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Implementing Strategic Buyer-supplier Alliances For Product Development

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IMPLEMENTING STRATEGIC BUYER-SUPPLIER ALLIANCES FOR PRODUCT DEVELOPMENT

by

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ABSTRACT

This study is concerned with the successful implementation of alliances as a way of creating competitive advantage. As managers in technology intensive industries try to meet the challenges of rising costs, shortened product lives, and intense competition, they are turning to strategic alliances. Alliances allow a firm to specialize in those activities of the value chain that are essential to its competitive advantage, while entrusting other activities to their partner firms. Much of the past research on strategic alliances has focused on the characteristics of, and motivations for, alliances. There has been little work on how alliances are implemented. This study examines the successful management of strategic alliances for product development.

The purpose was to: (1) develop a synthesized model of alliance management, (2) empirically test the model using data collected from alliance managers, and (3) identify determinants of successful alliance management and performance. The study, as part of an integrated multi-method research program, included a literature review, pilot study, model development, data collection, and model testing. The results of the literature review and pilot study were the basis for the development of the strategic alliance management model. Data to test the model was collected from managers in North American firms involved in thirty eight product development alliances. The model was

tested using Partial Least Squares (PLS) with data collected by questionnaires. The model explains approximately 61 percent of the observed variance in strategic performance.

Based on the results of the study, recommendations are made to practicing managers involved in product development alliances. Essentially three sets of activities, or steps, make up successful alliances, and managers can take specific actions to manage these steps. These activities are initiating, maintenance, and building actions. In evaluating alliance performance, managers can assess operational and strategic performance. Following these guidelines should help managers realize productive and successful product development alliances.

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I embarked on the path to a Ph.D. for very personal reasons, thinking that it was something I would do alone. Now, upon reaching the end of this path, I realize this journey could never have been made without the assistance and support of many people along the way. I want to take this opportunity to thank several of them for their contribution.

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DEDICATION

This thesis is dedicated to the memory of my mother, Viola Neupert, who always encouraged me to better myself and who supported those endeavors, regardless of how ridiculous they seemed at the time. This thesis is also dedicated to Dr. Wilma D. Stricklin, who has been an example to me of the growth possible from a life of intellectual pursuit.

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CHAPTER ONE

INTRODUCTION

The purpose of this research was to: (1) develop a synthesized model of alliance management, (2) empirically test the model using data collected from alliance managers, and (3) identify determinants of successful alliance management and performance. Alliances represent a way for managers in technology intensive manufacturing industries to face adverse international conditions. This research is offered as assistance in meeting that challenge. In the following six chapters, the results of a multi-method research program are discussed.

The Challenge to Managers

International Patterns

Internationally, manufacturing is shifting from some geographic regions to others. In particular, over recent years, there has been a pattern flow of jobs from many northern countries in Europe, Japan, the United States and Canada to Mexico, China, Indonesia and other lower wage countries (Beamish, Killing, Lecraw and Crookell 1994). While corporate headquarters remain in the north, the manufacturing operations move south. As these operations move, valuable manufacturing jobs that provide an economic base for their populations also drift away. As a result, many industrialized economies are faced with the prospect of diminishing economic and, ultimately, political global positions.

The shift of manufacturing jobs from north to south makes economic sense to managers faced with rising operational costs. In fact, manufacturers in the U.S. and Canada have embarked on this path, sourcing components and finished products from foreign suppliers. Kotabe (1990) points out that in a global marketplace crowded with competitors in both developed and developing countries, it is easy for multinational firms to justify a manufacturing strategy of sourcing components from outside suppliers. However, he cautions that, for these multinationals, "the ability to manufacture cost efficiently is likely to decline in the long run as they lose touch with emerging manufacturing know how and technology that eventually may lead to process innovations" (p. 30).

This is not to say that the fate of countries such as the U.S. and Canada rests only with their ability to maintain a manufacturing base. Rather, it would seem that maintaining and developing a manufacturing base that focuses on high value added design, development, and manufacture could be a means to offset the economic loss of manufacturing jobs to low wage regions. This implies that products that are leading edge, on a global basis, are important to the economic future of these two countries. Such a strategy requires that innovative skills in design, engineering and manufacturing be nurtured domestically. While product innovations can be easily reverse engineered and improved upon, manufacturing processes are more difficult to appropriate because they "require intangible know how and human skills hidden within the

firm" (Kotabe 1990, p. 30). While the tangible resources of plant and equipment are available worldwide, the intangible resources of ability and innovation develop only through use.

The Role of Product Development

Product success, on a global or domestic level, is related to product development effort. With the adoption of simultaneous improvement and concurrent engineering in many businesses, the tasks of design, development and manufacture have become intertwined. These three tasks are all part of the same goal: successful product development. Business Week (Nussbaum 1993) recently noted that leveraging the power of industrial design is one of the most important strategies in the marketplace today. This improves the competitive position of a firm in two ways. First, focusing on design keeps the firm close to the customer. From the manager's standpoint, "industrial design understands the needs of the customer and knits the customer into the fabric of our product development" (Nussbaum 1993, p. 54). Second, design moves technology out of the research and development laboratories and into the marketplace, using new technologies to solve problems. Currently, several firms, such as Apple, Sony, Motorola, and Gillette, are making design one of their core competencies and using it to drive their entire product development processes. While successful product development will not single handedly save countries such as the U.S. and Canada from industrial decline, it does address

an important aspect of their future competitive abilities.

Meeting the Challenge

It is against this background of broad global trends that managers in technology intensive industries must face other significant forces. These industries are volatile, characterized by rapid technology changes and short product lives. To compete successfully in this type of industry, the manager must have access to leading technology development, advanced product design, efficient manufacturing plants, and dependable distribution facilities. In such a highly volatile industry, this presents a substantial mandate for the firm. The manager is confronted with the dilemma of how to do these tasks successfully.

In technology intensive industries, such as computers, electronics and telecommunications, there appear two general ways of competing. One approach, *full integration*, worked under previous industry conditions, while the other, an *alliance* approach, offers a way of meeting current industry conditions. Under both approaches, industry conditions, such as intense competition, high development and manufacturing costs, and rapidly changing technology are the same. However, under the first approach, firms integrate all of the value chain activities, housing research and development, large integrated manufacturing systems, and sales forces, all within the boundaries of the firm. However, there is a high cost associated with this strategy. In

particular, the development costs for new products are increasing dramatically. For instance, it is estimated that it will cost over $1 billion to develop the next generation of dynamic random access memory chip (Schlender 1993).

The second approach, which is increasingly being adopted, allows a firm to concentrate on only part of the value chain, such as design and development, and build long-term alliances with other firms that also specialize in certain operations, such as manufacturing, warehousing or transportation. Jarillo (1988) advocates the alliance strategy approach as the solution to a firm's growth problem. He argued that "transaction costs can be affected by conscious actions of the entrepreneur . . . this is the foundation for the concept of 'strategic network'" (p. 33). The challenge for the manager is to effectively use alliances to lower the costs of operation and leverage the firm's skills and resources for competitive advantage. As Jarillo suggests, a firm in the alliance can enjoy lower costs because it captures economies of scale, or other sources of efficiency, from its associated firms, that other fully integrated competitors cannot realize because of internalized transaction costs. It also has the opportunity to combine its resources with other alliance members to create a level of competitive advantage that they could not have achieved individually.

The case of Toshiba is an example of the successful adoption of this strategy. For decades, Toshiba has used alliances as a way to compete,

allowing it to weather economic downturns, while providing access to important new technologies. Toshiba uses alliances, such as technology licensing agreements and joint ventures, as a way to augment its innovation and manufacturing skills. Fumio Sato, president and chief executive of Toshiba, stresses that, "It is no longer an era in which a single company can dominate any technology or business by itself, . . . The technology has become so advanced, and the markets so complex, that you simply can't expect to be the best at the whole process any longer" (as reported in Schlender 1993, p. 116).

The strategic implication of the alliance strategy is that it allows a firm to specialize in those activities of the value chain that are essential to its competitive advantage, reaping all the benefits of specialization, focus, and often, size. Other activities are then entrusted to members of the alliance that perform them more efficiently than the hub firm, since they specialize in these activities. Simultaneously, all the firms enjoy the added flexibility of not having fixed commitments to activities that are not essential to their primary operations.

However, in pursuing an alliance strategy, the biggest challenge to the manager may be in managing relations between the firms involved in alliances. Not only are the managers concerned with the internal operations of their firm,

but, with an alliance, they must be concerned with the operations of another firm. The key to making an alliance work successfully, is for each firm to be proficient at their own tasks while being able to rely on the other firms in the alliance to fulfil their roles as expected. The longer term challenge is to be able to leverage the knowledge, experience, and specialization, that the firms collectively develop within the alliance, into a competitive advantage to face future opportunities. This study is concerned with the successful implementation of alliances as a way of creating competitive advantage.

Purpose of the Study

The title of this study is "Implementing Strategic Buyer-Supplier Alliances for Product Development." "Implementing" suggests that successful management practices are the key focus. "Strategic alliances" implies that it addresses cooperative arrangements between firms for activities that are important to the firms' long term competitive position "Buyer-supplier" denotes that these inter-firm cooperative relationships are vertical in nature, that is linked along a value chain. Lastly, "for product development" limits the scope of the study to the design, development, and manufacture of products. The goals of this research are to:

(1) *develop* a *synthesized model* of alliance management,

(2) *empirically test* the model using data collected from alliance managers, and

(3) *identify* determinants of successful alliance management and performance.

The research is positioned to fill a gap in the management literature, in that, to date: (1) while there is increasing agreement about what are the important management determinants in some forms of alliance management, such as joint ventures, there has been little consensus regarding non-equity alliances, (2) some models of strategic alliance management have been suggested but not yet tested, and (3) this study is one of the first to use structural equation modeling to test relationships in strategic alliance management.

The important issues in alliance management research revolve around the questions of *what*, *why*, *with whom*, and *how*. Earlier research in joint ventures and alliances has addressed the questions of *what* (characteristics), *why* (i.e., motivations), and *with whom* (i.e., partner selection). There has been little research about *how* (managing the process). The primary focus of this research is on the *how* aspect, that is, activities that are most important in managing alliances between firms.

Dissertation Organization

This study is reported in six chapters, as outlined in Table 1.1. The literature review section, in Chapter Two, draws from fields such as strategic management, economics, and organizational theory, in considering various perspectives on alliances. First, the theoretical bases, or assumptions, of the fields are presented. Then, the points of management influence (management activities) that relate to alliances are summarized. This review yields the following summary of important points:

- alliances allow firms the opportunity to contract only for resources that are critical to their strategic objectives,
- alliances give firms the opportunity to access resources without having to develop them internally,
- organizational learning can be an important motivation behind alliances,
- two general sets of activities exist in alliances:
  - activities that develop a strong and effective working relationship,
  - activities that maintain the alliance,
- alliances develop through stages, and
- performance can be measured on several levels.

The literature provides: (1) a theoretical base for looking at alliances and (2) a general idea about what actions should be most important to alliance

management.

TABLE 1.1
Summary of Dissertation Organization

Chapter One:	**Introduction.** This chapter introduces the broad background motivations for this study and summarizes the contents of the various chapters.
Chapter Two:	**Literature Contributions.** This chapter is organized around several important issues regarding the management of strategic alliances: what, why, with whom, and how. Within this structure, literature is reviewed as it relates to each of these aspects.
Chapter Three:	**Research Model Development.** This chapter presents the theoretical assumptions of the study. Based on the summarized literature and pilot study, a model of strategic alliance management is proposed. The hypotheses also are presented.
Chapter Four:	**Methodology.** This chapter discusses the research design and operationalization, the data collection procedures, and the data analysis technique used.
Chapter Five:	**Analysis and Discussion of Results.** This chapter explains the methodology used to analyze the model. It also discusses the results of the study, in terms of the measurement and structural models.
Chapter Six:	**Conclusions.** This chapter discusses the overall conclusions of the study, including the contributions to research and practice, strengths and limitations and future extensions of the study.

In Chapter Three, a conceptual framework is discussed. This framework is based on: (1) a synthesis and extension of the strategic alliance literature and (2) findings from the pilot study that investigated strategic alliance management. For instance, aspects such as commitment, trust, and cooperation are findings common to several studies and are included in the framework. On the other hand, aspects such as firm specific investment and conflict resolution which are cited in the literature as theoretically important, but not widely tested in the literature, also are incorporated in the framework. This framework serves as a basis for the strategic alliance management model and hypotheses.

The assumptions of the model are:

- the concept of 'value chain' characterizes the creation of product value from 'idea' to 'consumption,'
- the value chain can be disaggregated and effectively managed,
- the basic decision underlying an alliance involves a 'make-or-buy' question,
- an alliance, in essence, is an 'exchange' relationship,
- firms are made up of bundles of resources, tangible and intangible, which are heterogeneous, and
- through experiences, successful firms develop distinctive competencies.

The model is developed from a review of the alliance management literature, and while somewhat of a hybrid, it draws in part from Wilson's (1989) process model of alliance development. The concepts of 'building' and 'maintaining' activities form the basis of the model. Added to these concepts are performance measures, operational and strategic, and an additional activity noted in the pilot study, called 'initiating' activities. The relationships between the concepts are straightforward. The model, presented in Figure 1.1, is made up of five constructs:

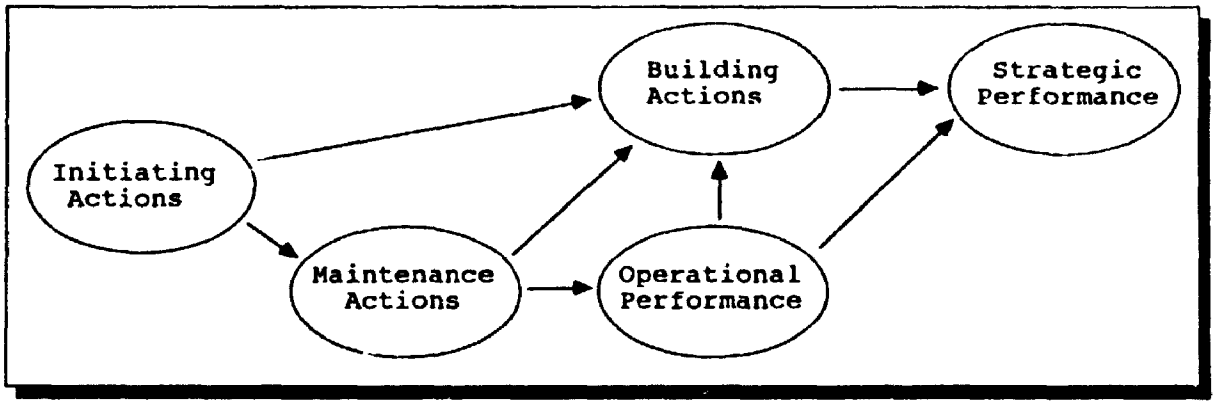
- **Initiating actions**: activities that lay the groundwork for beginning the alliance.
- **Maintenance actions**: operational activities that must occur for the alliance to continue as an ongoing relationship.
- **Building actions**: activities that develop a strong and effective working relationship between the partners.
- **Operational performance**: the operational goals established for the alliance.
- **Strategic performance**: the long term competitive position objectives.

The measures for the constructs are developed from previous research studies and the pilot study. Several groups of measures are used to capture multiple dimensions of each construct. Drawing on constructs and measures used in other studies allows the current model and the subsequent testing to

build on earlier research.

FIGURE 1.1

The Strategic Alliance Management Model



Chapter Four outlines the research methodology, which includes the data collection method, the instrument, and the methou of analysis. The data collection included a pilot study, interviews and questionnaires. The pilot study and findings are reviewed. Refinements to the model, as suggested by the pilot study and early data analysis, are discussed. The development of the questionnaire and the population and sample are described and explained.

The model was tested with data collected by questionnaires. The Partial Least Squares (PLS) data analysis method, a form of simultaneous regression analysis, was used. Following accepted guidelines, the model was refined in terms of the measures used. This refined model was then tested with the data. Aspects of the analysis, such as an assessment of the structural and measurement models, are presented and discussed. The final model explains approximately 61 percent of the observed variance in strategic performance.

Chapter Five discusses the results of the study. Overall, the model and the results accomplish the original goals of: (1) developing a synthesized model of strategic alliance management, (2) empirically testing this model using data collected from alliance managers, and (3) identifying determinants of successful alliance management and performance. It is important to note that the results have both theoretical and managerial value in understanding how strategic alliances are managed.

Chapter Six discusses the implications for research and practice, strengths and limitations of the research, and directions for future research. The study has provided a comprehensive, testable model of strategic alliance management. Although the research findings are limited, they provide a basis for further theory development in this area. The study has also applied a research method that enables more comprehensive assessments of models

composed of firm-level constructs, such as those that typify strategic alliances. This study used a structural equation modeling approach to assessing alliance management. This is one of only a few studies to analyze the alliance management process in such a manner. As part of an integrated research program, this type of methodology can be important to the development and testing of alliance theory.

Based on the results of the study, recommendations are made to practicing managers involved in strategic alliances. Essentially three sets of activities, or steps, make up successful alliances, and managers can take specific actions to manage effectively these steps. The activities are initiating, maintenance, and building activities. In evaluating alliance performance, managers can assess operational and strategic performance. Following these guidelines should help managers realize productive and successful product development alliances.

Summary

This chapter began by describing the tremendous economic, techn 'ogical, and competitive forces coming to bear on managers in manufacturing industries, particularly high technology industries. The strategic alliance approach was introduced as a way of meeting these forces by successfully leveraging the competencies of firms working together.

The purpose of the study is to develop a model of strategic alliance management, empirically test the model, and identify the determinants of alliance management and performance. The next chapter, organized around the questions of *what*, *why*, *with whom*, and *how*, reviews the literature as it applies to strategic alliance management.

CHAPTER TWO

LITERATURE CONTRIBUTIONS

This study is concerned with the implementation of strategic alliances between buyers and suppliers for product development. To understand how to best implement these alliances, several issues are considered. Issues such as *what* (characteristics), *why* (motivations), and *with whom* (partner selection) are important to the *how* (implementation) of any alliance. This chapter reviews the literature in addressing these fundamental issues.

What Are Strategic Alliances?

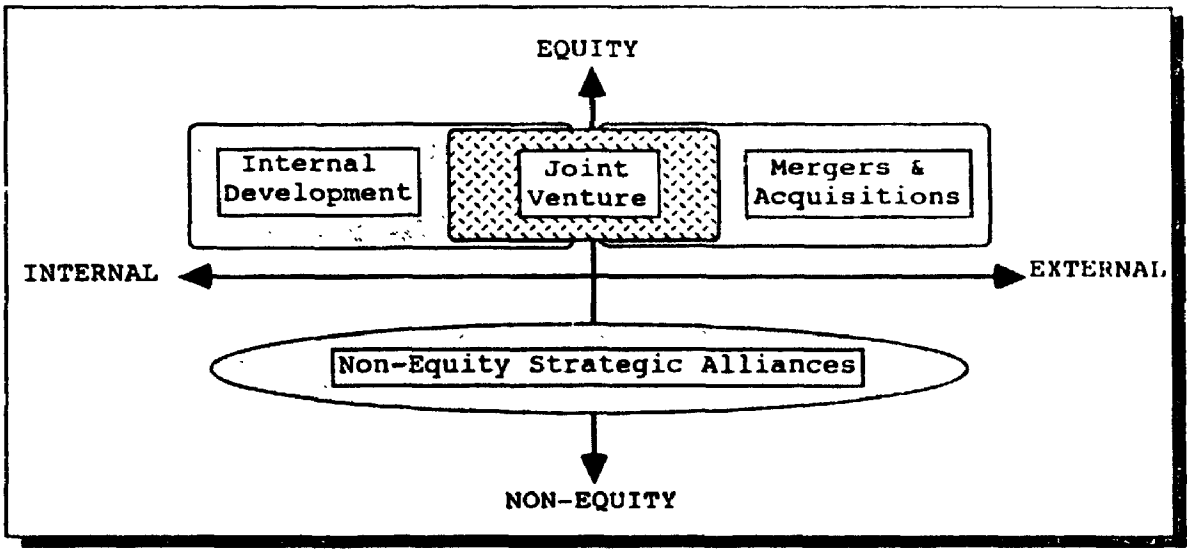
In recent years, the terms, strategic alliances, joint ventures, cooperative arrangements, and networks, have been used almost interchangeably. These forms of inter-organizational relationships are similar. Cooperative arrangements have been described as lying "between the two extremes of spot transactions undertaken by two firms, on the one end, and their complete merger, on the other hand," their difference being the compensation and impact for the each firm. (Contractor and Lorange 1988, p. 5). Joint ventures have been defined as a separate firm owned and operated by two or more firms (Killing 1991). It is considered an international joint venture when the parent companies are from different countries or when the joint venture is based in a country other than the home country. Jarillo (1988, p.32) describes strategic networks as "long-term, purposeful arrangements among distinct but related

for-profit organizations that allow those firms in them to gain or sustain competitive advantage vis-a-vis their competitors outside the network." Easton (1992) describes a network as a model or metaphor which describes a number of entities which are connected.

The common thread in these definitions is that two or more firms work together. For the purpose of this study, strategic alliances are cooperative relationships between two or more firms that seek to achieve some competitive advantage in the marketplace. They do not require equity ownership since positions of equity ownership move the alliance into the realm of joint ventures or mergers. Organizational growth can be pursued by any of these strategies. Figure 2.1 illustrates the distinction of the type of alliances in this study as based on dimensions of markets-to hierarchies and equity-to-non-equity. In contrast to internal development strategies, alliances allow growth opportunities without necessarily having to develop new resources or skills within the organization. In contrast to mergers and acquisitions, they allow selective access to resources without having to purchase or take on whole organizations that may bring redundant resources or unwanted burdens.

Despite these distinctions, alliances share many characteristics with joint ventures and networks. In examining alliances, this study draws from the literature that has addressed joint ventures, alliances, and networks.

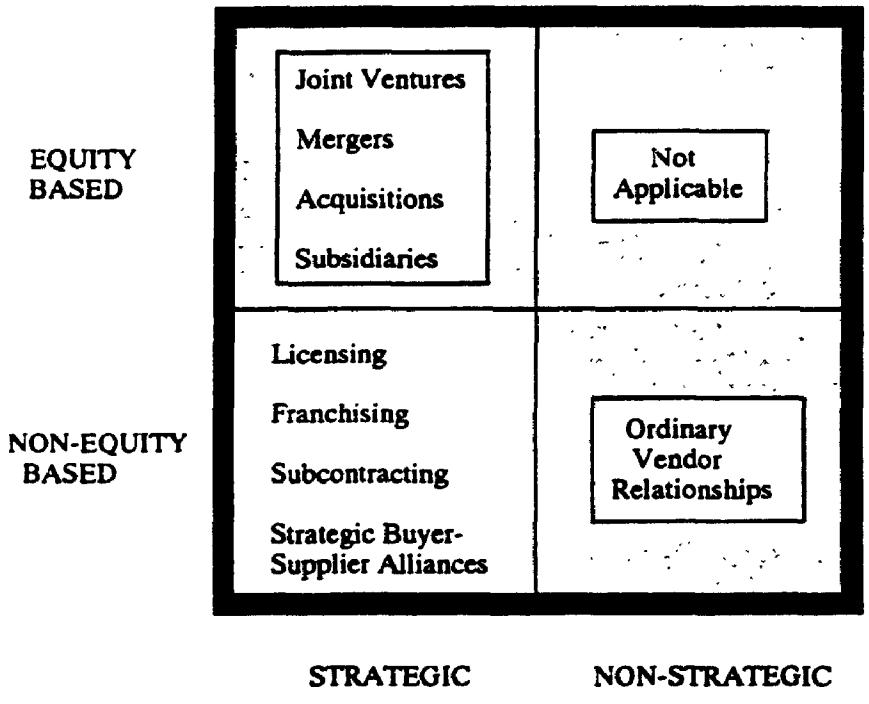
FIGURE 2.1
Types of Organizational Growth Strategies



As shown in Figure 2.2, this study distinguishes between equity-based strategic alliances (which include joint ventures) and non-equity strategic alliances. While both are types of "strategic alliances," it is assumed that management's orientation may differ because of the equity holdings. Particularly, in a equity-based situation, management may feel obligated to making an alliance work, unless they are ready to "write-off" the equity investment, walk away from the deal, and explain it to their stockholders This ownership stake in the outcome of the alliance may cause management to work

harder at making it successful[1]. By contrast, in a *non-equity* situation, there are no financial ties that hold the firms together. While investments in the relationship exist, such as time, effort, and experience, they are not as tangible. Therefore, it is assumed that if firms in non-equity alliances try to make them work, it is because of the benefits they hope to enjoy, not because of financial obligation.

