations are working closely together, inputs from both firms are likely to cross functional boundaries.

Second, the alliances reported in this study showed a much higher level of success (72%) than the previous research. One explanation for this discrepancy is that this survey asked for information only on the ‘most important’ strategic alliance. It may be that this focus predisposed respondents to think of their most successful alliance, or it may be that strategic alliances are more successful in biotechnology/technology-based firms. More recent evidence suggests that where perceptual measures of success are used, a significantly higher percentage of alliances are successful – as many as 85% of strategic alliances show a degree of success (Kale, Dyer and Singh, 2001). However, it is also possible that the reported high success rate of strategic alliances is characteristic of this industry or other technology-based industries. Most DBFs’ products and services require

a high level of technical expertise and this may lead to more pressure to 'make things work'. It is also possible that TBFs work together more effectively than other industries because of a commonality in knowledge base. Oakey et al. (1990) found that many of the founders of small TBFs were scientists and may have come from a background of scientific collaborative research. It seems likely, therefore, that these skills may be translated into the functioning of inter-firm relationships as well. Although an interesting idea, this remained beyond the scope of this study and remains an area for future research.

Third, this study shows that companies enter into alliances with complex and often multiple objectives and are able to judge the outcome of alliances on multiple measures. In this study, this was achieved through assigning an importance to a variety of possible outcomes and then comparison with the outcomes. Although this is a fairly descriptive approach, this area of research is in the very early stages of understanding the complex issue of alliance objectives and outcomes. These findings therefore provide an important, if preliminary, attempt at clarifying what/why firms do what they do and developing appropriate research methodologies to capturing these actions. Together with the fact that alliances themselves may be complex in terms of functional input, this has both theoretical and managerial implications. From a theoretical viewpoint, the complexity of these alliances suggests the need for a new way of modelling strategic alliances as complex multifunctional multifaceted relationships. The results from this study suggest that firms expect and/or want a complex mixture of outcomes from alliances, which may include both reducing costs (consistent with transaction cost theory) and/or competitive positioning (consistent with strategic behaviour theory), along with any number of additional expectations or desired outcomes. The notion that firms enter alliances simply to increase organisational learning is not supported by this study, which shows this as one of the least important desired outcomes, although complementary to other desired outcomes. The idea that firms form strategic alliances simply to reduce the uncertainty or transaction costs seems highly unlikely given the complexity and breadth of most firms' motivations and objectives on entering an alliance. This strongly suggests the need for a re-evaluation of what motivates firms to enter strategic alliances. The existing theories of firm behaviour previously applied to strategic alliances do not entirely capture the complexity of potential criteria for entering a strategic alliance.

Fourth, this study provides additional evidence to support the use of perceptual measures and builds on this idea by using a scale capturing multiple objectives and outcomes. This would seem to be a better way to capture both expected and unexpected outcomes of alliances. It would be useful to test this scale in industries other than the technology-based industries.

From a managerial perspective, a key finding is that many strategic alliances are successful when measured against a set of criteria that better captures their outcomes. This is important for firms considering an alliance as a potential strategy. It also seems that alliances can meet many possible objectives – there was no single objective that could not be met by forming alliances. For managers, this is a good news as it means that they need not limit their alliances to one form, e.g. R&D agreements. Finally, organisations entering alliances should expect to provide inputs from many functions – this is important since companies should not see alliances as, for example, 'the agreement that the marketing department formed with that overseas firm'. Alliances will almost certainly require complex and multi-departmental input to attain success.

Having a clear set of objectives before entering an alliance is of course important, but being able to accommodate a range of different outcomes is also important because alliances may have unexpected yet positive outcomes. It is also critical that strategic alliances are measured on a wide range of criteria – financial measures alone are inadequate but so are other traditional measures such as patent applications – Measures need to be multifaceted. For example in this study, only 45% of firms set out to gain financing through forming an alliance, yet 78% showed an improvement in this area. Again, while firms did not highly rate maintaining their independence, 77% said that the strategic alliance allowed them to do this. In maturing markets that often show consolidation, retaining independence of a firm may become increasingly important.

There are of course limitations with this study, which include the small number of alliances of respondent firms and the focus on dedicated biotechnology firms. Future research should seek to develop and refine the strategic alliance outcome measure as well as examine the generalisability of the findings to other industries.

In summary, this study set out to develop and evaluate a framework for determining whether strategic alliances succeed or fail and a measure for capturing the outcome of the alliance. In doing so, the study has provided evidence of the complexity of strategic alliances, their importance to DBFS and other TBFs and the need for review of current theories. This study provides important initial evidence for the need for a measure of strategic alliance outcome, which does indeed take into account the multiple motives and desired outcomes of strategic alliances. This research, while in the preliminary stages of understanding the complex issue of alliance objectives and outcomes, provides an initial start to clarifying what/why firms are supposed to do what they do and developing appropriate research methodologies to capturing these actions.

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