FIGURE 2.2
Types of Alliances



[1] The question of cognitive ownership of a situation and the actions that result are outside the parameters of this study. Whether or not managers do work harder at equity-based investments than they do at relationship-based investments is a question to be addressed in another study.

Why Pursue a Strategic Alliance Strategy?

At its most basic level, the purpose of a strategic alliance is to allow the partners to accomplish some goal, by pooling resources, that they would not have accomplished by acting alone (Borys and Jemison 1989). The motivations for alliances have been extensively chronicled in the literature along many dimensions (Harrigan 1985; Contractor and Lorange 1988; Kogut 1988; Killing 1991). Of the various motivations, those most applicable to the current study are: (1) cost reduction, (2) risk reduction, (3) access to technology and specialized knowledge, and (4) linking complementary partner contributions in a value chain (Contractor and Lorange 1988; Porter and Fuller 1986).

Cost reduction

The goal of cost reduction has been addressed by looking at alliances from a transaction cost perspective (Williamson 1985; Beamish and Banks 1987; Contractor 1990; Hennart 1991, 1988). This approach can be traced to the "make-or-buy" question discussed in the economics literature (Coase 1937; Williamson 1975). A major decision facing a firm is whether to produce a particular good or service itself, or to buy it from another firm. In deciding whether to make or buy, the firm must weigh several considerations, such as the cost to produce the item, the availability of raw materials, and the availability and cost of required technology. If the number of units needed are large enough, the firm may be able to achieve scale economies that help to

lower the unit cost of the item. Additionally, the firm then has full control over production of the item. In sufficient quantity or importance, it may be best for the firm to produce the item in-house. In acquiring a good or service from another, the firm must not only consider the cost of the individual item, but also the costs involved in carrying out the transaction. Transaction costs are the costs of negotiating, monitoring and enforcing contracts with external firms. Also added to the cost of the transaction is the cost of coordinating the transaction. These transaction costs must be added to the purchase cost of the good to find its full cost. In the final determination, the firm must weigh the cost of producing the good against the cost of acquiring it from another firm. Coase (1937) acknowledged that while all market transactions had associated costs, efficiencies could be gained by bringing the transactions within the boundaries of the firm. From this perspective, transactions within the firm were organized and controlled by the manager, while those outside the firm were controlled by the market's price mechanism. Accordingly, a firm would continue to grow until the cost of doing a transaction internally is equal to the cost of doing the transaction externally.

One of Williamson's (1975) important contributions, derived from Coase (1937), was to see markets and hierarchies as two alternative modes of organizing economic activities. According to theory, the most efficient organizational mode for a particular kind of transaction will prevail. Williamson

pointed out that the costs associated with market transactions were important determinants of how the firm organized its activities. The characteristics that were most likely to be internalized were transactions that were: long-term, uncertain, frequent, or difficult to document or enforce. According to Williamson, if these costs were low, the firm would subcontract the particular transaction. However, high market transaction costs encourage the integration, or internalization, of transactions. This allows the manager to lower the associated transaction costs, producing a firm that is more integrated and more efficient. Under conditions of globalization, increasing development cost, and shorter product life cycles, alliances can offer an effective alternative strategy. Joint ventures and alliances may be preferable to wholly owned organization structures in dealing with opportunism, bounded rationality, and uncertainty, especially in industries facing rapid changes (Beamish and Banks 1987; Contractor 1990).

Risk reduction

Alliances can reduce risk by (1) spreading the risk of the project over more than one firm, (2) enabling product portfolio diversification, and (3) enabling faster market entry and payback (Contractor and Lorange 1988). Risk sharing is most common in research intensive industries, such as computers, electronics and communications, where each new generation can cost more to develop, while shorter product life cycles allow less time to amortize

development costs.

Access to resources

It has been argued that access to resources, such as skills, knowledge and technology, can be an important motivation for an alliance (Anderson 1990; Bleeke and Ernst 1993; Hamel 1991; Inkpen 1992; Kogut 1988). Kogut (1988), Hamel (1991) and Inkpen (1992) have said that alliances are a way for one firm to learn or gain access to their partner's organizational skills and knowledge.

Hamel (1991) and Inkpen (1992) focused on competitive learning outcomes possible in international strategic alliances, taking a skills-based view of the firm. This approach is very similar to the resource-based approach. It conceives of the firm as a portfolio of core competencies on the one hand, and encompassing disciplines on the other (Prahalad and Hamel 1991). Core competencies and value-creating disciplines are the kinds of firm-specific skills for which there are only imperfect external markets, and therefore, according to Hamel, form the "raison d'etre" (p. 83) for the multinational enterprise (Buckley and Casson 1985; Caves 1971; Teece 1981). According to Hamel, this approach suggests that inter-firm competition essentially is concerned with the acquisition of skills and implies that global effectiveness is a result of a firm's pace, efficiency, and extent of knowledge accumulation.

The goal of Hamel's (1991) study was to understand the extent to which, and means through which, the collaborative process within international strategic alliances might lead to a reapportionment of skills between alliance partners. Previous research has recognized the role of skills discrepancies as a motivating factor for international collaboration (Contractor and Lorange 1988; Root 1988). Distinguishing between acquiring skills in the sense of gaining access to them and actually internalizing a partner's skills, Hamel proposed that an alliance may not only be a means for trading access to each other's skills, or quasi-internalization, but also a mechanism for actually acquiring a partner's skills, or de facto internalization. As a theory of inter-partner learning, Hamel put forth six propositions that addressed competitive collaboration, learning and bargaining power, intent as a determinant of learning, transparency as a determinant of learning, receptivity as a determinant of learning, and determinants of sustainable learning.

Complementary linkages

Jarillo (1988) conceptualized strategic alliances as "a mode of organization that can be used by managers or entrepreneurs to position their firms in a stronger competitive stance" (p. 32). One benefit of strategic alliances is the ability of several firms to capitalize on each other's specialized skills through an alliance structure. Case (1990) characterizes the competitiveness of the semiconductor industry as providing benefits to

specialization. For example, sharing technologies and skills allows for faster introduction of new products and manufacturing processes for all firms in an industry. An alliance-based strategy has other benefits. Alliances allow an otherwise small company to leverage its presence in the marketplace. The alliances also help to minimize or focus fixed costs. However, the major difference that distinguishes these alliances is the value created by the alliance for the firms within the alliance.

The concept of the value chain has been in the management literature for some time. In its most basic form, it tracks the value created at each stage of the production process from idea to consumption. Porter (1985, p. 33) describes the value chain as "disaggregat(ing) a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation." He explains that "every firm is a collection of activities that are performed to design, produce, market, deliver, and support its product, ... representing a value chain (p. 36)." Porter's value chain consists of value activities and margin. Value activities, divided into primary and support activities, are the physically and technologically distinct activities a firm performs. Primary activities are involved in the physical creation of the product and its sale and transfer to the buyer, as well as after-sale assistance. Support activities support the primary activities and each other by providing various firm-wide activities. A firm's value chain is embedded in

a larger stream of activities that Porter terms the value system. The inter-related value chains of suppliers, manufacturers, distributors and buyers make up the value system.

This study draws from Porter's (1985) concepts of value chain and value system. The concepts of value chain and value system are useful frameworks in examining the activities required to move a product from creation to consumption. The position advocated in this study is that the value system can be disaggregated into related, but distinct, value chains and effectively managed for product development and manufacture. For the purposes of this study, the analysis can be addressed without distinguishing between primary and support activities.

A firm need not perform all the activities itself, but it must design the operations flow for its long term advantage. In selling products to the market, one firm may produce them internally while another may obtain .nost of its parts outside. Accordingly, the firm must make two decisions regarding its operations (Itami 1987). The first is: what operations should be done internally? The second is: how can the firm control the operations it has chosen to have done by others? The first decision addresses internalization, or make-or-buy, and, the second addresses control. These decisions have important strategic importance to the firm since they affect three other factors

simultaneously: the amount of value that accrues to the firm, the security and quality of the total operations flow, and the firm's long term capabilities and adaptability. The first two factors can decide the firm's short-term competitive advantage, while the third relates to long-term survival.

In summary, firms may pursue strategic alliances for the purposes of: (1) cost reduction, (2) risk reduction, (3) access to technology and specialized knowledge, and (4) linking complementary partner contributions.

Strategic Alliance Partner Selection

Much of the work of partner selection has been done in the context of joint venture partners. Several studies suggest that partner selection has a important impact on joint venture performance (Berg and Friedman 1980; Geringer 1986; Harrigan 1984; Janger 1980; Killing 1983; Tomlinson and Thompson 1977), and that partner complementary is the key to successful partner selection (Alder and Hlavacek 1976; Berg, Duncan and Friedman 1982; Connolly 1984; Franko 1976; Geringer 1986; Harrigan 1984; Killing 1982). However, the partner selection process has been characterized as difficult (Berlew 1984; Killing 1983; Reynolds 1979). Some of the findings on joint venture partner selection that are applicable to strategic alliances are discussed.

Partner selection criteria can be distinguished by two broad categories: *"task related"* and *"partner related"* (Killing 1983; Geringer 1987, 1986). Task related criteria refer to tangible and intangible, human and non-human, variables that are related to the venture's viability *regardless* of its decision making structure. Examples of task related variables are patents, financing, management experience, and access to marketing and distribution systems.

By comparison, partner related criteria refer to variables, tangible and intangible, human and non-human, that are relevant *only if* the venture requires shared decision making. Examples include national or corporate culture, management team compatibility, and organization size and structure. Given that, within the definitions of this study, joint ventures are a subset of strategic alliances, these partner selection criteria should also apply to the alliances in this study.

Complementarity has been identified as another important dimension of partner selection criteria. Complementarity can be discussed in terms of technical skills and resources, mutual need, financial capability, relative size, complementarity of strategies and operating policies, communication barriers, compatibility of management teams, and trust and commitment between partners (Killing 1988; Beamish 1987; Geringer 1987, 1986). Given that many alliances are established around value chain activities, it is not surprising that

partner complementarity is often suggested as an important selection criteria. Partner complementarity applies to areas such as technical skills and resources, and strategies and operating policies. The primary selection criteria should be one partner's ability to provide the technical skills and resources which complement those of the other partner, with technical complementarity as a minimum qualification in partner selection (Geringer 1987). Having a partner with complementary technical skills and resources allows each partner to concentrate its resources on its areas of competence. This approach allows the partnership to collectively leverage the skills and resources of the individual firms.

In evaluating potential partners, there should be some identifiable mutual need, with each partner supplying unique capabilities or resources critical to the alliance's success. Proper matching would have each partner having a vested interest in keeping the venture going. A "middle level" of dependency between the partners may be desirable, since too much or too little dependency could lead to problems (Geringer 1987).

As for relative size between the firms, it is suggested that joint ventures with the best chance of success in the long term have parents that are comparable in size and sophistication (Killing 1988; Geringer 1987). In a joint venture, it may be preferable that both partners be large firms, with potentially

strong cash reserves. This is not always the case with strategic alliances involving product development. One of the managers interviewed in the study suggested that the smaller size of their partner was a benefit in that it allowed for quick reactions to operating changes. Another manager lamented that the sheer size of his firm's partner prohibited it from making decisions quickly, let alone acting on them.

In summary, in selecting a partner for the type of alliances in this study, the ideal candidate would be one that offered complementarity in technical skills and resources, financial capability, and strategies. Given that the study addresses vertical alliances, this complementarity should be centered around value chain activities.

Strategic Alliance Management

Jarillo (1988) distinguishes the role of the lead firm, or hub firm, in the alliance as important to the management of the strategic alliance. This firm has special relationships with other members in the alliance, relationships that have most of the characteristics of a hierarchal relationship: relatively unstructured tasks, long term point of view, and relatively unstructured contracts. Jarillo characterized these relationships as "investments" (p. 34) since there develops a type of 'asset specificity' in dealing with a known supplier that may not apply to another supplier. This raises the issues of how firms manage their

investments in strategic alliances.

Theoretical Perspectives on Strategic Alliance Management

Alliances can be characterized as networks. Jarillo (1988) notes that there has been almost no empirical work on non-equity strategic networks. Easton's (1992) review of the industrial network literature reveals that while there has been little *empirical* work on the topic, there has been a great deal of *conceptual* work published. In tracing the development of industrial networks literature, the distinction can be made between the North American approach, which has been motivated by consumer marketing in the study of buyers and sellers, and the European perspective, which is concerned with the totality of relationships among firms. The focus of the European research is the network or alliance, as a whole, not the firm or the individual relationships (Easton 1992). In an approach similar to that taken in the current study, the industrial network literature takes a multi-discipline approach to examining the phenomena. The four general perspectives of industrial networks are: networks as structures; as positions; as process; and as relationships (see Table 2.1). Each of these views has application to the current study. The unit of analysis in each of these perspective helps focus attention in moving from general to specific with the structures perspective as the most aggregate and the relationship view as the most focused.

TABLE 2.1
Network Perspectives

Networks as Structures	Basic Assumptions • Heterogeneity of resources, demands & firms • Interdependence among firms • Interdependence leads to structure Implications • Any number of network structures can carry out the transformation process • Structure can be characterized by the division of work between firms • Must consider strength of complementarity among network firms
Networks as Position	Basic Assumption • Networks seen as an aggregation of interlocking positions Position Characteristics • Function • Identity • Relative importance • Level of analysis
Networks as Process	Basic Assumption • Dynamics and change are key features Coordination Mechanisms • Invisible hand • Visible hand • Network processes
Networks as Relationships:	Basic Assumption • Relationships form the context in which transactions occur Relationship Elements • Mutual orientation • Dependence • Bonds • Investments Transaction Types • Exchanges • Adaptation

Networks as structures. The perspective of *networks as structures* is based on two related premises. The first is that, because of their heterogeneity, firms are interdependent, not independent. Second, this interdependence results in a structure within the network (Easton 1992). The interdependence constrains the actions of individual firms thereby resulting in an overall structure. If there were no interdependence, the industrial system would be unstructured and stochastic in nature. It follows that the greater the interdependence, the clearer the structure of the network becomes and the more important it is to determine the roles of individual firms. Network structure, in this context, is based upon firms as elements of an interdependent structure.

The assumption of heterogeneity and interdependence underscore this approach to organizational analysis. The elements of heterogeneity are: (1) the resources available to create products and services are heterogeneous; (2) individuals or individual firms have dissimilar needs and these needs can be met in many ways; and (3) each firm is unique because of its structure, history, resources, investments, skills, etc. (Easton 1992). Specialization, learning by doing, and the existence of transaction specific investments support heterogeneity. The role a firm chooses to play in the transformation process will be determined partly by these factors. The factors of heterogeneity and interdependence are mutually reinforcing. Heterogeneity in firms leads to

interdependence of firms, which reinforces heterogeneity, which leads to interdependence, and so on. It should be noted that the elements of heterogeneity and their implications are very similar to the resource-based view of the firm.

The goal of an industrial network is to allow heterogeneous firms to match heterogeneous resources with heterogeneous demands. Two of the implications of this are: first, that there are numerous network structures capable of performing a transformation process, and second, that a network can be characterized by the division of work among the firms within the network. For example, as the resource transformation process is spread along the value chain, the structure can be made up of a few monolithic firms or many smaller firms. While either configuration is capable of accomplishing the goal of matching resources with demands, the resulting structure is different.

Networks as positions. The *networks as positions* perspective represents a network as an aggregation of interlocking positions. The focus is on individual firms, rather than the network as a whole. Mattsson (1984) defines a position as a role that one organization has with other organizations with which it has direct or indirect relations. This implies that the firm is expected by other firms to behave according to norms associated with that position (Mattsson 1984). Other organizations define the position of the lead

organization through the relationships that they have with it. Similarly, Hakansson and Johanson (1984) describe strategic identity as the views about the firms's role and position in relation to other firms in the industrial network. Characteristics of position, outlined by Mattsson (1984, 1987), are function, identity, relative importance, level of analysis, and strength of relationship.

Positions in networks are primarily concerned with the nature of network connections. Fundamentally, a change in the position of one firm will change, to some extent, the position of other firms in the network. These changes can affect firms both inside and outside the network. However, Easton (1992) points out that it should not be construed that position changes are easy to achieve or always possible. Mattsson (1984) provides a link to strategy by identifying four strategic situations in relation to network position: entering, exiting, defending, and changing positions. Easton (1992) suggests that this view of network change corresponds to the strategy as position view outlined by Mintzberg (1988).

This approach fits well with the situation occurring in practice as firms split value chain activities among several specialist firms. Each firm can occupy a particular position along the value chain, fully aware of what is expected of them in order for the complete set of value chain activities to be carried out. That is, each firm occupies a position and, as long as each firm carries out the

role associated with that role, the alliance, should accomplish its goal.

Networks as process. Change and the dynamics of change are central features of much of the network literature. Accordingly, the *networks as process* perspective is concerned with network function issues. Easton (1992) outlines several issues that can be addressed under this approach. Within the network framework, coordination mechanisms are classified into three types: (1) invisible hand, (2) visible hand, and (3) network processes. Under the invisible hand of the market, which firm produces which product is determined by price formation signals. Under the second mechanism, the visible hand, activities that are under the control of a single firm are coordinated by that firm according to their plans. These plans may, at times, conflict with or replace market mechanisms. Easton (1992) likens this mechanism to an hierarchy under transaction cost theory. In situations of strong interorganizational relationships, network processes, can provide a mechanism to coordinate the firms' actions. This coordination of activities comes from the interactions of the organizations in the system, not from some hierarchy or market force. The strong relationships between the firms produce a coordinative influence on the system at the firm-to-firm level.

Firms, made up of heterogeneous bundles of resources, exert different power and interests, to differing degrees, within the network. The exertion of

these forces can be carried out through competition or cooperation. The network approach emphasizes cooperation, complementarity, and coordination (Easton 1992). Easton points out that "firms buying and selling from one another have to have a minimal level of cooperation in order to complete even a single exchange" (p. 23). Carried further, it follows that firms involved in multiple, on-going exchanges would require higher levels of cooperation, coordination, and complementarity.

Hakansson (1987) proposes that in a network setting innovation occurs *between* firms, not within firms. He argues that the creation of a novel solution results from a buyer and supplier working on mutual problems. Each firm, in tackling the problem, brings a complementary set of skills, knowledge and resources. In an innovation oriented network, limited resources force firms to become technical specialists. As a result, increasing reliance on firms with complementary resources requires coordinated activities. Therefore, innovation leads to networks with strong bonds. Hakansson (1987) identified knowledge development, resource mobilization, and resource coordination as examples of innovation in a network setting.

Networks as relationships. The view of networks that may have the most contribution to the current study is that of *networks as relationships.* Network researchers see relationships among firms as "*the sine qua non* of an

industrial network approach" (Easton 1992, p. 8), regarding networks as aggregations of relationships. In examining interfirm behavior, Johanson and Mattsson (1987) distinguish between relationship *elements*, which are general and long-term in nature, and *interactions*, which are more day-to-day.

Relationships are comprised of four elements: (1) mutual orientation, (2) dependence, (3) bonds, and (4) investments. Mutual orientation is a precondition for the relationship because it implies that the firms are prepared to interact with each other and expect each other to do so (Mattsson 1988). This requires cooperative relationships that presuppose complementarity between the parties' objectives (Hagg and Johanson 1983). Easton (1992) offers two sets of reasons why a firm would want to develop such relationships. The first set is based on partner complementarity. Hagg and Johanson (1983) suggest that such relationships allow a more effective acquisition of resources and sale of products. Easton (1992, p.9) explains that:

> By knowing a partner firm better and appreciating what they can do and have to offer, it is possible to both reduce costs and increase sales. Needs can be matched more exactly. Adaptations can be made which both reduce costs of production or transfer and increase effectiveness of exchanges. Knowledge may be created between firms by combining the existing knowledge and skills they both possess. Relationships also provide continuity and stability with an increased ability to plan, reduce costs and increase effectiveness.

The second set centers on utilizing network membership. A relationship implies some control over another organization, and indirectly over the environment

through that organization (Easton 1992). The resulting reduction in uncertainty and increase in stability may have high value for some organizations. This was the situation McLellan (1993) found in the financial services industry. As noted earlier, network relationships can also provide access to other firms with valuable resources.

Dependence, the second element, can be regarded as the price a firm pays for the benefits of a relationship (Easton 1992). It is partly a matter of choice and partly a matter of circumstances. While initially, a firm may be forced to deal with another firm for particular resources, over time, the firm can take steps to reduce that dependence. Dependence also brings problems of power and control, resulting from the power and control positions of the firms involved.

Bonds between firms are the third element of a relationship. A bond implies a strong closeness and coordination between partner firms that is implicit in the relationship approach. Easton and Araujo (1986) define the strength of the bond by its ability to provide a stable and predictable structure that can weather change. Bonds can have various economic, social, technical, logistical, informational, legal and time based dimensions (Mattsson 1984). Economic bonds involve not only basic exchanges, but also mutual investments. Social exchange, and the resulting bonds, are important factors

in the strength of a relationship. Technical bonds, based on product or service characteristics, develop as the firm's adjust their products and processes to accommodate their partner's requirements. This may also involve the development of knowledge specific to a particular relationship.

Investments, the fourth relationship element, are processes in which resources are committed to create, build, or acquire assets (Johanson and Mattsson 1986). In most cases, they are an investment in a specific relationship. The returns to such investments are: (1) efficient transactions, (2) accumulation of knowledge, and (3) control. Investments can be distinguished as hard or soft investments. Hard investments are traditional financial investments in property, plant and equipment. Soft investments, by contrast, involve people and time, such as acquiring knowledge of the technical, administrative or logistical characteristics of a partner (Easton 1992). It also includes time spent in establishing a good social relationship. In one sense, any resource committed above and beyond that required to execute the current exchanges may be considered an investment (Hagg and Johanson 1983).

The approach of networks as relationships has several points that apply directly to the interactions of the firms in the current study. Relationships form the context in which transactions take place (Easton 1992). Transactions, according to Johanson and Mattsson (1987), may be divided into exchanges

and adaptation procedures. Exchanges represent the day-to-day business, social or informational exchanges that occur between firms. These are closely associated with the investment element of relationships. Adaptation is a continuous process that results in changes in products or services bought or sold, in manufacturing processes or in routines and administrative procedures. Accordingly, it implies resource commitment as the resulting adaptations are investments in specific relationships. The returns to adaptation investments are strengthening bonds between firms, easier conflict resolution, confirmation that continuing adaptation is possible, and development of mutual knowledge and orientation (Johanson and Mattsson 1987; Easton 1992). In its essence, the adaptation process is analogous to the building actions in the strategic alliance management process model described in the current study.

The role of social exchange is a significant factor in the strength of interfirm relationships. Mattsson (1988) points to Blau's (1968) description of the process as social exchange relations evolving in a slow process. It starts with minor transactions in which little trust is required because little risk is involved and in which both partners can prove their trustworthiness. This enables firms to expand their relations and engage in major transactions. Easton (1992) points out that familiarity breeds affection as social relations between firms are the result of the relationships of the individuals involved. This characterization parallels the development of strategic buyer-supplier

ailiances discussed in the pilot study. The original vendor relationship developed into something more because of the working experience the individuals in the firms had with each other.

Easton (1992) suggests that the goals of the industrial network literature is primarily modeling, by way of description and explanation, not prescription. While a network approach yields normative implications, they result from the approach, rather than direct it. These implications contribute to the management of exchange processes and relationships, which may be dominated or initiated by either partner. The key issues are (1) choice of partners, (2) resource allocations among them, and (3) the management of individual relationships (Easton 1992).

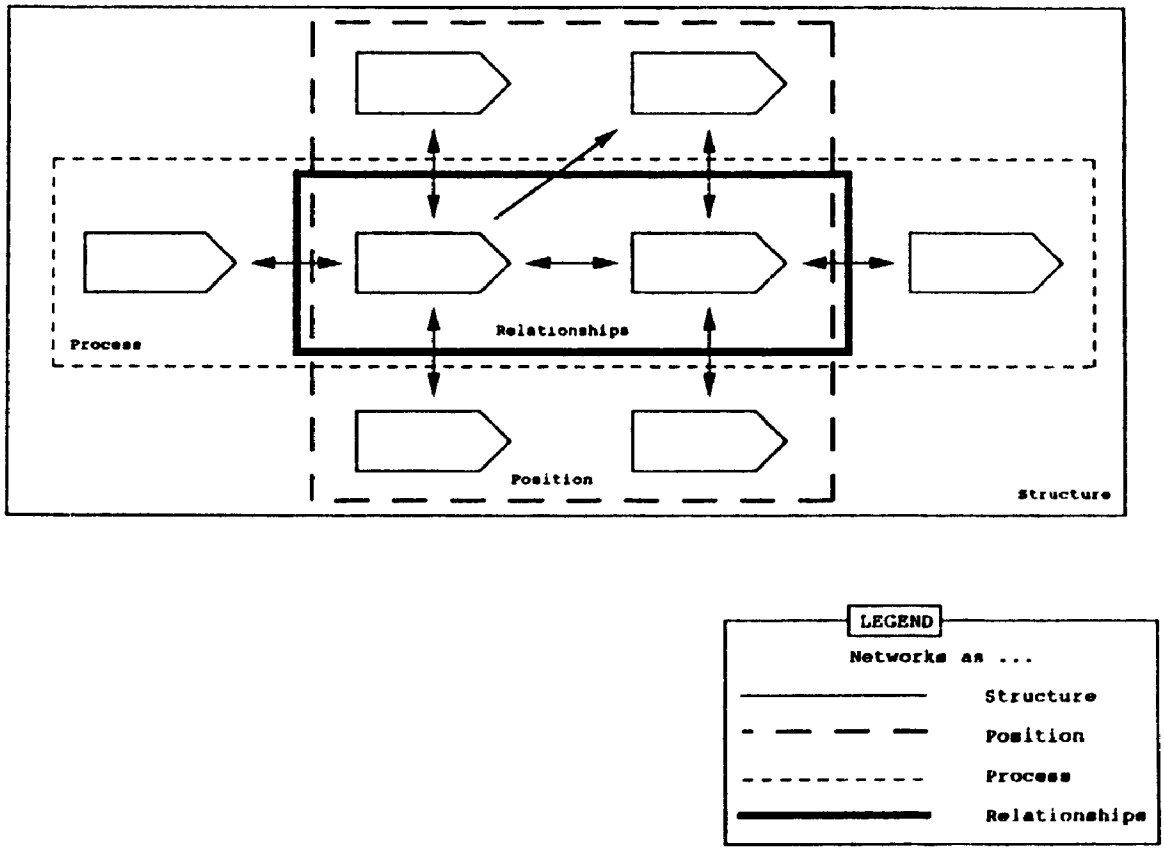
As discussed above, networks, and alliances, can be thought of in terms of: (1) structure, (2) positions, (3) process, and (4) relationships. The *structure* perspective, which is based on heterogeneity and interdependence of firms, creates structure through the division of work between network members. The *positions* perspective describes networks as aggregations of interlocking positions characterized by function and identity. The *process* perspective proposes mechanisms for controlling and coordinating network functions. The *relationships* perspective describes the elements of relationships and distinguishes between transaction types.

Porter's (1985) value chain concept can be used to better understand and distinguish between these perspectives. The value chain represents the flow of resources and value from producers to consumers. Porter (1985), McLellan (1993), and others have discussed how the value chain can be disaggregated into different value added parts such that individual firms focus on particular parts of the chain. The value chain and the firms can also be viewed from the four network perspectives, each offering a different unit of analysis. Specifically, the *structures* perspective can be thought of as focusing on the overall industry in which the firms function. The *positions* approach focuses on the functions, or roles, that the firms hold within the industry. The *process* perspective examines the mechanisms (market, hierarchy, or alliance) used to control the value chain. The *relationship* perspective addresses the relationships between individual firms. These different units of analysis are illustrated in Figure 2.3.

Empirical Research on Strategic Alliance Management

Of the few studies that address the management of strategic alliances, the two closest in focus to the current study are Henderson (1990) and Wilson (1989). While most other studies address aspects such as motivations and outcomes, these two examine the processes that lead to success or failure in strategic alliances.

FIGURE 2.3
Unit of Analysis in Network Perspectives



Henderson (1990) addressed the process of building partnerships as a management strategy involving the information systems function. Using interviews with executives, Henderson developed a descriptive model that focused on external partnerships (relationships between managers in separate organizations) and internal partnerships (relationships between line managers and information systems managers in the same organization). The term

"partnership" was described as "a working relationship that reflects a long-term commitment, a sense of cooperation, shared risk and benefits and other qualities consistent with concepts and theories of participatory decision making" (p.8). The basis of the partnership concept is the belief that performance can be significantly improved through joint, mutually dependent action.

Henderson's research focused on two dimensions of the partnership relationship, each having three determinants (Table 2.2). The partnership in context (PIC) dimension was defined as the degree to which the partners believe that the partnership will be sustained over time. This dimension addressed factors that established the participants' belief in the longevity, stability, and interdependence of the relationship. The determinants of the partnership in context dimension were mutual benefits, commitment, and predisposition. Mutual benefits, or benefits that could not be achieved through independent action, were financial returns directly attributable to the partnership, process or product innovation, risk sharing, and a positive working environment. The second determinant, commitment, was built through shared goals, reinforcing incentive systems, and the use of contracts as clarification and symbols. Predisposition, the third determinant of the partnership in context dimension, was indicated by trust and existing management attitudes and assumptions.

Partnership in action (PIA), the second dimension of the relationship, was described as the ability of the partners to influence policies and decisions that affect the operational performance of the partnership. The three determinants of this dimension were shared knowledge, mutual dependency, and organizational linkage. Shared knowledge of the environment, the corporate cultures, and the work processes involved were important to the first determinant. Mutual dependency on distinctive competencies and resources involved market knowledge, management skills, experience and product attributes. Mutual dependency was distinguished from asymmetric dependency by the view that if the partnership failed, each member of the partnership lost. Organizational linkage, the third determinant, was made up of physical process integration, information integration, and social networks.

Henderson (1990) found that these dimensions and determinants existed for both external and internal partnerships. Executives, when asked to illustrate specific steps taken to build the partnership noted such actions as education, joint planning, measurement and control, effective use of teams, multilevel human resource strategy, and technology. Education of partnership members focused on skills transfer and training, understanding the concepts and skills of partnership members, and social or cultural education. Joint planning, an ongoing, iterative planning process that reflected both strategic thinking and the translation of that strategy into action plans, was made up of negotiating

TABLE 2.2
Henderson's (1990) Attributes of Alliance Management

Partnership in Context: Concerns longevity, stability, and interdependence

- Mutual Benefits
  - Partnerships related financial returns
  - Process or product innovation
  - Risk sharing
  - Positive work environment

- Commitment
  - Shared goals
  - Reinforced incentive systems
  - Use of contracts as clarification and symbols

- Predisposition
  - Trust
  - Existing management attitude and disposition

Partnership in Action: Concerns affecting operational performance

- Shared knowledge about
  - Environment
  - Corporate culture
  - Work processes

- Mutual dependency
  - Market knowledge
  - Management skills
  - Experience
  - Product Attributes

- Organizational linkages
  - Physical process integration
  - Information integration
  - Social networks

Building Actions

- Education
  - Skills transfer and training
  - Understanding concepts and skills
  - Social and cultural education

- Joint Planning
  - Mutual benefits
  - Common goal set
  - Planning as education

- Measurement and control
  - Identification and creation of measures

and agreeing upon mutual benefits, creating a common goal set, and planning as education. Measurement and control, the third action, focused on identifying and creating appropriate measures to monitor activities and judge performance. The use of cross-functional teams helped create organizational linkages, social networks, and organizational stability. A multilevel human resource strategy helped establish partnerships at various levels in the firms. The key partnership building action noted by the executives was the use of necessary technology.

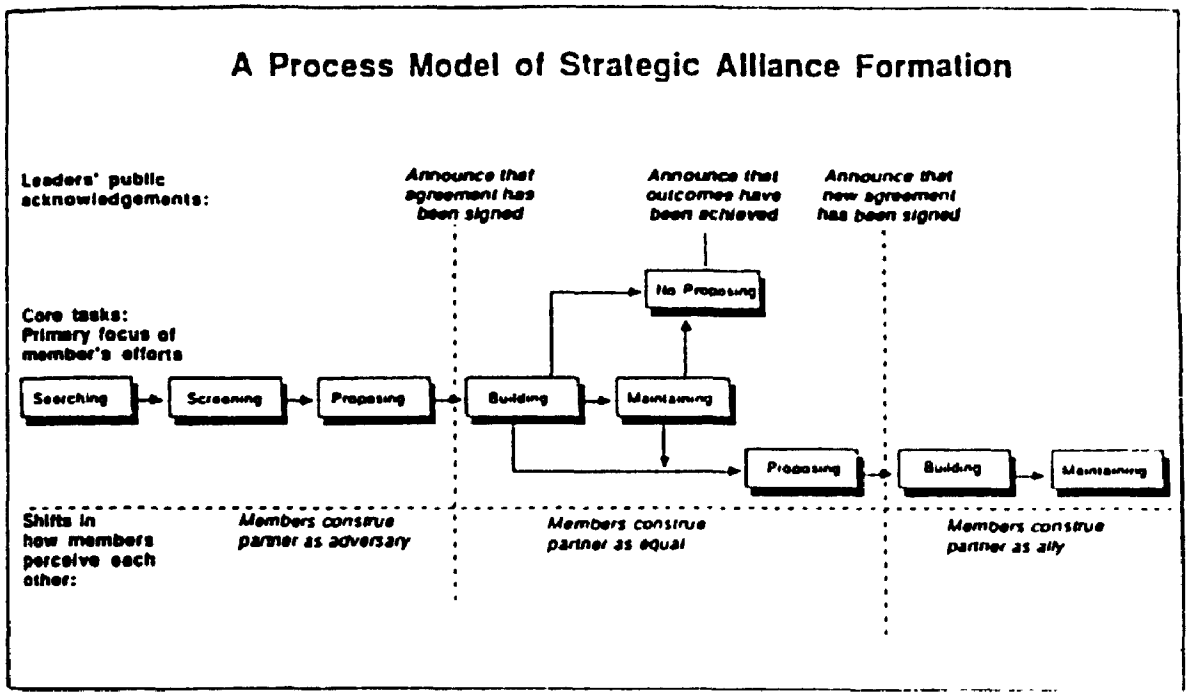
Henderson (1990) noted two conclusions. First, that while the partnership concept is invoked easily, it is very difficult to make it actually work. Second, many executives noted that a partnership relationship is not always appropriate. It is an inherently bad and common situation to believe that a partnership exists when, in fact, the relationship is simply a transaction. While the study was based on information systems partnerships, the findings appear to have implications for alliances in other industry and functional settings.

Wilson (1989) used a qualitative approach in studying the strategic alliance formation process of two major firms in the information technology industry. Wilson analyzed the process that firms use to identify critical needs for engineering know-how not found to exist within their organizational

boundaries and the action taken to acquire this knowledge by establishing long term relationships with other large firms. From this perspective, firms that develop a competence for forming successful strategic alliances may achieve a long term strategic advantage (c.f. Lyles 1988). According to Wilson, strategic alliances allow firms to contract only for assets that are important to their strategic objectives, thereby avoiding the burden of the unnecessary assets that often accompany an acquisition or merger. These findings support the resource-based approach in that firms form alliances for resources, tangible and intangible, that they do not currently have or do not want to develop themselves. The alliance gives them access to these resources without having to develop the resources internally.

Wilson's (1989) model of strategic alliance formation (Figure 2.4) focuses on how members of organizations, who are strangers to each other, but have expressed an interest in becoming allied, rely on special boundary systems and a shared norm of reciprocity for establishing stability in an otherwise unstable social relationship. Wilson found that, through a sequence of collective tasks and events, organizations first construe each other as adversaries, then equals, and finally as allies. The shifts in how members from the two organizations perceive each other are the result of successful core task accomplishments by members at various levels in both organizations. The changes in how and to what extent firm members accept each other is gauged

FIGURE 2.4
Wilson's (1989) Process Model of Strategic Alliance Formation.



source: Wilson, D. 1989. A process model of strategic alliance formation in firms in the information technology industry. Sloan School of Management Working Paper No. 90s: 89-070.

by joint public announcements and ceremonies. Wilson suggests that the basis for a long term relationship between two firms has not been tested, and so does not exist, until the thoughts and actions of the members of the new social system show commitment to preserve the alliance. This demonstration should

be comparable to similar commitments they make to groups in their respective firms.

Of particular interest to the current study are the core tasks in Wilson's model that address building and maintaining the relationship. These tasks are found in the second and third stages of the model where members construe the partner as an equal and then as an ally. Building activities are directed at establishing a strong and effective working relationship among members of both firms who are on the product team and exchange technical know-how. Formulating criteria for deciding who should be on the product team, developing procedures for assuring open and adequate communications, and motivating superior performance are important building activities. Additionally, demonstrations of goodwill and reciprocity were integral in building a successful strategic alliance for the firms. These activities are shown in Table 2.3.

According to Wilson (1989), maintaining the strategic alliance involved: (1) periodic diagnosis, review and evaluation of performance against each partner's objectives and expectations; (2) modifying the general objectives of the relationship; (3) taking defensive action to protect the product team from internal threats to its long term effectiveness; and (4) making public acknowledgements about performance outcomes. In one of the firms, specially created departments were expected to ensure that a consistency of good

TABLE 2.3
Wilson's (1989) Attributes of Alliance Management

Building Activities
- Formulation of product team membership criteria
- Development of procedures for communications
- Motivation for superior performance
- Demonstration of goodwill and reciprocity

Maintaining Activities
- Performance review and evaluation
- Modification of general objectives
- Protection of product team
- Public acknowledgements about performance

Successful Operationalization
- Individual level
  - Reciprocity
  - Trust
- Team level
  - Develop product in time
  - Develop product at cost
  - Develop product to specification
- Corporate level
  - Expand organizational boundaries
  - Expand scope of transactions

practice was maintained in each strategic alliance and that every strategic alliance conformed to a set of procedures that the firm believed would reduce the likelihood of failure.

Wilson found that strategic alliance success may be operationalized in several ways. At an individual level, success may be defined as the repeated

demonstration of acts of reciprocity and the development of personal trust between members. At a product team level, success is defined by developing the new product on time, at cost and specification. At a corporate level, success may be defined as expanding the boundaries and scope of transactions between partners. The extent to which leaders and members understand the distinction between these different outcomes and evaluate the impact of alternative boundary systems for achieving any or all may explain variances in the frequency of success across firms as well as the ratio of success to failure within a particular firm.

The implications for the current study are that managing an alliance requires conscious acts to build and maintain the alliance. These implications are similar to those expressed by Henderson (1990). Additionally, it is important to note that strategic alliance success, or performance, can be measured on several levels and dimensions. Not only can success be measured qualitatively and quantitatively, but also across several organizational levels.

Similarly, several points can be drawn from Hamel's (1991) study that apply to the current study. First, based on the finding of his study, the skills-based approach, and by analogy, the resource-based approach to organizational analysis, have credibility as an organizational analysis perspective. The second is that organizational learning is an important motivation for entering strategic

alliances. Hamel distinguished between internalization of partner skills and mere access to them. Another point is that competition may be as likely an intent for alliance partners as collaboration. It may be possible that this is due to the primary focus of his study, which was one firm's learning of another firm's skills. This point also has implications for the atmosphere that developed around the alliance. From the examples in Hamel's study, it seems that some alliance partners developed a trust in their partners, while others did not. Of those that did not, some suggested that the learning gained from the alliance would be used against them. One comment was: "If they were really our partners, they wouldn't try to suck us dry of technology ideas they can use in their products. Whatever they learn from us, they'll use against us worldwide" (p.87). This indicates the importance of trust in long term alliance relationships and that building trust requires demonstrations that the trust is warranted.

Summarizing the common findings of Henderson (1990), Wilson (1989), and Hamel (1991) reveals several implications for the current study. These are:

- Management's actions can be directed at building the alliance and maintaining the alliance.
- Alliances can have long-term resource and performance implications for the firms involved.
- Knowledge and technology exchange play an important role in successful strategic alliances.

- Trust and similar relationship building actions are important to successful and on-going strategic alliances.

Summary

The strategic implication of the alliance strategy is that it allows a firm to specialize in those activities of the value chain that are essential to its competitive advantage, reaping all the benefits of specialization, focus, and often, size. Other value chain activities are then entrusted to members of the alliance that perform them more efficiently, since they specialize in these activities. Simultaneously, all the firms enjoy the added flexibility of not having fixed commitments to activities that are not essential to their primary operations.

However, in pursuing an alliance strategy, the biggest challenge to the manager may be in managing relations between the firms involved in alliances. Not only is the manager concerned with the internal operations of his firm, but he must also be concerned with the operations of another firm. The key to making an alliance work successfully is for each firm to be proficient at their own tasks while being able to rely on the other firms in the alliance to fulfil their roles as expected. The longer term challenge is to be able to leverage the knowledge, experience, and specialization, that the firms collectively develop

within the alliance, into a competitive advantage to face future opportunities.

The literature reviewed in this chapter addressed issues concerned with the implementation of strategic alliances. These issues were *what* (characteristics of strategic alliances), *why* (motivations for entering strategic alliances), *with whom* (partner selection), and *how* (implementation of strategic alliances). In summary, strategic alliances can be defined as long term cooperative arrangements between firms whose purpose is to create competitive advantage for the partner firms. The reasons for entering into a strategic alliances, most applicable to this study, are: (1) cost reduction. (2) risk reduction, (3) access to technology and knowledge, and (4) value chain linkage. Complementary resources, tangible and intangible, are important alliance partner selection criteria. Perspectives, such as structures, positions, process, and relationships, help to conceptualize alliance management, while empirical studies assess their workings. Two management concepts from Wilson's (1989) study, when combined with other concepts from the pilot study, provide the basis for a model of strategic alliance management. The next chapter explains the development of the model that is tested.

CHAPTER THREE

RESEARCH MODEL DEVELOPMENT

This chapter begins with a brief summary of the literature synthesis in Chapter Two. Next, theoretical assumptions, the pilot study and findings are discussed as to their impact on the development of the model. Then, the model, hypotheses, and measures are discussed.

Literature Synthesis

From the literature reviewed in Chapter Two, several important theoretical points provide the conceptual perspective for the strategic alliance management model. These points are:

- the concept of the value chain characterizes the creation of product value from 'idea' to 'consumption,'
- the value chain can be disaggregated and effectively managed,
- alliances provide firms with the opportunity to contract only for assets that are critical to their strategic objectives,
- alliances give firms access to resources without having to develop them internally,
- organizational learning is often an important motivation behind alliances,
- two general sets of actions exist in alliances:
    - actions that develop a strong and effective working

relationship,

- actions that are directed at maintaining the alliance,

- alliances develop through stages, and
- performance can be measured on several levels.

The literature summaries provide: (1) a theoretical base for looking at alliances and (2) a idea about what management actions might be most important to alliance management. Together, these theoretical points provide the logic for firms forming alliances that focus on various aspects of the value chain. While the focus of the study is particularly on the product development aspect, the approach also may be applied to other aspects of the value chain.

Theoretical Assumptions of the Study

This study examines the management of strategic alliances from a resource-based perspective. Several assumptions under this approach apply to organizational analysis. Firms possess several types of resources that can be used to carry out chosen competitive strategies. The resources can be tangible, such as raw materials, transportation equipment, and manufacturing plants and equipment, or intangible, such as technological knowledge, manufacturing process expertise, marketing skills or distribution adeptness. Together, this bundle of resources can be leveraged to create a core, or distinctive, competence with which to compete. To understand how this view of resources affects strategy research, several points should be noted.

Several authors (Barney, 1990; Teece, Pisano and Shuen, 1990) distinguish the resource-based approach from other theories on two particular points. First, other theories, particularly industrial economics, view firms as identical in terms of the strategically relevant resources they control and the strategies they pursue. The resource-based approach, while considering the analysis in an industry context, focuses on the firm as its unit of analysis and sees unique organizations, each possessing distinctive bundles of resources. Other approaches focus on the industry as the unit or level of analysis, particularly when considering a firms's strategic behavior.

The second distinction is that the resource heterogeneity is seen as short lived because the resources used to carry out strategies are highly mobile (Porter, 1980; Caves and Porter, 1977). In contrast, the resource-based approach proposes that resources are not perfectly mobile. While some tangible resources, such as machinery and equipment are easily transferred, intangible resources such as technological expertise and distinctive marketing skills, are not easily duplicated. In fact, the development of such knowledge often is the result of a costly and time consuming process involving experience and refinement (Teece, Pisano and Shuen, 1990).

These distinctions combine to yield an analytic approach that stresses the inherent immobility of valuable production factors and the time required to

accumulate them. Firms are idiosyncratic because throughout their history they accumulate different sets of physical and intangible resources (Teece, Pisano and Sheun, 1990). Competitive imitation of another firm's assets is only possible by going through the same process of investment and learning that the first firm did (Dierickx and Cool, 1989; Barney, 1989). Even then, duplication or approximation is not guaranteed. As a result, the firm's history, strategy, and organization characteristics combine to create a unique bundle of resources for each firm. Had the firm made different decisions in the past, its path of asset accumulation would be different and, as a result, what the firm is today would be different. Therefore, the firm's future path is dependent on, and constrained by, its current resource bundles. In other words, the options that the firm has to chose from are available because of, and yet limited by, the accumulated resource investments made over its history.

While there has been a great deal written on resource-based approaches to business management (Barney, 1989, 1990; Dierickx and Cool, 1989; Peteraf, 1990; Chatterjee and Wernerfelt, 1988), to date only a few empirical studies address the role of resources in strategy selection. Chatterjee and Wernerfelt (1991) set out to identify a typology of resources that was generalizable across different firms, and the association between resources, types of markets and the potential for value creation. In looking at the change in product diversification profile of 118 firms during the period 1981 through

1985, they found that intangible and financial resources are the dominant factors in explaining the type of product diversification a firm chooses. However, the study suffers primarily from three weaknesses. First, its short time frame (five years) does not account or control for economic cycles which can an important factor in diversification. Second, the data set of 118 firms covers 82 four-digit SIC codes. Subsequently, there was no control for industry characteristics that may have influenced strategy selection and performance. Third, the resource measures are inadequate. Tangible assets are measured by order backlogs, innovation by research and development expenditures, and creativity by advertising expenditures. The use of uni-dimensional measures devalues the richness that such resources embody.

In the second study, Collis (1991) used a detailed field-based case study of three firms in the bearing industry to decide the value of three resource-based concepts (core competence, organizational capability, and administrative heritage) in explaining and analyzing competitive strategy. The results suggest that the resource-based view of the firm complements economic analysis, and that both are essential to a complete understanding of competitive strategy. The primary limitation of the Collis (1991) study is the inability to generalize beyond the three cases examined. While its longitudinal nature and rich detail are insightful, there are no measures of resources developed that can be used in subsequent studies. In this sense, it is difficult to go beyond the parameters

of the study.

However, with their pioneering efforts, both studies made contributions. An benefit of the Chatterjee and Wernerfelt (1991) study is to imply that the resource-based approach has not yet matured enough to be tested with currently available secondary data, and that the dynamics of resources are too complex to be captured with single measures. The Collis (1991) study adds that there is a dynamic interplay between various resources and that this has significant implications for performance.

Overview of the Pilot Study

Distinguishing Strategic Buyer-Supplier Alliances

The question can be raised: What makes an alliance *strategic*? Jarillo (1988) characterizes strategic alliances as "long term purposeful arrangements among distinct but related for-profit organizations that allow those firms in them to gain or sustain competitive advantage vis-a-vis their competitors outside the network." From this, it would seem that *long term purposeful arrangements for competitive advantage* make an alliance *strategic*. We also can draw on a definition offered by Grant, Krishnan, Shani, and Baer (1991) in regard to strategic investments. They say that investments are strategic to the degree that they are *important* (i.e., critical to the firm's overall performance), they involve *substantial resource commitments*, they are *long term*, and they

are *not easily reversible*. They also suggest that "managers view the primary objective of strategic investments as establishing competitive advantage" (p.45). These definitions are similar in that, in this study, a *strategic* alliance, as an investment, differs from other alliances in its purpose (to gain competitive advantage), its time frame (long term), and the magnitude of the investment involved (substantial).

The pilot study interviews yield similar practitioner views. Managers, in distinguishing between strategic alliances and supplier alliances, characterize a supplier alliance as "an ordinary vendor relationship," while a strategic alliance involves "some technology transfer or sharing." Other managers define it as "a situation where each partner brings some unique skill to the table," and "it involves a product that represents the firm's core competencies or an important market position." These definitions give a general feel for the nature of a strategic buyer-supplier alliance. Accordingly, the current study focuses on alliances between buyers and suppliers that are important to each firm's competitive position, that are long term in nature, and are based on the exchange or sharing of unique firm resources and competencies.

The current study has some similarities to other studies, such as Henderson (1990), Wilson (1989), and Hamel (1991), in that it addresses the management of strategic alliances. In that sense, these studies are helpful in

framing the current study. Yet, it differs from these and other studies in that this study addresses strategic alliances that are *vertical* in nature. Particularly, these are alliances between buyers and suppliers. As such, the firms involved would not ordinarily consider themselves competitors. This removes a large source of adversarial conflict that may exist between partners, as Hamel (1991) notes. The implication is that these types of alliances should have a better chance of focusing on cooperation, without competition lurking in the background. Accordingly, the firms involved should be better able to focus on making the alliance work. This is an important foundation of the alliances in the study. They are *cooperative* alliances. The firms in these alliances have decided a priori that they are not going to compete in other areas of the value chain. Instead they specialize on only a part of the value chain. Additionally, these firms do not intend to move up or down the value chain. They are not the type of *competitive* alliances that Hamel (1991) discussed, so the competitive learning and veiled adversarial motives encountered should not be issues in this study.

The *focus* of the strategic alliances in the study is on the *development of products*. While this includes the cooperative development of *new products* by partner firms, it also includes the joint development of *new models* of products currently in production. It also includes the joint development of *equipment* and *related manufacturing processes*. Because of advances in new

manufacturing techniques, particularly simultaneous engineering, it is sometimes difficult to separate the design, development, and manufacturing functions. Consequently, the vertical alliances here also may include the design, development, and manufacture of important component products for final manufacturers. For example, one alliance in the study involves the development and testing of an integrated circuit for use in a telecommunication product. Although the circuit is small in size and does not represent a large percentage of the manufacturing costs of the product, it is a critical component in that it contains the 'brains' of the final product. Another alliance addresses the development and manufacture of a product that is crucial to the effective operation of the buyer's primary product. The important point to make is that the goal of the alliance is some tangible output.

The settings for the pilot study and the main study were industries termed "technology intensive." These are industries whose products are dependent on high technology. Examples of these products are semiconductor chips, global positioning systems, telecommunications systems, and computer-related equipment. As mentioned earlier, these industries are subject to volatile competition, rapid technology changes, and short product lives. In this study, they are considered technology intensive because of the strong role technology plays in the development of the industry and the nature of the products.

Results from the Pilot Study

This was a multi-stage, multi-method research program. The first stage addressed theory development and the second addressed theory testing. In this first stage, the literature review centered around the guiding questions of what, why, with whom, and how. This review resulted in the development of a preliminary model of strategic alliance management and an interview protocol which was used as a guide during the pilot study.

The purpose of the pilot study was to better understand the basic attributes and relationships of strategic alliance management. Given the relative paucity of empirical research and the goal of the pilot study, semi-structured interviews were used as the main data gathering method in the pilot study (Kidder and Judd 1986). Four North American based international firms, which were involved in stable strategic alliances, were studied. Each of these firms use alliances as an integral part of their competitive strategy. Furthermore, all of the firms were leaders in technology intensive manufacturing industries, with mean sales of $9 billion and mean number of employees of 80,000. The interviews were with five managers in four partner firms representing four strategic alliances. The executives interviewed were senior vice presidents and middle level purchasing managers. Confidentiality of responses was guaranteed. The interviews ranged from approximately one hour to three hours with an average interview time of two hours. Archival

research and review of pertinent firm documents provided an additional source of data.

The interview topics were split into two groups, one group addressing general topics and the other addressing more specific topics. The first group addressed general industry conditions, motivations for entering alliances, and what was most important for their management. The second group addressed other issues of alliance management, such as information and technology exchange, factors facilitating alliances, conflict and performance. Interview responses were examined for important themes and were categorized according to their theme (Miles and Huberman 1984). Several major themes emerged relevant to managing strategic alliances.

The pilot study interviews suggest that changing industry conditions were a major factor for entering into strategic alliances. Firms were coming under increasing pressure to focus on core skills, but still needed to have access to new technology. This has led to a breaking up of the value chain into discrete activities that are carried out by different firms. In this sense, some firms have come full circle. Many firms began by focusing on assembly of components supplied by other firms. Gradually, they moved toward fully integrated manufacture and assembly. Now, in the face of changing industry conditions, these same firms are moving away from integration and toward

alliances based on value chain activities. For the most part, they are forming alliances with firms with whom they already had a buyer-supplier relationship. This has an important implication for the study because the buyer-supplier relationship serves as a facilitating foundation for building an alliance. It may be that the vendor experience strengthens the first stages of a strategic alliance.

Regarding specific issues of managing alliances, the themes centered around the importance of trust, sources of conflict, information and technology sharing, and performance. Through these interviews, a basic understanding of the complex nature of strategic alliance management was pieced together into a generalizable framework. This framework also drew on earlier research work in developing a model that is applicable to strategic alliances involving product development despite the industry setting.

Strategic Alliance Management Model and Hypotheses

The alliance management literature reviewed in Chapter Two provided the basic framework for the research model. In particular, two sets of actions, building and maintenance, as noted by Wilson (1989) are the foundation concepts of the model. Added to these concepts are performance measures and an additional activity set, called initiating actions, as suggested by the pilot study. Put together, the framework for the model is made up of five

constructs. These are:

- **Initiating Actions**: actions that lay the groundwork for beginning the alliance,
- **Maintenance Actions**: operational actions that must occur for the alliance to continue as an ongoing relationship between the firms,
- **Building Actions**: actions that develop a strong and effective working partnership between the firms,
- **Operational Performance**: measures for evaluating the achievement of operational goals established for the alliance, and
- **Strategic Performance**: measures for evaluating the achievement of long term competitive position objectives.

The research model is shown in Figure 1.1.

Based on the literature review and synthesis and the pilot study interviews, the process of managing strategic alliances seems to develop in two stages. Each of these stages involves the interplay of building and maintenance actions and performance. The early stage focuses on the operational aspects of the alliance, while the later focuses on the strategic aspects of the alliance. To understand the aspects of the management process, the components are described.

Initiating Actions

Initiating actions lay the groundwork for beginning the alliance. They help establish the parameters, expectations and goals for the alliance. While these may seem like trivial actions, several managers in the pilot study noted that establishing clear roles, expectations and standards at the beginning of the project, or alliance, helped reduce the chances of misunderstanding and conflict later in the relationship. This type of activity was not suggested in the literature, perhaps because it appears to be common sense. However, since alliance managers felt strongly enough about this activity to point out the importance of these actions to the overall success of the alliance, initiating actions are included in the model.

Maintenance Actions

Maintenance actions are operational actions that must occur for the alliance to continue as an ongoing relationship. Henderson (1990) and Wilson (1989) speak of maintenance actions but do not define them or give specific examples of them. However, from the pilot study, these are day-to-day activities that are expected to occur in the alliance. As one manager commented, "They are a given." Maintenance actions address such aspects of the alliance as cost, delivery, quality, and the exchange of operational information. They play a paradoxical role in the alliance in that their presence is expected but not directly rewarded. However, if they are absent, the alliance

will quickly crumble. In this sense, they are necessary, but not sufficient, for the alliance to progress.

Building Actions

Building actions come into play at all times in the management process. When the alliance is young, the firms involved must make some showing of their commitment to the alliance. Wilson (1989) says this occurs through activities such as in-person plant visits, public statements by top management, and exchanges of personnel and technology. Other building activities include the perception that the alliance will continue, joint activities, (Henderson 1990), and conflict resolution. Wilson (1989) characterizes building activities as "activities directed at establishing a strong and effective working relationship among members of both firms who are on the product team and . . . exchange of technical know-how" (p.34). They are demonstrations of "goodwill and reciprocity" (p.37) that were integral to building the alliance. Pilot study interviews suggest that in the later stage of the process, these actions are crucial to cementing the long term strategic role of the alliance. They solidify the alliance, building on operational successes, and paving the way for future opportunities between the partners.

Operational Performance

Operational performance addresses the achievement of operational goals

established for the alliance. Often, these goals have been determined a priori and are quantifiable. Examples are: reduction in development costs, reduction in development time, growth in sales, and profitability. They are linked closely to maintenance actions in that the performance is measured by how well the maintenance actions achieve the operational goals. Successful operational performance also provides the basis for additional building actions.

Strategic Performance

Strategic alliance performance is measured by the achievement of a higher order of performance objectives. Depending on their specific focus, they may or may not be quantified, and they may or may not be specified a priori. These measures address long term competitive position objectives, such as: risk reduction, successful new product introduction, technology exchange or sharing, organizational learning, and attainment of mutual gains. The strategic success of the alliance also provides the basis for exploring other business opportunities together.

The Alliance Management Process

The alliance management process has two general sets of components: a management actions set and a performance evaluation set. The management actions set is made up of initiating, maintenance, and building actions. However, from the pilot study, it seems that how large a role each activity

plays depends on the alliance relationship's level of development. At the beginning, initiating actions lay the ground work by identifying goals and setting role and product expectations. Then, in the early stages, the focus is on maintenance actions, which are operational in nature, such as production, delivery, and quality, although building actions are important. Accordingly, maintenance actions are related to operational performance evaluations.

In the later stages of the relationship, building actions become the focus of attention as the alliance relationship develops and more collaboration takes place. Here, the objective is the achievement of higher order strategic performance goals. Maintenance actions are still important, but they have a smaller emphasis in relation to building actions. It is important to note that if operational activities or performance falls off, the alliance will experience difficulty. The resolution of these difficulties is an important building block for the alliance. Then, the achievement of strategic performance goals leads to the exploration of additional business opportunities and the process begins again.

H1a: *Initiating* actions are positively related to *maintenance* actions.

H1b: *Initiating* actions are positively related to *building* actions.

The second aspect of the model links management action with alliance

performance. It is expected that the building and maintenance actions will determine the operational and strategic performance of the alliance. Particularly, it is expected that maintenance actions will be linked to operational performance while building actions will be linked to strategic performance. It is expected that operational performance also will be linked to building actions in the alliance.

Both Henderson (1990) and Wilson (1989) noted that strategic alliance success, or performance, can be measured qualitatively and quantitatively. From a qualitative perspective, performance can be measured by such aspects as achievement of goals (Hamel 1991; Henderson 1990), organizational learning (Hamel 1991), and mutual gain (Henderson 1990; Wilson 1989). Additionally, researchers have found a strong correlation between quantitative performance measures and qualitative performance measures (Geringer and Hebert 1991). Managers interviewed in the pilot study alluded to qualitative measures of performance, but when asked directly how they judged performance of the alliance, the answers were overwhelmingly in favour of quantitative-based measures. As one manager put it:

> Certainly a relationship would also generate some qualitative benefits. We want all those good things to happen, but if all those intangibles do not result in incremental business at the end of the day, it's probably not worth the effort. You can have great working relationships with them, have great get-togethers, and like each other, and all the rest, but if no business materializes, it isn't going to carry the day.

Measures such as increased sales, decreased costs, and inventory turnover were some of the performance measures observed in the pilot study.

H2a: *Maintenance* actions are positively related to *operational* performance.

H2b: *Maintenance* actions are positively related to *building* actions.

H3a: *Operational* performance is positively related to *building* actions.

H3b: *Operational* performance is positively related to *strategic* performance.

H4: *Building* actions are positively related to *strategic* performance.

Measurement of the Model

Three important dimensions of managing the alliance address initiating, maintaining, and building the alliance. Wilson (1989) distinguishes between building an alliance and maintaining an alliance, saying that building actions are directed at establishing a strong and effective relationship among development

team members from both firms. Adaptiveness, demonstrations of goodwill and reciprocity are also important to building an alliance between the partner firms. Similarly, Henderson (1990) distinguishes between partnership in context and partnership in action. Partnership in context addresses the degree to which the firms believe the partnership will be sustained over time. This is similar in orientation to the building aspect of the alliance in that building the alliance would imply a growth or nurturing of the alliance over time. Partnership in action, or the ability of the partners to influence policies and decisions that affect the operational performance of the partnership, is tied more to the maintenance aspect of the alliance. Henderson (1990) notes six general actions used to build and sustain partnerships. These include: (1) education (specific and general), (2) multilevel human resource policy, (3) technology, (4) joint planning, (5) the effective use of teams, and (6) measurement and control. While Henderson does not say which activities build and which sustain, the distinctions were apparent from the pilot study when managers distinguished between actions that help maintain the alliance but that did not directly help it to grow. Aspects such as cost, quality, delivery, and the communication of daily information help to keep the alliance running. In contrast, aspects such as technology exchange, trust, and commitment tend to build the alliance.

Given the nature of the constructs in the study, measures that reflect the nature of the management actions and the performance evaluations were used

to the model. Since there has been little testing of similar measures in strategic alliance management models, these measures were developed to reflect the multi-dimensionality of the constructs. That is, no pre-determinations were made that might limit the comprehensiveness of the measure, or the construct, at this early stage in the research. Therefore, the managers were asked about the importance of several different specific actions in managing strategic alliances. Based on their assessments of appropriateness, measures that best reflected the constructs were used in the model. Table 3.1 lists the constructs and their measures.

Initiating actions lay the groundwork for beginning the alliance. Accordingly, actions such as setting goals, discussing product and role expectations, establishing specifications and measures, and past experience are used as measures of initiating actions. Maintenance actions are operational activities that must occur for the alliance to continue as an ongoing relationship. Measures of this construct included such actions as meeting production and delivery schedules, meeting quality standards, exchanging information, adjusting systems, and having knowledgable and well trained people in the alliance. Building actions develop a strong and effective working partnership between the firms. Measures that could reflect this construct are resolving conflict, sharing risks, developing trust, and establishing personal contacts.

TABLE 3.1
Constructs and Measures

Construct	Measure
Initiating Actions	Setting common project goals
	Providing supplier with specific plans
	Letting supplier lead development effort
	Establishing common measures
	Establishing material specifications
	Discussing product expectations
	Discussing role expectations
	Past experience with supplier
Maintenance Actions	Adjusting our systems and procedures to accommodate the other firm
	Having well-trained people for activities that the other firm relies on
	Having our people understand the importance of the alliance
	Establishing a measurement and control system
	Meeting production schedules
	Meeting delivery schedules
	Meeting quality standards
	Sharing work process information
	Exchanging information on operations
	Exchanging information on costs
	Exchanging information on delivery
Building Actions	Developing trust in each other
	Expecting the relationship to continue
	Resolving conflicts between the firms
	Engaging in joint development activities
	Developing mutual long-term goals
	Public announcements about performance
	Sharing information about the industry
	Sharing information about strategies
	Sharing financial risks
	Sharing development risk
	Making investments specific to the other firm
	Adapting our systems and processes to fit the other firm
	Exchanging personnel to work on projects
	Developing personal relationships in other firm
	Management visits to each other's facilities

TABLE 3.1 continued
Constructs and Measures

Construct	Measure
Operational Performance	Develops the product on time
	Develops the product at cost
	Develops the product to specification
	Increases revenues
	Decreases costs
	Increases market share
	Increases product scope
	The relationship is profitable
Strategic Performance	Enables process innovation
	Enables product innovation
	Allows us to share development risk
	Allows us to share financial risk
	Provides access to technology we did not have
	Product introduction is successful
	Provides for other opportunities with partner
	Improves our market position
	Strengthens the alliance
	Allows us to specialize in certain operations or activities
	Allows us to focus on some aspects of project while leaving others to partner

The performance of a strategic alliance can be assessed on two different levels. Operational performance measures the achievement of operational goals established for the alliance, while strategic performance measures the achievement of long term competitive position objectives. Operational performance measures include such aspects as developing the product on time and at cost, profitability, and increased market share. Measures of strategic performance include process and product innovation, shared risks, technology

access, specialization and focus, and future opportunities.

Summary

This chapter began with a summary of the literature applicable to strategic alliance management. Next, the pilot study was described and its contributions to the development of the strategic alliance model were discussed. Then, the alliance management process was described and key concepts identified. The process was discussed in terms of the concepts and relationships between management activities and performance in strategic alliances. Three management activity sets, initiating, maintenance, and building actions, were discussed. Two performance evaluation concepts, operational performance and strategic performance, were also discussed. The research hypotheses and construct measures were presented in the context of this discussion. The next chapter describes the research methodology used to measure the constructs and test the relationships in the model. In addition, the sample and data collection are discussed.

CHAPTER FOUR

METHODOLOGY

The previous chapter discussed the development of the research model. This chapter outlines the methodology employed in the study. The discussion includes research design, operationalization, data collection, field procedures, data editing and file preparation, and the data analysis technique.

Research Design

General Approach

The research model was based on the literature review and synthesis and on the pilot study findings. This model (Figure 1.1) was operationalized as a multiple indicator structural equation model. Hypotheses were tested using a field survey research design in which pre-tested mail questionnaires were used to collect perceptual, self-reported information from managers involved in strategic alliances. These managers were solicited from firms in two similar industries, SIC 3661 (Telephone and Telegraph Apparatus) and 3663 (Radio and Television Communications Equipment). It was expected that this research design would generate sufficient responses for data analysis and hypothesis testing using the structural equation modeling algorithm Partial Least Squares (PLS). The following sections discuss the rationale for the research design and the limitations of this approach.

This study is concerned with identification of determinants of successful strategic alliance management and performance. While a longitudinal study of how firms learn to manage strategic alliances, or how they develop over the lifetime of their relationship, would make a significant contribution, it is not the focus of this study. This study synthesized and extended concepts identified in previous studies (e.g. Wilson 1989, Henderson 1990), developed a model of concepts, relationships, and measures, and then tested the model. Essentially, the questions here was, "What are the determinants of successful strategic alliance management?" While various research strategies are suitable to determine what practices lead to successful strategic alliance management, a survey can be an appropriate methodology for answering such a research question (Yin 1989).

Mail Surveys

Several data collection methods, such as questionnaires, phone interviews, and personal interviews, were possible for this study. From the pilot study personal interviews, it was obvious that managers involved in these industries were very busy. Getting them to give up one or two hours out their schedules for a personal interview was difficult, and it was soon discovered, that appointments were subject to last minute cancellations. Moreover, the firms involved in these alliances were spread across North America. Therefore mailed or faxed questionnaires were chosen to collect data.

The purpose of the questionnaire was to identify the determinants of effective strategic alliance management from the manager's perceptions. A questionnaire allowed managers the flexibility to respond at a convenient time. The questionnaire allowed managers to answer questions designed to measure each construct in a way that allowed comparisons and structural testing. Potential respondents were initially contacted by mail and phone to be certain they met particular criteria to be included in the survey sample. It was hoped that this would positively influence the response rate and increase respondent commitment.

Self-Reported Data

The collection of self-reported data is appropriate as the managers involved in strategic alliances are the people who should most fully understand the nature and dynamics of these alliance relationships. While there are potential problems with self-reported data (cf., Nisbett and Wilson 1977), it is one way to tap perceptions, feelings, and thoughts (Smith 1992). Churchill, Ford, Hartley and Walker (1985) found that self-reported measures, used in assessing sales representatives' performance, did not create bias in findings.

Research Context

The purpose of the research was to identify, from the manager's perspective, the determinants of successful strategic alliance management in

technology intensive manufacturing industries. This raises some potential problems that needed to be addressed. Type of product and type of relationship are two such problems since these factors could influence the relationships being tested in the model.

These potential problems were addressed in two ways. First, the products and companies included in the study were limited to two closely related Standard Industrial Classification (SIC) codes. This is similar to the approach used by Moriarty (1983), who had customers complete questionnaires only if they were involved in the purchase of a specific product. A disadvantage of this approach is that it does not provide variation in product focus. Still, this method is appropriate for two reasons. First, alliances have been identified as providing a way for managers in these industries to cope with the forces of rapid technology changes, high development costs, and shortened product lives. While these forces weigh equally heavy on both of these industries, they may not bear equally on other industries. Also, restricting the study to these two industry classifications, limits confounding effects due to industry forces. Second, this stage of the research program focuses on model development and testing. A focused study, although not readily generalizable to other manufacturing or service industries, can provide greater insights regarding strategic alliances in these industries.

The type of strategic alliances of interest in this study were clearly identified to potential respondents. The cover letter and accompanying research overview introduced the study as focusing on the effective management and performance impact of product development alliances. Strategic buyer-supplier alliances were defined as cooperative inter-firm relationships between buyers and suppliers. It was specified that the alliances were to involve products or components which were important to the firm's competitive position, *or* with which the firm was closely identified, *or* which represented significant sales or manufacturing volume. Product development was defined as the design, development, or manufacture of these products or components. These criteria were also set out in the questionnaire and restated in telephone conversations. All of the respondents acknowledged that they understood the study's criteria. The cover letter, research overview, and questionnaire are shown in the appendix.

Operationalization

General Approach

Constructs were operationalized with multiple indicators using a mix of original and adapted items. The scales used closed-end Likert statements with five ordered responses between the descriptors "very important" and "not important." The items and measurement format were pre-tested and modified to provide easy response. Cox (1980) recommends using either five or seven

response alternatives as an odd number gives a neutral choice, and fewer or more choices can constrain differences or make distinctions more difficult. Five was chosen in order to allow respondents to focus of primary differences in importance, not minimal degrees of difference.

Specific Items

The choice of specific items was guided by the conceptual definition of the constructs, prior related research literature, pilot study interviews, and pre-test results. Each construct had several indicators, which are shown in Table 3.1. The indicator variables were grouped together under a unifying heading in the questionnaire.

Initiating Actions. Initiating actions had eight indicators. The measures 'setting common project goals' (COMMGOAL), 'discussing product expectations' (PRODEXPS), 'discussing role expectations' (ROLEEXPS), and 'past experience with the supplier' (PASTEXP) were drawn from Wilson (1989). The measures 'providing supplier with specific plans' (SETPLANS) and 'letting supplier lead development effort' (SUPPLEAD) were drawn from purchasing literature. The two remaining measures, 'establishing common measures' (SAMEMEAS) and 'establishing material specifications' (MATLSPEC) were developed from the pilot study.

Maintenance Actions. Maintenance actions had eleven indicators. The measures 'adjusting our systems and procedures to accommodate the other firm' (ADJUST), 'establishing a measurement and control system' (CTRLSYS), and 'having well trained people for activities that the other firm relies on' (TRAINED) were developed from Wilson (1989). The measures 'sharing work process information' (PROCINFO), 'exchanging information on operations' (OPERINFO), 'exchanging information on cost' (COSTINFO), and 'exchanging information on delivery' (DELVINFO) were drawn from Henderson (1990). The measures 'having our people understand the importance of the alliance' (UNDRSTND), 'meeting production schedules' (MEETPROD), 'meeting delivery schedules' (MEETDEL), and 'meeting quality standards' (MEETQAUL) were developed from the pilot study.

Building Actions. There were fifteen indicators for building actions. 'Developing trust in each other' (DEVTRUST) was drawn from Wilson (1989), the pilot study and various other literature sources (McLellan 1993, Williamson 1985). The measures 'developing personal relationships in other firms' (CONTACTS), 'public announcements about performance' (ANNOUNCE), 'sharing information about the industry' (INDINFO), 'sharing information about strategies' (STRATINF), and 'adapting our systems and processes to fit the other firm' (ADAPT) were developed from Wilson (1989). 'Developing mutual long-term goals' (DEVGOALS), 'sharing financial risks' (FINRISK), and 'sharing

development risk' (DEVRISK) were drawn from Henderson (1990). 'Exchanging personnel to work on projects' (EXCHANGE), 'management visits to each other's facilities' (VISITS), and 'resolving conflicts between firms' (RESOLVE) were developed from the pilot study. 'Making investments specific to the other firm' (INVSTMNT), 'expecting the relationship to continue' (CONTINUE), and 'engaging in joint development activities' (JTDEVEL) were developed from Anderson and Weitz (1992) and Heide and John (1990).

Operational Performance. Performance was distinguished between strategic and operational performance. There were eight operational performance indicators in all. 'Develops the product on time' (EVALTIME), 'develops the product at cost' (EVALCOST), and 'develops the product to specification' (EVALSPEC) were drawn from Wilson (1989). 'Decreases cost' (EVALDECR) and 'increases product scope' (EVALSCOP) were developed from the pilot study. 'Increases revenues' (EVALREVS), 'increases market share' (EVALMKSH), and 'the relationship is profitable' (EVALPROF) were drawn from Wilson (1989), Cooper and Kleinschmidt (1987), and the pilot study.

Strategic Performance. There were eleven *strategic performance* indicators. 'Enables process innovation' (EVALPROC), 'enables product innovation' (EVALPROD), 'allows us to share development risk' (EVALDEVR), and 'allows us to share financial risk' (EVALFINR) were drawn from Henderson

(1990). 'Provides access to technology we did not have' (EVALTECH) was drawn from Hamel (1991). 'Product introduction was successful' (EVALINTR) came from Wilson (1989). 'Improves our market position' (EVALMKT) was from Landeros and Monckza (1989). 'Provides other opportunities with partner' (EVALOPPS), 'strengthens the alliance' (EVALSTRE), 'allows us to specialize in certain operations or activities' (EVALSPCL), and 'allows us to focus on some aspects of the project while leaving others to partner' (EVALFOCU) were developed from the pilot study.

Additional Items in the Questionnaire

The questionnaire also asked for demographic information. This included company sales, alliance product sales, supplier purchases in dollars and percentage, number of suppliers, age of alliance, and how long it was expected to continue. Questions relating to resource contribution and control also were asked. These focused on value chain issues such as design expertise, testing, materials procurement, production, inventory, and financing.

Data Collection

This section outlines the data collection issues and procedures involved in the study. These include the sample, the required sample size and the role of key informants.

Sample

The sample population is the set of strategic alliances involved in product development projects. For the research sample, and the data obtained, to be representative of the population, the sampling frame must also be representative of the population. This implies an important correspondence between the sampling frame and the population the study attempts to describe.

A problem encountered when developing the sampling frame was that there is no pre-existing and comprehensive listing of strategic alliances that focus on product development. Moreover, it became obvious in the early stages of this study that companies did not readily divulge information about ongoing strategic alliances involving product development. These alliances were seen as important to current and future competitive positions and managers were not quick to share information about them. This presented a double hurdle; first, how to identify the strategic alliances that were appropriate for the study, and then, how to get respondents to disclose information. By contrast, a listing of joint ventures can be compiled by sorting through several information sources. These include: Mergers and Acquisitions, Predicasts F&S Index of Corporate Change, and Foreign Direct Investment in the United States published by the U.S. Department of Commerce's International Trade Administration. For Canadian-based joint ventures, Investment Canada provides listings.

Creating a listing of companies involved in product development alliances proved to be a major task, tempered only by the narrow industry focus of the study. Using the 1992 edition of Dun and Bradstreet's Million Dollar Directory for U.S. companies and Dun and Bradstreet's Canadian Key Business Directory for Canadian companies, 679 companies were identified as potential alliance partners based on industry membership. Each firm in the 3661 and 3663 SIC codes was contacted initially by mail. An introduction letter was sent to the Chief Executive Officer, or President, of the firm. This introduction letter and research overview are shown in the appendix. The purpose of the introduction letter was to: (1) define the focus of the study as being the management and performance of strategic alliances involving product design, development, or manufacture of a product or component, (2) solicit the participation of the firm if they were involved in such alliances, (3) guarantee confidentiality, and (4) offer a summary report of the findings in return for participating in the study. The research overview explained what the study was about, why it was important to managers, and how it was being carried out.

Given that it was not known initially how many firms were actually involved in strategic alliances, the introduction letter and research overview were sent as first contact. Then, firms were contacted by phone to ask: (1) if they were involved in the type of strategic alliances described in the letter, and

(2) if so, whether they would participate in the study. If they expressed a willingness to participate, they were immediately sent a survey questionnaire by mail or fax.

Key Informants

When the unit of analysis is either the organization or the relationship between organizations, an important issue in organizational research is the use of key informants to provide information. Since the information sought was relationship-specific, the respondents should be the organization members who were most knowledgeable about the alliances. Prior research on joint ventures (Tomlinson 1970; Hills 1978; Janger 1980; Geringer 1986) found that, on average, one to three key executives within each organization were closely involved throughout the joint venture partner selection process and had access to pertinent information. Typically, these executives were in upper or upper-middle management in their respective companies and held line positions. All of the respondents in the study had intimate knowledge of the alliances and held at least upper-middle management positions in their respective companies.

The combination of a limited population of qualified respondents and of busy executive schedules was expected to hinder efforts to recruit multiple respondents. Fortunately, for major and non-routine organizational decisions, there has been found a high level of consensus among key executives regarding

perceptions of joint venture management aspects (Geringer 1986). Therefore, it seemed that the crucial task was not securing as many respondents as possible, but rather ensuring that the individual respondent was among the key executives in the management of the strategic alliance. Many studies in the marketing literature have used a single key informant to report on organizational characteristics or relationships.

Informants from both sides of a relationship is another way to use multiple informants. John and Reve (1982) measured several structural dimensions of interorganizational relationships and several dimensions of dyadic sentiments. They found key informants across firms provided reliable and valid measures concerning the structural form of the relationship, but these same measures did not show adequate convergent and discriminant validity regarding sentiment constructs. They attributed the divergence to "real" differences in perception between respondents across the dyad in relation to the constructs. In this study, it is argued that, while it is preferable, it is not necessary to collect data across the relationship dyad. The constructs of interest related to what managers regard as determinants of successful alliance management, regardless of which side of the alliance they are on. While the sampie did not include matched pairs, the number of buyers and suppliers was almost balanced, with 61 percent buyers and 39 percent suppliers.

Field and Operational Procedures

This section outlines the procedures used in developing and implementing the survey instrument. It provides a general overview of the approach taken, survey development and content considerations, pretest procedures, and implementation aspects. The main objectives throughout the design process were the need to collect valid and reliable data, and the need to reach an acceptable response rate.

General Approach

The field and operational procedures outlined by Dillman (1978) for the development and implementation of effective mail and telephone interviews provided the guidance for this study. The Total Design Method (TDM) offered by Dillman is an integrated approach that has been successfully used in industrial and non-industrial settings. Dillman (1978) reports an average response rate of 74 percent in non-business surveys using TDM. Walker, Kirschman, and Conant (1987) report usable response rates of 37 percent and 65 percent in two industrial studies incorporating TDM. Barclay (1991) adopted TDM and reported usable response rates of 42 percent and 50 percent in two stages of an industrial study.

TDM is a series of design and implementation elements based on exchange theory concepts that people are motivated to complete surveys

because of the benefits expected. Dillman suggests that optimum response and data quality can be achieved by generating respondent interest, lowering respondent costs, and establishing trust that anticipated benefits will be realized. Survey development guidelines regard the survey format and length, page formats, survey covers, question placement, and instructions. Implementation guidelines regard the basic appeal, cover letter, survey package, pre-tests, and follow-ups.

Survey Development

Dillman advises that the survey format should suggest the worth or value of the questionnaire. Therefore, in keeping with the objective of conveying the importance of the study, the survey instrument was produced using a laser printer and duplicated on 8.5" X 11" quality white bond paper. In consideration of busy executive schedules, the instrument was brief and to the point. Totalling five pages, it had questions on only four pages. This was because response rates generally decrease as instrument lengths increase (Baumgartner and Heberlein 1984). The front cover showed the name and logo of the University of Western Ontario and the Western Business School, and the name and logo (two clasped hands) of the study. Also on the cover were instructions for responding and specific descriptions about the type of alliance the study addressed. The pages containing the questions were formatted for ease of flow and comprehension, and used simple instructions. Dillman

suggests that items measuring the same construct should be placed together, allowing respondents to develop cognitive ties between responses as this would help increase response rate. Given that the study sought to identify determinants of various alliance management activities, this was the approach used.

Implementation

Effective survey implementation is important for optimum response and data quality (Dillman 1978). TDM offers guidelines to increase the personal relevance of surveys and maintain respondent interest in completing the task. Dillman advocates social-usefulness as the basic appeal instead of altruism. Therefore, respondents were asked to complete the survey in order to help their firms and other managers better understand effective management of buyer-supplier strategic alliances. While Dillman suggests using a token financial incentive, respondents in this study were only offered a summary report. Michaels (1983) found that a summary report was the incentive most favored by respondents. Barclay (1986) also found this approach to be effective. The management summary will provide a brief summary of the empirical results, followed by a discussion of how these results could be important to alliance managers.

The questionnaires were sent with a cover letter thanking them for

participating and reaffirming confidentiality. The letters were individually addressed to the potential respondents, and the questionnaires were filled in as to the company name, potential respondent, and respondent's position. High quality paper with the University of Western Ontario letterhead and logo was used for the letters and the research overview. If the questionnaires were mailed, an addressed, stamped envelope was provided to return the questionnaire.

If faxed, a Western Business School cover sheet with return fax number accompanied the questionnaire and research overview. Respondents were very amenable to having the questionnaires faxed to them. This provided prompt follow-up to telephone conversations and tended to promote quick responses back from the respondents.

Data Editing and File Preparation

Each returned questionnaire was reviewed, coded for data entry, and typed into SPSS-PC data files. The first line contained the designation for buyer or supplier firm and the firm identification code. Responses to questions for each page of the questionnaire were entered onto a separate data line. Missing data was coded with "9" to identify it. These procedures helped to visually inspect response profiles to check for data input errors. Separating data files helped identify the source and resolution of entry problems.

Missing Data

Missing data was handled with a substitution approach adapted from Barclay (1986). Casewise deletion could have resulted in a low usable response rate. Pairwise deletion would have maximized the information used in the study, but could have produced biased results since it is not random. Also, it can produce inconsistent sample sizes, which would prohibit the use of jackknifing for parameter estimates. Jackknifing requires a complete data matrix and substitution for missing data. In instances of missing data, the substituted values were the mean values for the responses to that item.

Data Analysis Technique: Partial Least Squares

The data analysis techniques used in this study was Partial Least Squares (PLS), a method of structural equation analysis. PLS is a regression-based technique rooted in path analysis (Pedhazur 1982; Wold 1985). Fornell (1982; 1984) refers to it as a second generation multivariate analysis technique. Second generation methodology emphasizes theory building or development by combining a priori knowledge derived from theory, previous empirical research, and research design with empirical analysis. According to Fornell (1984), the essence of research methodology is to advance understanding by combining theoretical knowledge with empirical knowledge. Second generation methods combine theoretical and empirical knowledge by: (1) modeling errors in observation (measurement or non-sampling error), (2)

incorporating both theoretical (un-observable) and empirical (observable) variables into the analysis, (3) confronting theory with data (hypothesis testing), and (4) combining theory and data (theory building).

PLS and LISREL

PLS and LISREL are two approaches to structural equation modeling that could have been used in this research study. PLS was seen as the most appropriate when compared to LISREL along the following three dimensions: (1) the stage of theory development, (2) the objectives of each approach, and (3) the data requirements.

First, LISREL is most suited to research problems where a strong a priori theory exists, while PLS is more appropriate where theoretical knowledge is weak or tentative (Fornell 1983). PLS has been described by Lohmoller (1982) as closer to the data, more explorative, and more data analytic. From this perspective, LISREL can be considered more appropriate for theory testing, while PLS is more appropriate for theory development.

Second, the objective of PLS is the explanation of variance via ordinary least squares (OLS) estimators. Here the goal is minimization of residual variance in the model. This makes PLS more predictive as it is capable of identifying a subset of proposed causal constructs. Since the objective of this

study is to explain variance by identifying important predictors of effective strategic alliance management, PLS is the more appropriate methodology.

Finally, PLS makes minimal demands concerning measurement scales, the distribution of residuals, or sample sizes. As PLS does not involve a statistical model, assumptions regarding the scales of measurement need not be made. Nominal, ordinal, and interval scaled measurements are permissable (Fornell and Bookstein 1982). The fixed point estimation of PLS is distribution free (Wold 1982). Lohmoller (1982) showed that PLS can be implemented with small sample sizes because the iterative algorithm behind the method estimates model parameters and loadings in small subsets, with subsequent iterations providing successive approximations for the estimates subset by subset, until selected convergence criteria are met (Fornell and Bookstein 1982; Barclay 1986). This subset estimation process consists of nothing more complex than simple and multiple regressions so that the sample size required need be no greater than required to support the most complex multiple regression in the process. Often, the most complex regression will involve the construct with the most indicators, with those indicators being predictors of that construct (Barclay 1986).

PLS Models

PLS requires that both the structural model, or path model, and the

construct-to-measures relationship be explicitly specified. The *exogenous* construct predicts or "causes" an *endogenous* construct. An exogenous construct can be thought of as an independent variable, while an endogenous construct is similar to a dependent variable.

Constructs can have either formative or reflective indicators. *Formative* indicators imply that the construct is expressed as a function of the variables; that the variables cause or precede the construct. Alternatively, a construct may have *reflective* indicators in which the variables are expressed as a function of the construct; that the variables are manifestations of the construct. According to Bollen (1989), these are "effect" indicators and is consistent with the way the construct-measure relationship is usually viewed. Fornell and Bookstein (1982, p. 442) comment on the conceptual distinction between reflective and formative modes:

> Constructs such as "personality" and "attitude" are typically viewed as underlying factors that give rise to something that is observed. Their indicators tend to be realized, then, as reflective. In contrast, when constructs are conceived as explanatory *combinations* of indicators (such as "population change" or "marketing mix") which are determined by a combination of variables, their indicators should be formative.

Once the path model and the construct-to-measure relationship has been specified, the measurement and structural parameters of the PLS model are estimated in an iterative manner using Ordinary Least Squares (OLS) simple and

multiple regressions.

In applying the procedure to complex causal models, the PLS algorithm takes segments of the complex models and applies the set of simple and multiple regressions until the entire model converges. At any given time, the iterative procedure is working with one construct and a subset of measures related to that construct, or to adjacent constructs in the model. It is this segmenting of complex models that allows PLS to work with small sample sizes. The subset estimation process consists of simple and multiple regressions, so the sample required is that which would support the most complex regression encountered (see Fornell, Barclay and Rhee 1988 for more detail on the procedure).

Although the measurement model and structural parameters are estimated together, a PLS model is analyzed and interpreted in two stages: (1) the assessment of the reliability and validity of the measurement model, and (2) the assessment of the structural model. This sequence ensures that, before attempting to draw conclusions about the relationships among the constructs, the measures are reliable and valid. This is explained further in Chapter Five.

Summary

The choice of PLS as the statistical method was driven by three considerations: (1) the research goal of identifying determinants of strategic alliances and (2) the theoretical goal of developing and testing synthesized theory, and (3) the appropriateness of the PLS to these goals. The use of PLS is not without precedent. Fornell, Lorange and Roos (1990) used the same latent variable modeling approach to investigate the cooperative venture formation process.

As discussed previously, the theoretical model used in this study was developed from Wilson's (1989) findings about the product development alliance formation process. To Wilson's two sets of activities, building and maintaining, were added initiating actions and performance measures. The model, as presented here, hypothesizes that: Initiating Actions are positively related to Building and Maintenance actions, (2) Building Actions are positively related to Strategic Performance, (3) Maintenance Actions are positively related to Building Actions and Operational Performance, and (4) Operational Performance is positively related to Building Actions and Strategic Performance.

CHAPTER FIVE

ANALYSIS AND DISCUSSION OF RESULTS

As mentioned earlier, the purpose of this research is, first, to develop a synthesized model of strategic alliance management and performance, then, to test this model, and, finally, to identify determinants of effective alliance management. The model's development was discussed in Chapter Three and the methodology used for testing it was discussed in Chapter Four. This chapter discusses the data analysis and research results, which include: (1) the survey response rate, (2) descriptive statistics regarding the organizations and the respondents, (3) the PLS analysis of the research model using the data set.

Survey Response Rate

As described in Chapter Four, 679 companies were identified as possible alliance participants based on industry membership. Each firm's president, C.E.O., or other senior manager, as identified in the directory, was sent an introduction letter and research overview description. The letter explained the purpose of the study, defined the topic of interest, and asked for participation, if they were involved in appropriate product development strategic alliances.

Of the introduction letters sent, 56 were returned by the post office as undeliverable. The remaining potential companies were listed in the address file alphabetically by state and by city. This list was divided into four time zones.

Random telephone calls were made to as many companies as possible within a one hour period, twice a day, during each regular business day of the telephone phase of the study. For example, from 8:00 a.m. until 9:00 a.m. eastern time, calls would be placed to companies in the eastern time zone. From 9:00 a.m. to 10:00 a.m. eastern time (8:00 a.m. to 9:00 a.m. central time), calls were made to companies in the central time zone. From 10:00 a.m. to 11:00 a.m. eastern time (8:00 a.m. to 9:00 a.m. mountain time), calls were made to companies in the mountain time zone. From 11:00 a.m. to 12:00 noon eastern time (8:00 a.m. to 9:00 a.m. pacific time), calls were made to companies in the pacific time zone. This rotation, random calls within each of the four time zones, was then repeated from 1:00 p.m. though 5:00 p.m., using the same pattern. Return calls, requests to call back and follow-up calls were scattered throughout the day. On average, it took five telephone calls to actually speak to a manager.

Based on the substantial time and resources required to contact potential companies, the telephone process continued until the enough questionnaires had been returned to surpass the required minimum sample size of 30. Two hundred fifty seven companies (38 percent of 679) were telephones to discuss the research and solicit participation. Of these calls, only 127 managers (49 percent of calls placed) were actually able to be contacted. Despite persistent and repeated phone calls and messages, these other

managers were not able to be reached. Of the 127 managers contacted about the study, 50 (39 percent of 127) were "not interested" or "too busy" to participate in the study. Thirty nine (31 percent of 127) were "not appropriate" for the study. In the end, 38 (30 percent of 127) questionnaires were returned. This level of participation was expected to enhance the external validity and statistical conclusion validity of the results and conclusions within the industry parameters.

There was no reason to believe that any non-response bias existed. While there were not any follow-up calls or letters because of the difficulties experienced in the telephone phase, for those contacted, reasons for not participating were recorded when participation was declined. For the most part, these were "not interested," and "too busy."

TABLE 5.1
Survey Response Rate

	Number of Companies	
Introduction letters sent	679	
Letters returned	56	
Companies telephoned	257	
Managers contacted	127	(100%)
Managers "not interested" or "too busy"	50	(39%)
Companies "not appropriate" or "no alliances"	39	(31%)
Questionnaires returned	38	(30%)

Descriptive Statistics

All the organizations in the sample were North America based. While only four identified their partners as based outside North America (see Table 5.2), the firms in the sample intended that their alliance product would serve an international customer base. The respondents represented both sides of alliances with 23 (61 percent) in the role of buyers and 15 (39 percent) in the role of suppliers. Mean annual sales were approximately $195 million, while sales outside North America accounted an average of 22 percent. The mean sales for the products which the alliances involved were $45 million (23 percent of annual sales), with the supplier partners providing approximately 25 percent of the cost of goods sold. The managers had been asked to select alliances for the study that they considered significant and strategic. These figures support their view of the alliances as significant and strategic.

All the alliances were based on a buyer-supplier relationship. Most represented preferred supplier situations with over half (52 percent) of the firms sourcing the products from only one supplier. Overall, 84 percent of the buyers used no more than two suppliers. The mean duration of the alliance relationships was five years and 67 percent of the firms expected the alliance to continue for at least another four years. More than half (60 percent) of the buyer firms had sourced other products from the supplier partner.

TABLE 5.2
Strategic Alliances in Sample:
Product Focus and Partner Location

Alliance Product	Buyer Location	Supplier Location
High Frequency Radio with Antenna Ku Band	USA	Japan
LCD Terminal Display with Keyboard	USA	Malaysia
Cable and Wire Assemblies	USA	USA
TCXD, Filters	USA	USA
Telecom Integrated Circuits (DTMF Receiver)	USA	USA
Emergency 911 Equipment (Telecommunications)	USA	USA
Digital Crossover System	USA	USA
Network Bridge	USA	n.d.*
Video Displays and Processors	USA	France
Industrial Telecom Systems	USA	USA
Telecommunications Equipment	n.d.*	Canada
Digital Echo Cancellers	USA	France
Telecommunications Routing Equipment	Canada	n.d.*
Custom Integrated Circuit Development	USA	n.d.*
Communication Equipment and Systems	USA	n.d.*
Fiber Optic Cable	USA	n.d.*
Radar Detectors	USA	n.d.*
Electro-mechanical Positioners	n.d.*	USA
Computer Systems and Software (Telephone Switching and Predictive Dialers)	USA	n.d.*
Electronic Telemetry Transceivers	USA	USA
Fractional T2 Multiplexer (Data Communications)	USA	n.d.*
Integrated Circuit Assembly	USA	n.d.*
Industrial Automation Solutions	USA	USA
Semiconductor Processing Equipment	USA	USA
Semiconductor Processing	n.d.*	USA
Semiconductor Processing	USA	USA
Electronic Instruments and Computers	USA	n.d.*
Aerospace	USA	USA
Interconnect (Computers)	USA	n.d.*
Electronic Engine Controls	USA	n.d.*
Automotive Electronics	USA	n.d.*
Printed Circuit Boards (Telecommunications)	Canada	n.d.*
Telecommunications	Canada	n.d.*
Fiber Optics	USA	n.d.*
Conferencing Devices (Telecommunications)	n.d.*	USA
Telecommunication Switching Product	USA	n.d.*
Telecommunications	n.d.*	USA
Data Network Access Platform (Data Communications)	USA	n.d.*

n.d.*: Not disclosed due to confidentiality

All the respondents held upper level management positions within their respective organizations (see Table 5.3). Eight of the respondents were presidents in their organizations, twenty were vice-presidents, two were directors (manufacturing and purchasing), and eight were business or functional area managers. Because of the criteria used in selecting respondents, it was assumed that all respondents had personal knowledge about the alliances on which they were reporting.

TABLE 5.3
Respondent Profiles

Organization's Role	**Frequency**	**Percent***
Buyer	23	61
Supplier	15	39
Respondent's Position	**Frequency**	**Percent***
President/C.E.O.	8	21
Vice-President	20	53
Director	2	5
Manager	8	21

* Rounded to nearest whole number.

PLS Analysis

PLS models are evaluated from two perspectives. One is an assessment of the structural model and the other is an assessment of the measurement

model. The structural model represents the direct relationships, or paths, between unobserved constructs (latent variables). The measurement model represents the epistemic relationships between observed items (manifest variables) and the constructs they measure. As mentioned earlier, these epistemic relationships can be specified as formative, where unobserved constructs are indices defined by a linear combination of observed variables, or reflective, where the unobserved constructs give rise to the observed variables. The structural and measurement models are discussed, beginning with the measurement model.

The Measurement Model

The assessment and refinement of the measurement model requires an evaluation of convergent validity (including reliability) and discriminant validity. This was done with the original model. After the initial PLS run, the measurement model was trimmed of poor items. Then the trimmed model was rerun and re-assessed. These steps are discussed below.

Convergent Validity. According to Campbell and Fiske (1959), convergent validity assesses the degree to which two or more measures of the same construct agree. Fornell and Larcker (1981) suggest three ways convergent validity can be assessed when constructs are measured within a single survey instrument: (1) item reliability, or the reliability of individual

measures, (2) internal consistency, and (3) average variance extracted by each construct.

Item Reliability. For an individual measure to have item reliability, at least half the variance in the measure must be attributable to the construct, rather than to error (Carmines and Zeller 1979). This is the case when the loading of the measure on the construct is greater than .707, since the item reliability is the square of the item's loading on its associated construct. The rule of thumb is that loadings of .7 or greater are acceptable (Barclay, Duxbury and Higgins 1991). In situations where some items load positively on a particular construct while other items have load negatively on it, there are three possible explanations. First, the item could be an unreliable item, containing random error. Second, the negative loading could be the result of a methods factor where it shares more with a common method of measuring items across constructs than it shares with the construct. Finally, the construct could be multidimensional. Situations such as these could justify modifying the construct's measures.

Internal Consistency. Researchers using PLS generally report the measure of internal consistency developed by Fornell and Larcker (1981). It is computed as the sum of the loadings all squared divided by the sum of loadings all squared plus the sum of the error terms. This measure is similar to

Cronbach's alpha as a measure of internal consistency. Fornell and Larcker argue that their measure is superior to Cronbach's alpha since it uses the item loadings obtained within the nomological network. The measure is more general than Cronbach's alpha, but the interpretation of the resulting values is similar and Nunnally's (1978) guidelines can be used (Barclay, Duxbury and Higgins (1978). Nunnally (1978) suggests that values greater than .7 should be adequate.

Average Variance Extracted. The average variance extracted by a construct is the preferred measure of convergent validity, and is more conservative than composite reliability (Fornell and Larcker 1981). It is calculated as the average of the squared individual item loadings for all measures of a construct. This value should not be less than .5 since values lower than this suggest that the amount of variance captured by the construct is less than the amount of variance due to error.

Item Trimming. The initial factor structure was checked that all the items had loadings of greater than .7 on their respective constructs. They also were checked that they loaded more on their own construct than on other constructs in the model. The initial factor structure indicated that some of the items met the criteria while others did not. These are discussed below and shown in Table 5.4.

When problems are identified with the measurement model, it is necessary to decide whether to revise the model. There are no established rules. The decisions are based on how close the measures are to the suggested psychometric standards and on the research objectives. Generally, there is a trade-off between maximizing reliability and validity on one hand, and maximizing the variance captured by a latent construct on the other. In the early stages of research it is more acceptable to relax the requirements for reliability and validity to increase understanding. When the research objective is to develop measurement scales or to more rigidly test theory, higher levels of reliability and validity are required (Nunnally 1978).

The process of revising the measurement model was iterative since changes made to any scale affect the loadings of indicators for different constructs. After two revisions to the measurement model, a final measurement model was developed that was believed satisfactory for the purposes of this study. The rationale for these changes is explained below.

Some measures of the constructs appeared to have low item reliability. A possible explanation is that, first, several of the measures were developed from other literature, and, second, this was the first time many of the measures had been used. It could be that some were not adequate measures of the construct or were not appropriate for a product development setting. Another

TABLE 5.4
Initial Loadings and Cross-Loadings of Measures

	Initiating Actions	Maintenance Actions	Operational Performance	Building Actions	Strategic Performance
COMMGOAL	**.77**	.48	.30	.51	.42
SETPLANS	**.66**	.29	.13	.28	.28
SUPPLEAD	**.23**	.11	.30	.33	.39
SAMEMEAS	**.54**	.39	.10	.31	.14
MATLSPEC	**.52**	.28	.26	.12	.22
PRODEXPS	**.70**	.55	.52	.51	.54
ROLEEXPS	**.73**	.59	.23	.53	.38
PASTEXP	**.17**	.20	.38	.18	.40
OPERINFO	.51	**.59**	.01	.42	.23
COSTINFO	.66	**.62**	.25	.47	.44
DELVINFO	.05	**.38**	.08	.13	.07
PROCINFO	.35	**.33**	.16	.20	.08
TRAINED	.15	**.38**	.01	.13	.18
UNDRSTND	.55	**.67**	.21	.36	.25
ADJUST	.32	**.56**	.15	.44	.41
CTRLSYS	.33	**.38**	-.07	.15	.05
MEETPROD	.27	**.68**	.45	.51	.46
MEETDEL	.34	**.74**	.61	.52	.54
MEETQUAL	.30	**.56**	.70	.43	.64
EVALTIME	.48	.32	**.34**	.41	.26
EVALCOST	.32	.32	**.41**	.18	.23
EVALSPEC	.25	.27	**.41**	.07	.20
EVALSCOP	.26	.27	**.78**	.32	.54
EVALREVS	.28	.45	**.88**	.57	.77
EVALDECR	.38	.19	**.32**	.35	.46
EVALPROF	.39	.45	**.90**	.45	.71
EVALMKSH	.30	.51	**.90**	.56	.71

possible explanation is that the items with low reliabilities were worded in such a way that the respondents did not understand the questions.

TABLE 5.4 continued
Initial Loadings and Cross-Loadings of Measures

	Initiating Actions	Maintenance Actions	Operational Performance	Building Actions	Strategic Performance
DEVTRUST	.46	.51	.71	**.75**	.65
RESOLVE	.43	.51	.56	**.72**	.63
CONTINUE	.34	.45	.38	**.48**	.36
DEVGOALS	.40	.18	.23	**.64**	.29
EXCHANGE	.36	.31	.28	**.43**	.26
CONTACTS	.10	.05	.12	**.06**	.09
VISITS	.26	.16	-.07	**.28**	.11
ANNOUNCE	-.10	.13	.35	**.30**	.28
INDINFO	.29	.19	.14	**.37**	.24
STRATINF	.54	.30	-.03	**.50**	.36
INVSTMNT	.12	.21	.06	**.45**	.29
ADAPT	.20	.31	.17	**.44**	.32
FINRISK	.46	.54	.55	**.71**	.71
DEVRISK	.56	.66	.39	**.78**	.63
JTDEVEL	.42	.46	.00	**.45**	.22
EVALPROC	.44	.31	.00	.36	**.19**
EVALPROD	.30	.23	.30	.43	**.43**
EVALDEVR	.46	.65	.44	.64	**.78**
EVALFINR	.48	.66	.50	.63	**.58**
EVALTECH	.25	.15	.17	.28	**.41**
EVALSPCL	.31	.40	.68	.46	**.70**
EVALFOCU	.37	.33	.48	.63	**.71**
EVALSTRE	.37	.25	.21	.42	**.44**
EVALOPPS	.39	.37	.52	.47	**.63**
EVALMKT	.37	.54	.85	.61	**.82**
EVALINTR	.50	.48	.72	.39	**.57**

Initiating Actions. Several of the eight measures of the initiating actions construct had low initial item reliability. The final measures for the construct, initiating actions, were: 'setting common project goals' (COMMGOAL),

'discussing product expectations' (PRODEXPS), and 'discussing role expectations' (ROLEEXPS). The measures dropped due to low item reliability were: 'providing supplier with specific plans' (SETPLANS), 'letting supplier lead development effort' (SUPPLEAD), 'establishing common measure' (SAMEMEAS), 'establishing material specifications' (MATLSPEC), and 'past experience with supplier' (PASTEXP).

Maintenance Actions. For maintenance actions, many measures had low loadings. The same iterative and exploratory approach, as noted above, was taken with this construct. In the final model, two measures, 'meeting production schedules' (MEETPROD) and 'meeting delivery schedules' (MEETDEL) remained as adequate. The measure MEETQUAL loaded higher on the operational performance construct and was moved accordingly. The measures dropped due to low item reliability were: 'exchanging information on operations' (OPERINFO), 'exchanging information on costs' (COSTINFO), 'exchanging information on delivery' (DELVINFO), 'sharing work process information' (PROCINFO), 'having well-trained people for activities that the other firm relies on' (TRAINED), 'having our people understand the importance of the alliance' (UNDRSTND), 'adjusting our systems and procedures to accommodate the other firm' (ADJUST), and 'establishing a measurement and control system' (CTRLSYS).

Building Actions. The loadings of the measures for the building actions construct had a wide range. Using the same approach as described above, 12 items were selectively dropped. The final measures included: 'developing trust in each other' (DEVTRUST), 'resolving conflicts between the firms' (RESOLVE), and 'sharing development risk' (DEVRISK). The measures dropped due to low item reliability were: 'expecting the relationship to continue' (CONTINUE), 'developing mutual long-term goals' (DEVGOALS), 'exchanging personnel to work on projects' (EXCHANGE), 'developing personal relationships in the other firm' (CONTACTS), 'management visits to each other's facilities' (VISITS), 'public announcements about performance' (ANNOUNCE), 'sharing information about the industry' (INDINFO), 'sharing information about strategies' (STRATINFO), 'making investments specific to the other firm' (INVSTMNT), 'adapting our systems and processes to fit the other firm' (ADAPT), 'sharing financial risk' (FINRISK), and 'engaging in joint development activities' (JTDEVEL).

Operational Performance. Half the measures for the operational performance construct had high initial loadings. Four had very low loadings and were eventually dropped from the model. The final measures were: 'increases product scope' (EVALSCOP), 'increases revenues' (EVALREVS), 'the relationship is profitable' (EVALPROF), 'increases market share' (EVALMKSH), and 'meeting quality standards' (MEETQUAL). The measures dropped due to

low item reliability were: 'develops the product on time' (EVALTIME), 'develops the product at cost' (EVALCOST), 'develops the product to specification' (EVALSPEC), and 'decreases costs' (EVALDECR).

Strategic Performance. Several measures for the strategic performance construct had strong initial loadings. Selectively eight items were dropped. The final measures were: 'allows us to specialize in certain operations or activities' (EVALSPCL), 'provides for opportunities with partner' (EVALOPPS), and 'improves our market position' (EVALMKT). The measures dropped due to low item reliability were: 'enables process innovation' (EVALPROC), 'enables product innovation' (EVALPROD), 'allows us to share development risk' (EVALDEVR), 'allows us to share financial risk' (EVALFINR), 'provides access to technology we did not have' (EVALTECH), 'allows us to focus on some aspects of the project' (EVALFOCU), 'strengthens the alliance' (EVALSTRE), and 'product introduction is successful' (EVALINTR).

The research model was then rerun with the changes indicated and the measurement model was reevaluated. Table 5.5 shows the revised measurement model's factor structure. The subsequent measurement was greatly improved and considered adequate for further analysis. Figure 5.1 illustrates the measurement loadings for the model.

Reliability and Convergent Validity. Reliability was evaluated using the internal consistency measure developed by Fornell and Larcker (1981). Convergent validity was assessed by high item loadings, as discussed above, and by assessing the average variance extracted for each construct. Table 5.6 shows the measures for internal consistency and the average variance extracted.

All of the constructs were reliable. All of the items had internal consistency measures over .8, with two over .9. Nunnally (1978) suggests .8 as the minimum for basic research. Convergent validity also was acceptable. In all cases, the average variance extracted was greater than .5, indicating that at least 50 percent of the average variance in the manifest variables was shared in the construct. These values ranged from .58 to .89.

Discriminant Validity. Discriminant validity in causal modelling measures the extent to which any particular construct differs from other constructs in the model. Fornell, Tellis and Zinkhan (1982) suggest two measures of discriminant validity that can be applied in a PLS framework: (1) construct loadings, and (2) shared variance.

Construct Loadings. The first criterion is that any indicator should load higher on its associated construct than on any other construct in the model.

TABLE 5.5
Revised Loadings and Cross-Loadings of Measures

	Initiating Actions	Maintenance Actions	Operational Performance	Building Actions	Strategic Performance
COMMGOAL	**.78**	.01	.24	.38	.28
PRODEXPS	**.81**	.35	.47	.58	.41
ROLEEXPS	**.70**	.24	.19	.45	.32
MEETPROD	.24	**.93**	.43	.54	.27
MEETDEL	.33	**.96**	.62	.62	.42
MEETQUAL	.38	.57	**.78**	.49	.59
EVALSCOP	.26	.31	**.73**	.37	.50
EVALREVS	.32	.45	**.92**	.59	.71
EVALPROF	.47	.45	**.90**	.57	.78
EVALMKSH	.34	.59	**.90**	.61	.63
DEVTRUST	.56	.61	.66	**.90**	.59
RESOLVE	.50	.48	.48	**.87**	.50
DEVRISK	.55	.45	.39	**.71**	.40
EVALSPCL	.35	.33	.56	.46	**.79**
EVALOPPS	.42	.19	.54	.45	**.75**
EVALMKT	.32	.35	.69	.51	**.82**

This criterion was tested within PLS by examining the latent variable loading structure matrix. This is a matrix of the loadings of all indicators on all constructs. This matrix is shown in Table 5.5. All measures satisfied this criterion.

FIGURE 5.1
Measurement Loadings

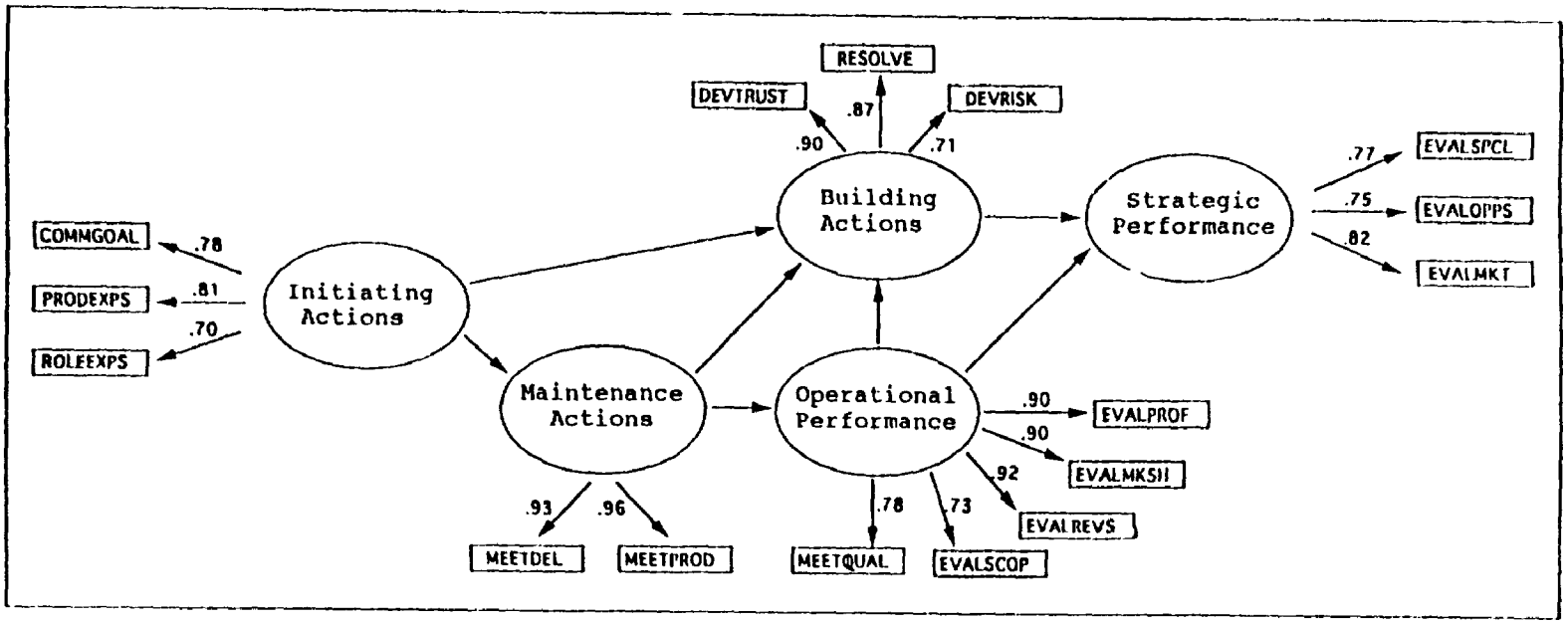


TABLE 5.6
Internal Consistencies and Average Variance Extracted for the Constructs

	Number of Items	Internal Consistency	Average Variance Extracted
Initiating Actions	3	.81	.58
Maintenance Actions	2	.94	.89
Operational Performance	5	.93	.72
Building Actions	3	.87	.80
Strategic Performance	3	.83	.62

Shared Variance. The second criterion for discriminant validity is that the variance shared between two constructs (the squared correlation) should be less than the variance shared between either construct and its respective measures (the average variance extracted). If poor discriminant validity is found, it would reduce the confidence in causal interpretation. In other words, it would be difficult to say that there was a cause and effect relationship between the two constructs or whether the indicators actually measured a single construct. Table 5.7 shows the correlations among constructs that correspond to the hypotheses, with the average variance extracted for each latent constructs. In all cases, the square root of the average variance extracted was greater than the correlations between constructs. This indicated that all the constructs in the model exhibited discriminant validity.

In summary, the tests of reliability, convergent validity and discriminant validity showed that the measurement model was sound. Moreover, all of the constructs were identifiable as distinct constructs. It was concluded that there was sufficient convergent and discriminant validity so that an assessment of the structural model could be made.

TABLE 5.7
Construct Correlations*

	IA	MA	OP	BA	SP
Initiating Actions (IA)	.76				
Maintenance Actions (MA)	.30	.94			
Operational Performance (OP)	.42	.56	.85		
Building Actions (BA)	.64	.62	.62	.89	
Strategic Performance (SP)	.46	.37	.76	.60	.79

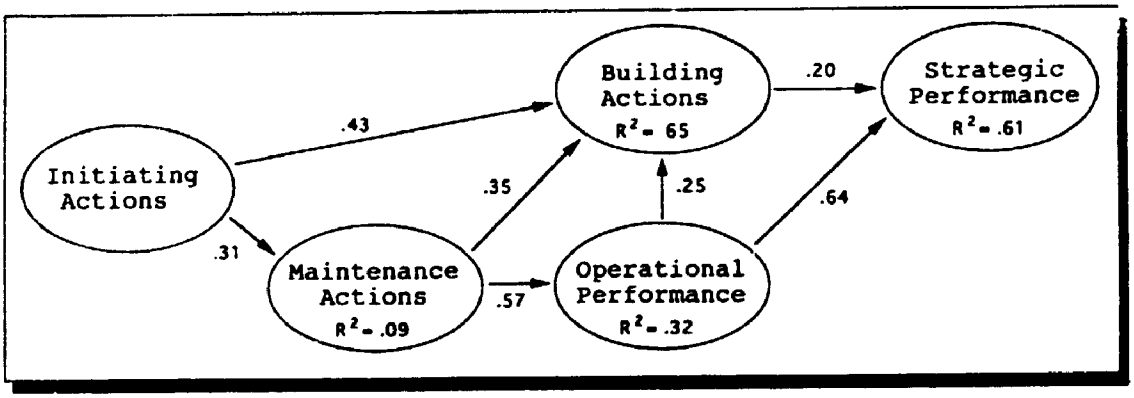
* Diagonal elements in the Construct Correlation matrix are the square roots of average variance extracted. For adequate discriminant validity, diagonal elements should be greater than corresponding off-diagonal elements.

The Structural Model

Once the measurement model has been evaluated as adequate, the next step is to assess the structural model. This is a determination of whether the model supports the hypotheses. This is done by examining two factors: the path coefficients and the variance explained. Figure 5.2 shows the variance explained in the dependent constructs (R^2) and the path coefficients for the

model. Figure 5.3 shows the values for the measurement model and the structural model in a combined format.

FIGURE 5.2
Variance Explained and Path Coefficients

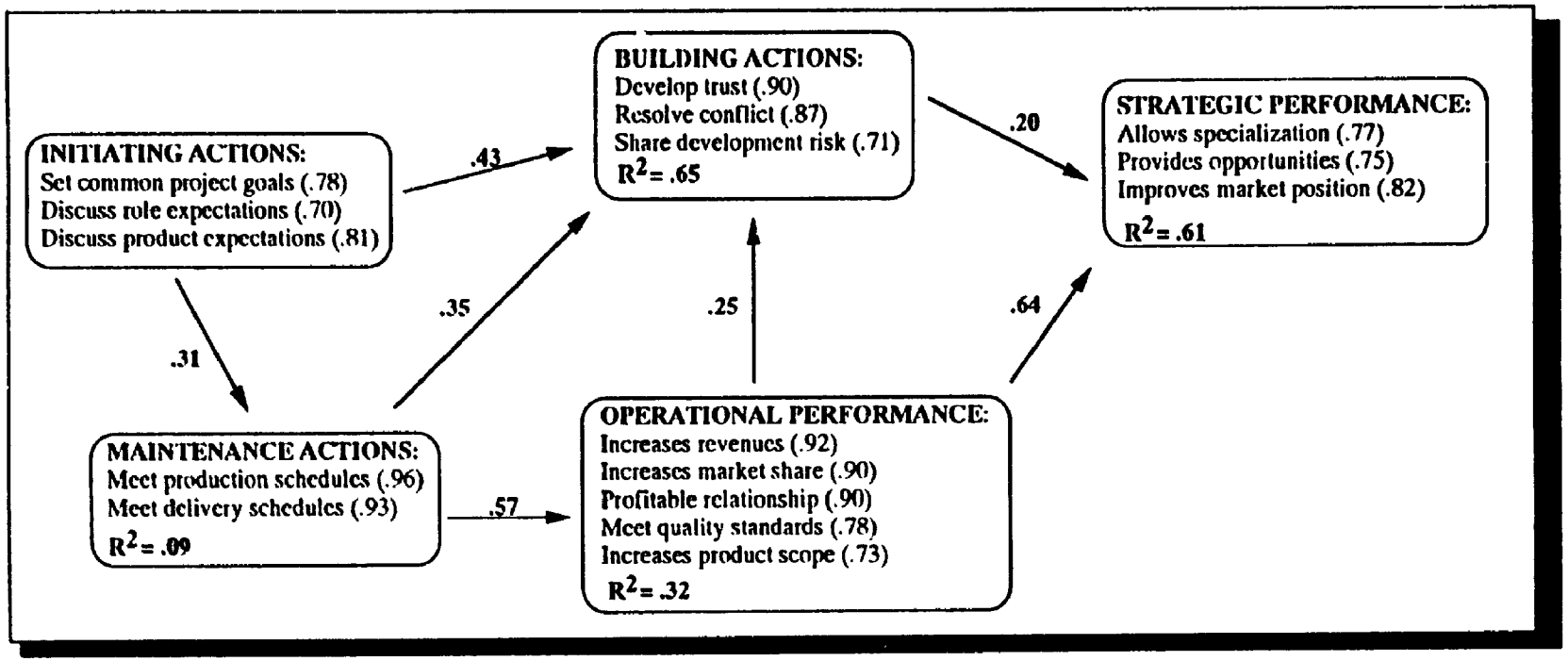


Path coefficients significant at $p \leq .001$.

Path Coefficients. The path coefficients (and their signs) and the significance of the paths are often reported together. Path coefficients are defined as:

> the fraction of the standard deviation of the dependent variable (with the appropriate sign) for which the designated factor is directly responsible, in the sense of the fraction which would be found if this factor varies to the same extent as in the observed data while all other (including the residual factors . . .) are constant (Wright 1934, p. 162).

FIGURE 5.3
Measurement Model and Structural Model Combined



In other words, a path coefficient shows the change in a dependent construct, expressed in standard deviations, that results from a one-standard-deviation change in an independent construct, when all other independent constructs in the model are held constant.

Path coefficients were tested using the non-parametric technique jackknifing. This technique, originally developed by Tukey (1958), provides the opportunity to test statistical significance and assess the stability and validity of analyses without the necessity of large sample sizes.

The jackknifing procedure used for these structural equation model analyses was developed by Fornell and Barclay (1983). The procedure involves removing a subsample from the data and calculating sample statistics (path coefficients) from the remaining data. The subsample is then replaced and another subsample of equal size is removed, and another set of sample statistics is calculated. This continues until all cases have been removed from the data set, and a sample of sample statistics is computed. These sample statistics are therefore calculated from several subsamples that overlap in the observations they contain. These sample values have been shown to have a distribution approaching normality (Gray and Schucany 1972) and are used in the calculation of the jackknifed path coefficients. The jackknifed path coefficients are then divided by the standard error of the samples of path

coefficients calculated from the various subsamples, which result in a t-statistic that can be interpreted for significance.

Table 5.8 shows the results of the hypothesis tests for all path coefficients. All the paths were statistically significant at p. $\leq$ .001, positive, and in the hypothesized direction. The path coefficients ranged from .20 to .63. Pedhazur (1982) suggests .05 as the lower limit of substantive significance for path coefficients. As a more conservative position, path coefficients of .10 and above are preferable. All the path coefficients easily surpassed this minimum hurdle. The hypotheses were tested on the basis of the path strengths of the structural model. The hypotheses are discussed below.

Paths leading from initiating actions. Hypothesis 1a predicted that initiating actions would be positively related to maintenance actions. The path coefficient of .31 supported this hypothesis. Hypothesis 1b, which predicted that initiating actions would be positively related to building actions, was supported (path = .43).

Paths leading from maintenance actions. Hypothesis 2a predicted that maintenance actions would lead to operating performance. The strong path coefficient (path = .57) supported this relationship. Maintenance actions, as

predicted in hypothesis 2b, lead to building actions (path = .35).

Paths leading from operating performance. In hypothesis 3a, operating performance was expected to be positively related to building actions. This was supported (path = .25). Hypothesis 3b predicted that operating performance would lead to strategic performance. The path coefficient of .64 strongly supported this relationship.

Path leading from building actions. Building actions were expected to be positively related to strategic performance. This relationship was supported (path = .20).

In summary, the hypotheses tested in the structural model were supported. The results are statistically significant, and provide generally strong evidence of relationships, as hypothesized, between initiating actions, maintenance actions, building actions, operating performance, and strategic performance. Initiating actions are related to maintenance and building actions. Maintenance actions are related to building actions and operating performance. Operating performance leads to building actions and strategic performance. Building actions are related to strategic performance.

Variance Explained. Overall, the model had strong predictive power. All paths were significant at $p < .001$. The model accounted for 61 percent of the variance in strategic performance, 65 percent of the variance in building actions, and 32 percent of the variance in operating performance. However, only 9 percent of the variance in maintenance actions was explained. This may be due to two factors. First, there is only one path leading to maintenance actions and second, there are only two measures for the construct.

The path coefficients represent the direct effects of each antecedent construct. The sign, size, and significance of path coefficients can be used as evidence to support or reject hypotheses. Total effects, the sum of direct and indirect effects, show how important a predictor is within the causal model. A construct could have a low or non-significant direct effect on another construct but still be an important determinant by its effect through antecedent constructs on the endogenous constructs in the model. The direct, indirect and total effects are shown in Table 5.9. All the direct effects on the constructs were substantial. Only building actions and strategic performance were affected indirectly.

Restatement of the Model

Although the original model fared well in terms of measurement, structural, and hypotheses assessment, a restated model was developed that

TABLE 5.8
Tests of Hypotheses

Hypotheses	t-value for path
H1a: Initiating Actions ☛ Maintenance Actions	6.75*
H1b: Initiating Actions ☛ Building Actions	19.47*
H2a: Maintenance Actions ☛ Operational Performance	22.53*
H2b: Maintenance Actions ☛ Building Actions	10.74*
H3a: Operational Performance ☛ Building Actions	5.65*
H3b: Operational Performance ☛ Strategic Performance	18.22*
H4: Building Actions ☛ Strategic Performance	7.39*

* $p < .001$ $n = 38$ $t = 3.55$; with $n = 40$

Total Effect = Direct Effect + Indirect Effect

TABLE 5.9
Direct, Indirect, and Total Effects

Hypotheses	Standardized path coefficient (Direct Effect)	Indirect Effect	Total Effect
H1a: Initiating Actions ☛ Maintenance Actions	.31	.00	.30
H1b: Initiating Actions ☛ Building Actions	.43	.15	.58
H2a: Maintenance Actions ☛ Operational Performance	.56	.00	.56
H2b: Maintenance Actions ☛ Building Actions	.35	.14	.49
H3a: Operational Performance ☛ Building Actions	.25	.00	.25
H3b: Operational Performance ☛ Strategic Performance	.64	.05	.69
H4: Building Actions ☛ Strategic Performance	.20	.00	.20

* $p < .001$

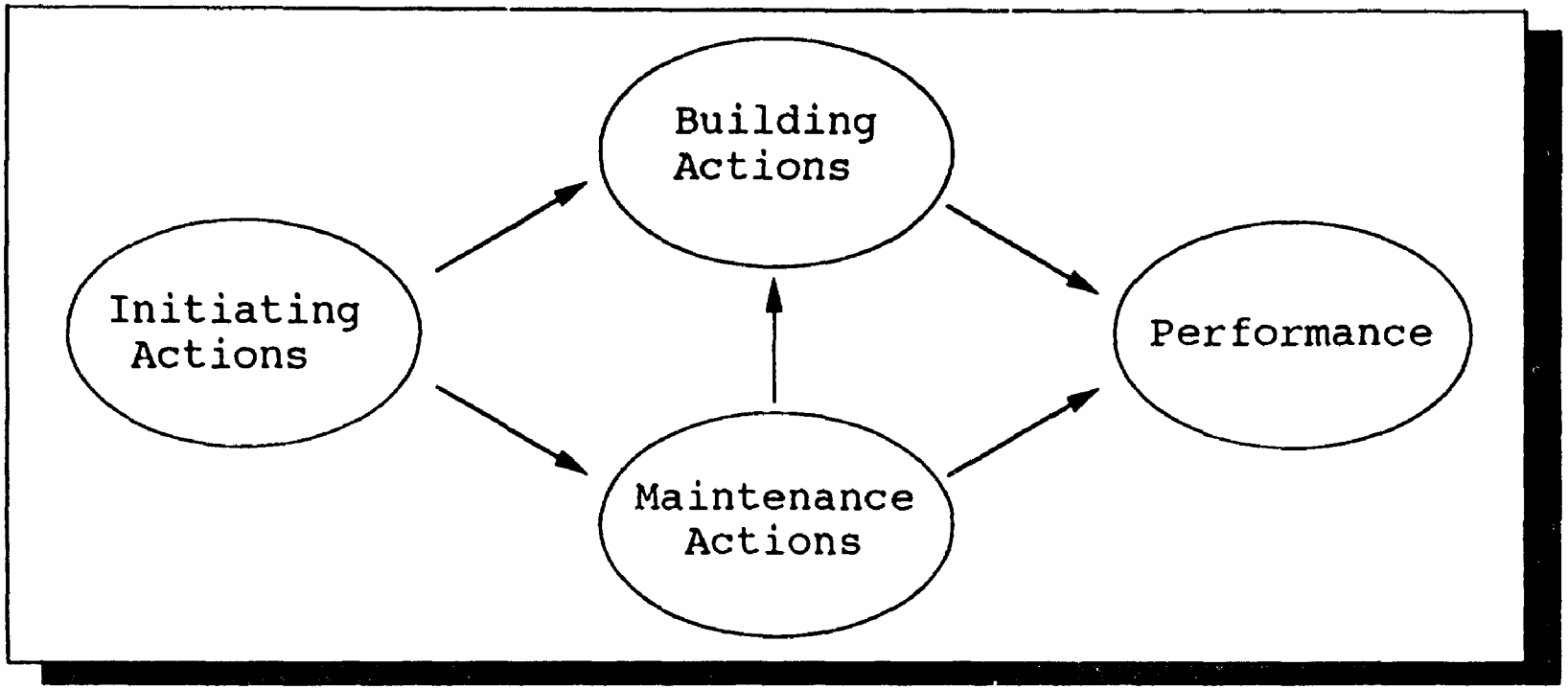
Total Effect = Direct Effect + Indirect Effect

tried to capture the performance dimension on a more general level. This restated model was practically identical to the original except that it had only one performance construct. This model is shown in Figure 5.4. The restatement can be explained with two considerations. First, from a managerial viewpoint, performance can be understood as one general measure, instead of as two related measures. That is, a distinction between operational performance and strategic performance may be too fine a distinction. Second, prior literature (Geringer and Hebert 1991) has suggested that performance is just as effectively measured as one construct, instead of as several.

The restated model was made up of four constructs. These were initiating actions, maintenance actions, building actions, and performance. The hypothesized relationships between the constructs are similar to the original model. Initiating actions lead positively to maintenance and building actions. Maintenance actions lead positively to building actions and performance. Building actions lead positively to performance. The relationships can be seen to follow from the original model.

The restated performance construct was developed by combining the operational and strategic performance measures. These items were then edited using the same procedure as with the original model. The performance measures in the restated model were 'increases revenues' (EVALREVS),

FIGURE 5.4
The Restated Strategic Alliance Management Model



'increases market share' (EVALMKSH), 'improves market position' (EVALMKT), and 'the relationship is profitable' (EVALPROF). The measures 'increases product scope' (EVALSCOP), 'allows specialization' (EVALSPCL), 'provides future opportunities' (EVALOPPS), and 'meet quality standards' (MEETQUAL) were dropped due to insufficient item loadings. The measurement loadings are shown in Table 5.10 and Figure 5.5.

Reliability and Convergent Validity. Reliability was again evaluated using the internal consistency measure developed by Fornell and Larcker (1981). Convergent validity was evaluated by high item loadings and average variance extracted for the constructs. Table 5.11 shows the measures for internal consistency and the average variance extracted.

The Measurement Model

All of the items were reliable. All of the items had internal consistency measures between .82 and .94, surpassing Nunnally's suggested minimum of .80. Convergent validity was also acceptable. In all cases, the average variance extracted was greater than .5, indicating that at least 50 percent of the average variance in the manifest variables was shared in the construct. These values ranged from .58 to.89.

TABLE 5.10
Revised Loadings and Cross-Loadings of Measures in Restated Model

	Initiating Actions	Maintenance Actions	Building Actions	Performance
COMMGOAL	**.78**	.01	.38	.22
PRODEXPS	**.81**	.35	.58	.46
ROLEEXPS	**.70**	.24	.45	.19
MEETPROD	.24	**.93**	.55	.40
MEETDEL	.33	**.96**	.62	.58
DEVTRUST	.56	.61	**.90**	.67
RESOLVE	.50	.48	**.87**	.50
DEVRISK	.55	.45	**.72**	.42
EVALREVS	.33	.45	.59	**.93**
EVALPROF	.47	.45	.57	**.91**
EVALMKSH	.34	.59	.61	**.88**
EVALMKT	.32	.35	.52	**.81**

Discriminant Validity. Two measures of discriminant validity, as suggested by Fornell, et. al. (1982), were assessed to determine the extent to which the constructs differed from each other in the model. The measures were construct loadings and shared variance.

Construct Loadings. The guideline that any indicator should load higher on its associated construct than on any other construct was tested by examining the latent variable loading structure matrix, shown in Table 5.11. All measures satisfied this guideline.

FIGURE 5.5
The Restated Strategic Alliance Management Model
Combined Measurement and Structural Model

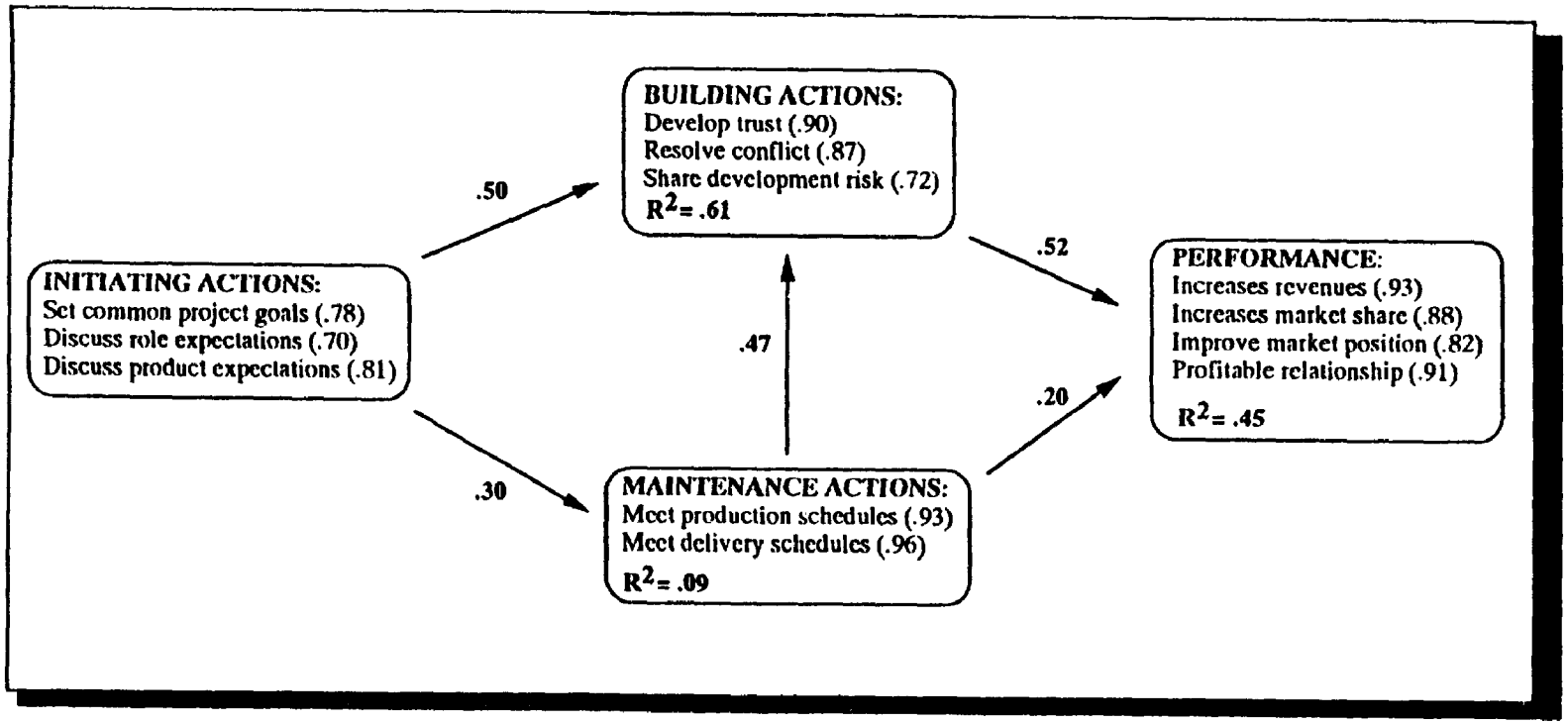


TABLE 5.11
Internal Consistencies and Average Variance Extracted for the Constructs in the Restated Model

	Number of Items	Internal Consistency	Average Variance Extracted
Initiating Actions	3	.82	.58
Maintenance Actions	2	.94	.89
Building Actions	3	.87	.69
Performance	4	.93	.78

Shared Variance. For discriminant validity, the variance shared between two constructs (the squared correlation) should be less than the variance shared between either construct and its respective measures (the average variance extracted). Table 5.12 shows the correlations among constructs, with the average variance extracted for each latent constructs. In all cases, the square root of the average variance extracted was greater than the correlations between constructs. This indicated that all the constructs in the model exhibited discriminant validity.

In summary, the tests of reliability, convergent validity and discriminant validity showed that the measurement model was sound. Moreover, all of the constructs were identifiable as distinct constructs. It was concluded that there was sufficient convergent and discriminant validity so that an assessment of

the structural model could be made.

The Structural Model

The structural model assessed by examining the path coefficients and the variance explained. Figure 5.4 shows the variance explained in the dependent constructs (R^2) and the path coefficients for the model. The path coefficients ranged from .20 to .52.

TABLE 5.12
Construct Correlations* for the Restated Model

	IA	MA	BA	P
Initiating Actions (IA)	.76			
Maintenance Actions (MA)	.31	.94		
Building Actions (BA)	.64	.62	.83	
Performance (P)	.41	.53	.65	.88

* Diagonal elements in the Construct Correlation matrix are the square roots of average variance extracted. For adequate discriminant validity, diagonal elements should be greater than corresponding off-diagonal elements.

Paths leading from initiating actions. The restated model predicted that initiating actions would be positively related to maintenance actions. The path coefficient of .30 supported this hypothesis. Hypothesis 1b of the restated model, predicted that initiating actions would be positively related to building actions. This was supported (path = .50).

Paths leading from maintenance actions. The restated model predicted that maintenance actions would lead to performance. The path coefficient (path = .20) supported this relationship. Maintenance actions also lead to building actions (path = .47).

Path leading from building actions. Building actions were expected to be positively related to strategic performance. This relationship was supported (path = .52).

Variance Explained. Overall, the model had good predictive power. All paths were significant at $p < .001$. It accounted for 45 percent of the variance in performance, 61 percent of the variance in building actions, and 9 percent of the variance in maintenance actions was explained.

The restated model exhibited good measurement and structural assessment. Subsequently, the restated model was tested with actual performance data for the alliances in the study. This data were perceptual evaluations of how well the alliance had performed. The performance had been evaluated on a five point Likert scale with anchors of "above average," "average" and "below average." These results are reported below using the same format.

The Restated Model using Performance Data

The Measurement Model

Reliability and Convergent Validity. Reliability was again evaluated using the internal consistency measure developed by Fornell and Larcker (1981). Convergent validity was evaluated by high item loadings and average variance extracted for the constructs. Table 5.13 shows the measures for internal consistency and the average variance extracted.

All of the items were reliable. All of the items had internal consistency measures over .80, with two over .90. Convergent validity was also acceptable. In all cases, the average variance extracted was greater than .5, ranging from .58 to.89.

TABLE 5.13
Internal Consistencies and Average Variance Extracted for the Constructs in the Restated Model using Performance Data

	Number of Items	Internal Consistency	Average Variance Extracted
Initiating Actions	3	.81	.58
Maintenance Actions	2	.94	.89
Building Actions	3	.87	.69
Performance	4	.95	.84

Discriminant Validity. Two measures of discriminant validity, construct loadings and shared variance, were assessed to determine the extent to which the constructs differed from each other in the model.

Construct Loadings. The guideline that any indicator should load higher on its associated construct than on any other construct was tested by examining the latent variable loading structure matrix, shown in Table 5.14. All measures satisfied this guideline.

TABLE 5.14
Revised Loadings and Cross-Loadings of Measures in Restated Model using Performance Data

	Initiating Actions	Maintenance Actions	Building Actions	Performance
COMMGOAL	**.78**	.01	.39	-.11
PRODEXPS	**.81**	.35	.58	.13
ROLEEXPS	**.70**	.24	.45	-.02
MEETPROD	.24	**.93**	.54	.13
MEETDEL	.33	**.96**	.62	.21
DEVTRUST	.56	.61	**.89**	.22
RESOLVE	.50	.48	**.87**	.20
DEVRISK	.55	.45	**.73**	.16
PERFREVS	.06	.21	.24	**.94**
PERFPROF	-.08	.09	.07	**.88**
PERFMKSH	.03	.16	.21	**.88**
PERFMKT	.04	.17	.24	**.96**

Shared Variance. For discriminant validity, the variance shared between two constructs (the squared correlation) should be less than the variance shared between either construct and its respective measures (the average variance extracted). Table 5.15 shows the correlations among constructs that correspond to the hypotheses, with the average variance extracted for each latent constructs. In all cases, the square root of the average variance extracted was greater than the correlations between constructs. This indicated that all the constructs in the model exhibited discriminant validity.

TABLE 5.15
Construct Correlations* for the Restated Model using Performance Data

	IA	MA	BA	P
Initiating Actions (IA)	.76			
Maintenance Actions (MA)	.31	.94		
Building Actions (BA)	.64	.62	.83	
Performance (P)	.04	.18	.23	.92

* Diagonal elements in the Construct Correlation matrix are the square roots of average variance extracted. For adequate discriminant validity, diagonal elements should be greater than corresponding off-diagonal elements.

In summary, the tests of reliability, convergent validity and discriminant validity showed that the measurement model was sound. Moreover, all of the constructs were identifiable as distinct constructs

The Structural Model

The structural model was assessed by examining the path coefficients

and the variance explained. Figure 5.6 shows the variance explained in the dependent constructs (R^2) and the path coefficients for the model.

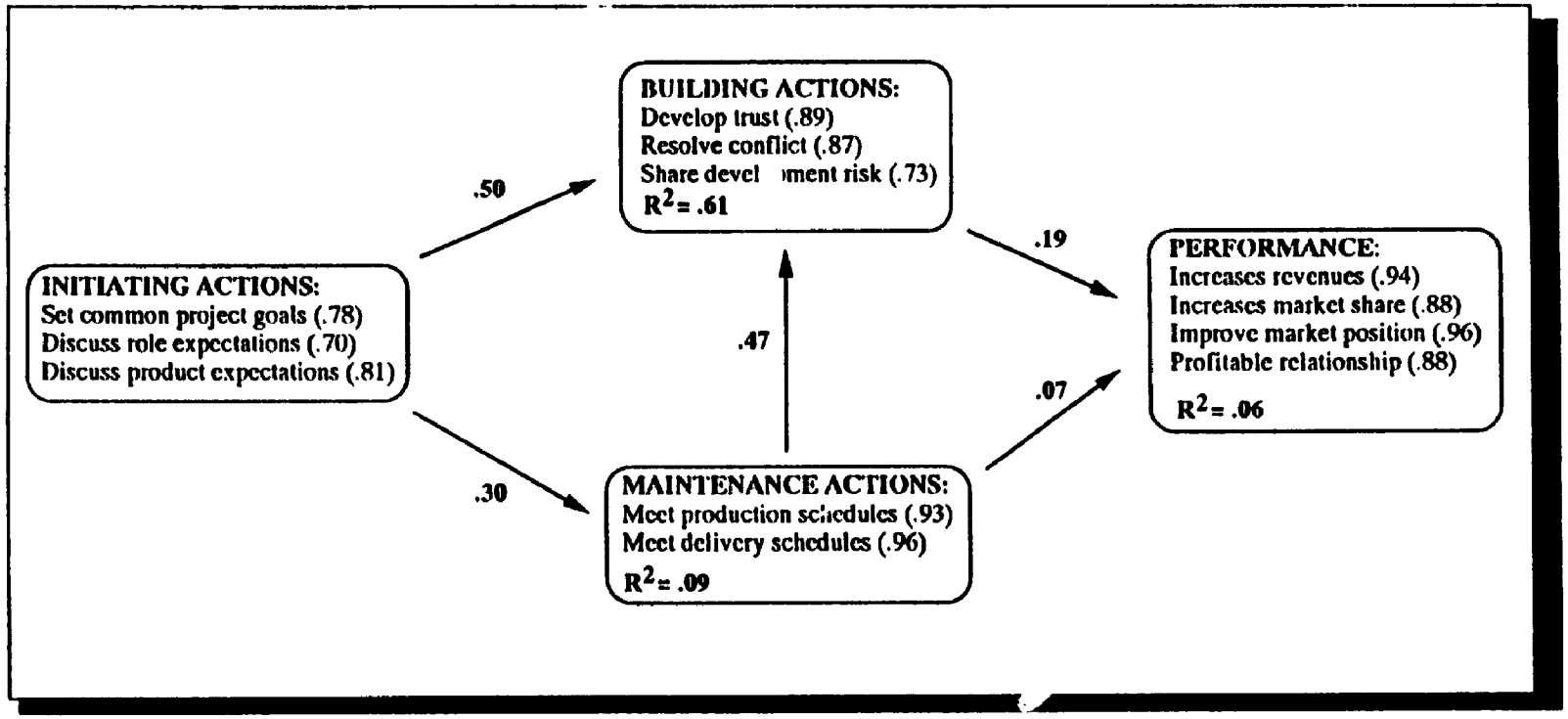
Path Coefficients. Again, all paths were statistically significant at p. < .001, positive, and in the hypothesized direction. The path coefficients ranged from .07 to .50. The only differences resulting from the use of the performance data were in the paths leading to performance. These paths are discussed below.

Paths leading to performance. The restated model predicted that maintenance actions would lead to performance. The path coefficient (path = .07) supported this relationship. Building actions were expected to be positively related to performance. This relationship was supported (path = .19).

Variance Explained. Overall, the model had adequate predictive power. It accounted for 6 percent of the variance in performance, 61 percent of the variance in building actions, and 9 percent of the variance in maintenance actions.

The restated model tested with performance data showed good measurement and structural assessment. The biggest disappointment was that

FIGURE 5.6
The Restated Strategic Alliance Management Model
Combined Measurement and Structural Model Using Performance Data



the lowered amount of variance explained in the performance construct. Using performance evaluation criteria in the restated model yielded 45 percent of variance explained. However, when the data reflected the managers' perception of how well the alliances had performed was used, the explanatory power of the performance construct dropped to .06. However, this implies several things. First, the criteria that managers say is important to assessing performance is actually important. The relationships between maintenance actions and building actions remained significant. Second, the lowered R-squared suggests that, in practice, factors other than those used in the model may effect the performance of the alliance. This is reasonable. Regardless of the respondents' best intentions, the ultimate performance of the alliance may be due to things outside their control, such as economic cycles, raw material availability, and actions by competitors.

A closer look at the characteristics of the alliances in the study adds further credibility to the model. According to the managers involved, the alliances in the study enjoyed average general performance relative to other business relationships. Moreover, the alliances had above average performance in terms of some measures such as profitability and market position. In the subsequent testing of the model with actual performance data, the relationships between the constructs held. This confirms that what the managers said was important to managing the alliances and evaluating the resultant performance.

The model's constructs were shown to be relevant in practice.

Discussion of Results

This study sought to develop a model based on a synthesis and extension of the relationships suggested by earlier strategic alliance research (e.g. Wilson 1989, Henderson 1990), and then to test this model. In doing so, it integrated several related aspects into a cohesive model which could be tested statistically. The findings reported here represent an initial attempt at explaining these relationships by identifying determinants of effective strategic alliance management and related performance.

Wilson (1989) was concerned with the *formation of* product development alliances. She proposed that alliances develop through three stages: (1) proposing formal terms of the relationship, (2) building a social system to sustain the relationship, and (3) maintaining the social system after the initial benefits have been realized. This process model of alliance formation was developed from two case studies with companies involved in alliances.

In explaining the relationships, Wilson noted several attributes of each stage. Her general stages, relationships, and attributes were incorporated into the synthesized model developed in this research study. Many of these were supported through the research findings. The idea that implementing an

alliance requires distinct sets of management actions was generally confirmed with the model. The relationships between the action sets and the performance outcomes were substantive and statistically significant. However, many of the attributes suggested by Wilson were not supported by the items used to measure the constructs in the model. Aspects such as personal inter-organization relationships, adaptiveness and public announcements were not supported by the study. Neither were the performance indicators supported. Only trust was found to be a strong indicator of building actions. Overall, the general relationships and constructs suggested by Wilson's work were supported, but the particular measures of these constructs were not.

Similarly, Henderson's (1990) descriptive model of strategic partnerships was not directly supported, although many aspects of it were integrated into this study's research model. Henderson had proposed that benefits, or performance outcomes, from alliances would include financial returns, process or product innovations, and risk sharing. Measures of financial returns (i.e., whether the alliance was profitable or increased revenues) were supported as performance attributes, but process and product innovations were not. Henderson's proposal of risk sharing as a beneficial outcome was somewhat supported by the model. However, in the study it was portrayed as a building action (i.e., sharing development risk), not as a performance measure (i.e., allows us to share development and financial risk). Henderson also proposed

knowledge sharing and shared goals as important management actions in managing alliances. This was not supported in this research study.

This is not to dispute the appropriateness of Henderson's or Wilson's findings regarding measures and attributes. They are, no doubt, appropriate for their studies. However, they were not all supported in this study. This may be due to two differences between the studies: the products involved and the age of the relationships involved. First, although product development was the focus in each of the studies, the products being developed differed. Henderson's (1990) study and Wilson's (1389) study involved the development of information systems technology. This study focused on the development of various individual products as well as systems products. It may be that the different nature of the products affected the suitability of particular measures.

Duration may also be a factor affecting measure appropriateness. The length of the relationships in Henderson's (1990) study were not disclosed. The alliances in Wilson's (1989) study were three and five years old. The alliances in this study had been in existence, on average, for five years. It is highly likely that measures and attributes shift in importance over the life of the alliance.

In spite or the limited support found for alliance attributes, or indicators

that can be used as measures, proposed by prior literature, it is important to keep in mind that the overall model and the hypothesized relationships were strongly supported. Given the nature of this study, this should be seen as a positive outcome. From a measurement perspective, many of the measures were adequate and several were very substantive and significant. These provide an attempt at developing empirically tested scales that may be used in subsequent research.

The resulting model has strong intuitive appeal. It proposes that there are three sets of management activities that address distinct aspect of effectively implementing strategic alliances. Initiating actions set out the common goals for the project and establish expectations for the product and the partners. Maintenance actions address the day-to-day aspects of keeping the alliance running by focusing on meeting production and delivery schedules. In fact, these are critical to creating value in the companies involved. Successful production and delivery can lead to increased revenues, profits, and increased market share. As the firms carry out the maintenance actions and experience successful operating performance, they build the alliance for the long term by resolving sources of conflict and sharing development risk. This also leads to the development of trust between the firms. As the alliance develops, it can be leveraged into future opportunities which draw on each firm's unique capabilities and strengthen their respective competitive positions

in the marketplace.

While the model does not contain an explicit feedback loop, feedback is implicit in the process. Managers evaluate the performance of (1) the development/manufacturing process and (2) the alliance. This evaluation acts as feedback in the sense that it allows managers an opportunity to assess the results of their pervious actions and adjust their future actions accordingly. There also seems to be a feedback stage after the project is completed, in deciding whether to do business with the other firm again.

As the model is constructed, the performance measures act as feedback on the operations of the alliance. Managers saw successful performance of alliance on operational measures as a prerequisite for building actions. In this sense, the managers used the operational performance as an assessment of the effectiveness of the initiating and maintenance actions. Likewise, the strategic performance allowed an assessment of the project and the alliance. Dotted lines could have been added to the model to indicate feedback, but were omitted with the desire to maintain parsimony in the model.

Summary

Two aspects of the model have been assessed using PLS analysis. First, the measurement model was discussed in terms of convergent validity and

discriminant validity. The model was satisfactory for the three measures of convergent validity (reliability, consistency and average variance extracted) and the three measures of discriminant validity (construct correlation, construct loadings, and shared variance).

Second, the structural model, that is, the direct relationships, or paths, between unobserved constructs, was discussed in terms of the path coefficients, the significance of the path coefficients, and the variance explained. All the paths were positive, substantial, in the hypothesized direction, and statistically significant. Overall, the model explained 61 percent of the variance in strategic performance. The next chapter discuses the conclusions resulting from the research.

CHAPTER 6

CONCLUSIONS

The previous chapters have discussed the research program. Chapter One described the challenges facing today's managers and outlined the topics in this report. Chapter Two summarized the relevant literature regarding the *what*, *why*, *with whom*, and *how* of strategic alliance management. Chapter Three described the development of the research model. Chapter Four outlined the methodological issues in research program. Chapter Five discussed the results of the analysis. This final chapter discusses contributions to research, implications for practitioners, strengths and limitations of the study and future research directions.

Contributions To Research

An objective of this research was to gain insights about the *how* of managing strategic alliances. The results of this research identify some of the determinants of effective alliance management and performance. These results and implications are now considered within the context of the strategic alliance management theory (network and resource based views) and methodology.

Alliances as Networks

The network approach to alliances was described as viewing alliances in four perspectives: as structures, as positions, as process, and as relationships.

The basis of the 'structures' approach is that, because of their heterogeneity, firms are interdependent, not independent. This interdependence leads to a formation of structure between organizations. A premise of this approach is that any number of structures can carry out the resource transformation process. This seems to be the case, especially for the product development alliances addressed in this study. While one approach to structuring value chain transformation processes would be full integration of operations, the alliances in this study have adopted an alternate approach. They have split up the value chain functions among themselves. While the goal of product development and manufacture is still accomplished, it is done by way of an alliance instead of internalization.

The basis of the 'positions' approach is that networks can be seen as an aggregation of interlocking positions. While this follows from the structures perspective, it provides a clearer understanding of how the value chain can be split up among distinct firms. The position each organization occupies can be characterized by its function, identity, and relative importance. The alliance is based on the role the organization plays along the value chain. Each position carries with it certain behavioral norms (Mattsson 1984). In this study, one firm had the function of supplier (i.e., "supplying" product development skills) while the other was a buyer (i.e., "buying" product development skills). These functions carried with them a sense of identity for each, within the alliance, and

a sense of importance, both within the alliance and outside the alliance.

The 'process' approach provides for a coordination of activities that replaces the invisible hand of the market place and the visible hand of hierarchy. The coordination comes from the interactions of the organizations in the system. Hakansson (1987) proposed that innovation occurs between organizations as buyers and suppliers work on mutual problems. In this study, each firm, a buyer and supplier, came together bringing a complementary set of skills, knowledge and resources, resulting in innovation, i.e., a new product was developed.

As the name suggests, the 'relationships' approach emphasizes the manner in which relationships form the context in which transactions occur. The relationships can be based on partner complementarity and control. As suggested in the alliance partner selection literature, a partner with complementary skills and resources can be very attractive as an alliance partner since resources can be provided without duplication. The relationship between the partners provides some degree of control, however informal it may be. This can reduce uncertainty and increase stability for the alliance members. The alliances in this study tend to support this approach. The alliances were based on relationships that had existed for five years, on average, and were expected to continue for several more years. Over the course of such a relationship,

mutual orientation, dependence, bonds and mutual investments (tangible and intangible) would reduce uncertainty and increase stability as expected.

Aspects of each of these approaches are seen in the alliances in this study. The structure of the alliance, within the value chain, is based on the heterogeneity and interdependence of the partners as the work is divided among them. Their positions within the alliance can be described by their function. Within this context, the process mechanisms provide a manner for managing the relationships as they develop through dependence, investments, mutual orientation and bonds. In the end, the alliance constrains the partners to particular tasks, but offers opportunities that neither could meet on their own. The benefits realized can include reduced uncertainty regarding developmental risk, ability to specialize in tasks or functions, and coordination of value chain functions.

An important implication is that strategic action is not limited to a particular firm but involves the range of relationships within the alliance and the resources to which it has access. Firms are constrained by the alliance but also offered opportunities by it. In analyzing these constraints and opportunities, they must view them in an alliance perspective, attempting to predict how the other alliance partner will respond to their initiatives. This is one area where the current study is important. It identifies determinants of successful alliance

management and performance. These determinants can help managers to direct their efforts and resources to making alliances work. This is especially necessary in the costly and high risk area of product development. Moreover, it may be possible to apply these determinants to alliances involving other aspects of the value chain.

Resource-based Theories of Strategy

The network perspective assumes that firms are heterogeneous in their skills and resources. The firms in the alliances in this study tend to support the resource-based view. While this theoretical perspective has been accepted for some time among European researchers, particularly Scandinavian researchers, it is still being examined in North America. Although this view may not yet be accepted by researchers as an analytical perspective, the results of this study suggest that managers have accepted the heterogeneity of firms and are using it to their collective advantage by way of strategic alliances. As more researchers provide evidence of this approach (Teece, Pisano and Shuen 1990; Hamel 1991; Inkpen 1992), perhaps this viewpoint will become as generally accepted in North America as it is in Europe.

The results of this study suggest support for the resource-based view. The overall findings were that firms can effectively divide the product development and manufacturing processes between separate firms. One of the

performance measures found as important was whether the alliance allowed specialization. Specialization can be seen as developing distinctive bundles of resources, a foundation of the resource-based view. That the managers in the study placed such strong importance on specialization tends to support this view.

The Theory of the Firm

Recently, the business press has proclaimed the coming of the virtual corporation (Business Week 1993). The concept of a company that comes together along value chain functions as opportunities arise, only to disband when the project is over, has its supporters and detractors. Many firms have successfully implemented a virtual corporation type of strategy. Others think that the notion is simply a fad driven buzzword. While this study does not confirm the existence or success of such strategies, the results suggest that many firms are able to effectively implement a strategy that utilizes individual core competencies and is built on value chain alliances.

The virtual corporation is expected to rely on technology as a means of linking companies together. Each company is expected to bring its own distinct excellence, based on its core competence, to the fluid union. Based on common purpose and trust between partners, the group manages the production function without regard to organizational boundaries as it capitalizes

on opportunities that arise. Although not as dramatically, this is similar to the strategies employed by the alliance firms in the study. These firms specialize in particular aspects of the production process, product design, development and manufacturing. The alliance revolves around each partner contributing their specialized talent so that both firms benefit. According to the managers involved in these alliances, trust and the ability to do the job are key ingredients to the continued success of the alliance.

The results of this study do not foretell the destruction of the firm. However, it does suggest that equity ownership is not needed to manage a value chain. These functions can be divided among individual firms, who then focus on specific activities. However, what is important to managing these alliances is trust. The belief, or reliance, that your partner will do what is expected, is important to the successful implementation of an alliance strategy. It is this belief, and resulting actions, that build the relationship from a one-time situation to an ongoing partnership that makes the most of each partner's contributions. The alliances in this study suggest that such alliances perform as well as or better than other business relationships. If this level of performance can be maintained or bettered, it may open the door for more alliance based strategies in the future as firms search for ways to meet opportunities while maintaining flexibility, competitiveness and profitability.

Partial Least Squares Methodology

Fornell, Lorange and Roos (1990) applied Partial Least Squares (PLS) structural model analysis to the cooperative venture formation process. The model of cooperative venture formation was developed by Roos (1989) based on analogies from strategy formation processes literature on foreign investment decision processes, resource allocation processes, and acquisition processes. The model was tested using questionnaire data from Swedish and Norwegian firms. By using the theoretical constructs of stakeholder strength, extent of internal push, and breadth and depth of analytical scope, they were able to explain 40 percent of the variance in performance, as they defined it. In discussing the contribution of the methodology, Fornell, et. al. (p. 1253) say:

> Much of the research on strategic processes is based on studies built around small-sample, clinical case studies, e.g. Bower 1970; Mintzberg, Raisinghani and Theoret 1976; Mintzberg 1978; Barwise, et al. 1988. This can be contrasted with much of the research in marketing, e.g. Aker and Bagozzi 1979; Bagozzi 1980; Arora 1982; Fornell and Westbrook 1984 as well as in many other social science fields. In these fields large sample-based first and second generation multivariate approaches have been used quite extensively for the study of complex phenomena . . . it may be time to both *confront* the existing theory with data and *combine* the theory with new data for further explanatory development.

Fornell, et. al. see second generation multivariate methods, such as PLS, as a way to narrow the distinction between quantitative and qualitative research.

This advocacy should be tempered by recent calls for more qualitative approaches to understanding complex issues in alliances (Parkhe 1993). A

sensible approach may be to use both types of analysis as part of an overall integrative research program, as in this study. Taking a multi-method approach to investigating complex social relationships allows the researcher to utilize the strengths of each approach, while minimizing their weaknesses. As in alliances, complementarity can apply to research methodology.

Implications for Practice

As a result of the study, several recommendations are made to practising managers involved in strategic alliances. However, these recommendations should be preceded by a word of caution. This research study was based on relationships in product development alliances. While these recommendations may hold for other types of alliances, they have yet to be tested outside the parameters of this study.

As a result of this study, several recommendations are made to practising managers involved in strategic alliances. However, these recommendations should be preceded by a word of caution. This research was based on relationships in product development alliances. In addition, these relationship were considered "strategic" by the managers involved[2]. While

[2] The perceptions of these alliances as strategic is affirmed by percentage of sales for which the alliance products accounted. The alliance products accounted for 23 percent of the buyer firm's annual sales with the supplier firm contributing 25 percent of the cost of goods sold. For the suppliers, the alliance products accounted for approximately 20 percent of their annual sales.

these recommendations may hold for other types of alliances, such as "non-strategic" or distribution alliances, they have yet to be tested outside the parameters of this study. However, based on the results of this study, it might well seem that the general model, or relationships, would apply to other settings.

The study identified three sets of activities, or steps, that contribute to successful alliances, together with specific actions that managers can take to facilitate these necessary steps. In addition, the success or performance of the product development alliance can be assessed on two levels.

Initiating Actions

Initiating actions are activities that lay the groundwork for beginning the alliance project. The determinants of initiating actions were identified as: (1) establish common goals for the alliance, (2) discuss expectations for the product, and (3) discuss expectations for the role of the partners. These actions help to define, for both partners, where the alliance is headed, what is expected of each party and what will ultimately be expected from the co-developed product. This step defines the obligations and expectations for all involved.

Maintenance Actions

Maintenance actions address the day-to-day operational issues that get the product out. These include meeting production schedules and meeting delivery schedules. Indeed, producing products in sufficient quantity and getting them to the partner on schedule gets to the heart of a manufacturing alliance, and it is only through successful completion of these tasks that an alliance will be continued. These are the necessary, but not sufficient actions that facilitate moving the relationship from being transaction-based to being trust-based.

Building Actions

Building actions elevate the relationship from a transactional and operational level to a long-term, mutually beneficial alliance. Successful performance through maintenance actions provide the basis for firms in the alliance to: (1) work to develop trust, (2) resolve conflicts with the partner firm, and (3) share development risk. Through building actions, the partners prove they are worthy of trust and deserving the effort required to overcome differences. As the firms begin to see themselves as partners in an alliance, they are willing to accept a share of the development risk involved in the project.

Operational Performance

Operational performance is the proof that the operational aspects of the alliance are successful. In assessing the operational performance of the alliance, managers should consider whether: (1) quality standards have been met, (2) product scope has increased, (3) market share has increased, (4) revenues have increased, and (5) profits have increased. To be fair to the alliance, only the performance of the product development alliance should be considered, not the overall performance of the firm.

Strategic Performance

Strategic performance of the product development alliance should be evaluated in terms of whether: (1) it allows each firm to specialize in certain operations or activities, (2) provides for other opportunities with the partner, and (3) improves the firms' market positions. Specialization allows each firm to concentrate on developing and honing particular skills and resources. In effect, they become more expert at what they do. However, with this focus often comes a narrowed range of skills. Therefore, a successful alliance will provide future opportunities for the partners so that they can leverage not only their own particular skills, but also the collective knowledge, skills, and resources they have developed. The overall result should be improved market positions for the partner firms as they become stronger marketplace competitors, individually and together. Following these guidelines should help

managers realize successful product development alliances.

Strengths and Limitations of the Study

Strengths of the Study

The most prominent strength of the study is the nature of the research program used in the study. The study employed a multi-stage, multi-method approach which sought to compound the discrete advantages of the methods, offset their inherent disadvantages, and achieve a deeper understanding of strategic alliance management that any individual method could have produced alone.

The first stage focused on developing a model of effective strategic alliance management. The second stage focused on testing this model. Additionally, within each of the two stages there were a number of phases. The research program is discussed below and shown in Figure 6.1.

The first stage of the research program was the development of a model of effective strategic alliance management and performance. The focus of the study was on product development alliances which managers perceived as strategic. Several phases were required to carry out this stage of the research.

The first phase of this stage was a review of the applicable literature to

identify the key concepts of strategic alliance management. The literature review centered around the guiding questions of *what*, *why*, *with whom* and *how*. The *how* questions focused on the objective of the research: *how are strategic alliances effectively managed for performance?* This review resulted the development of: (1) an preliminary model of strategic alliance management, and (2) an interview protocol instrument which was used as a guide during the next phase of the research, the pilot study.

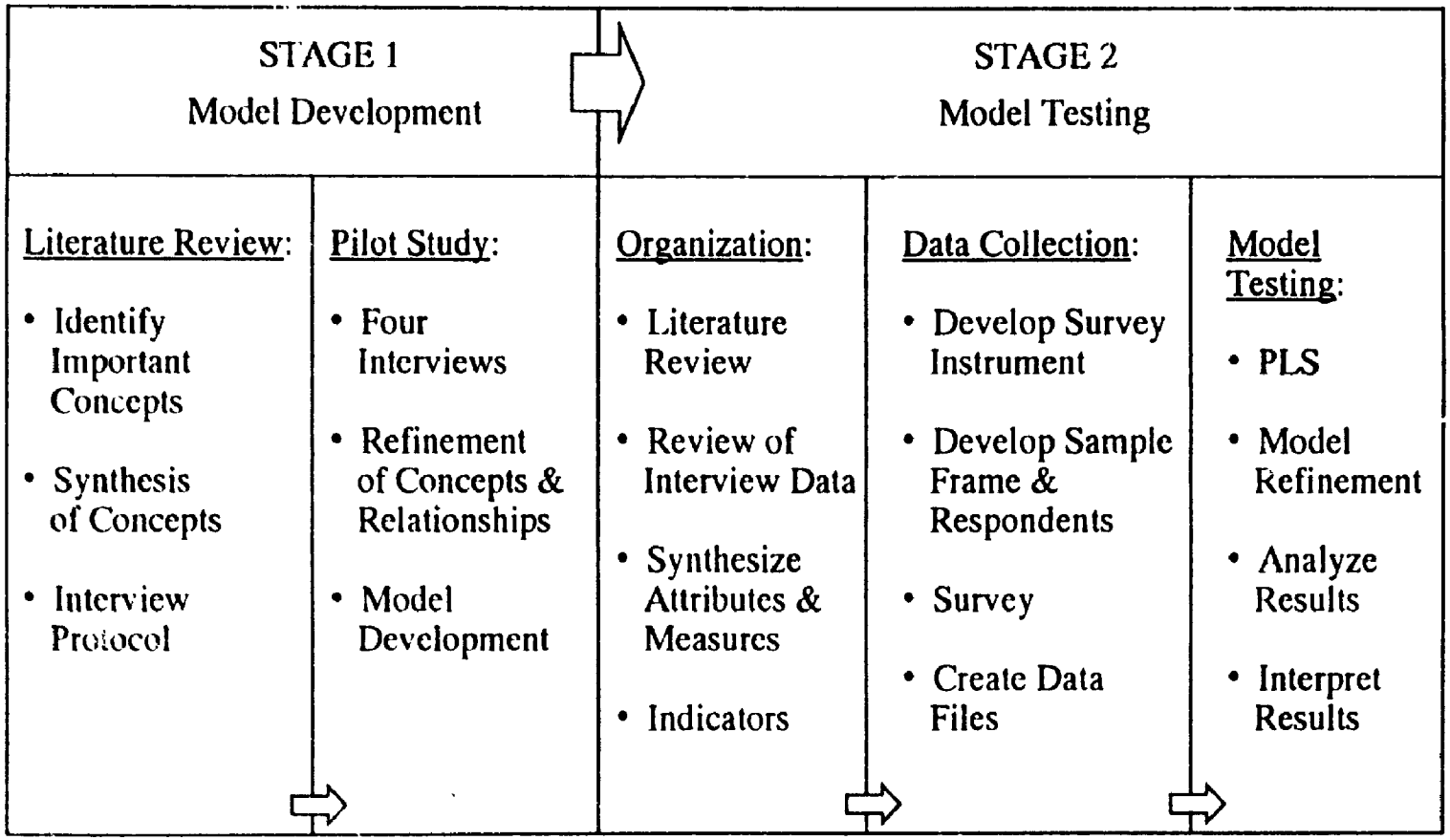
The pilot study built on the understanding of strategic alliance management that came out of the earlier phase. In the pilot study, managers involved in four alliances were interviewed about what was important in making the alliances work. The pilot study, which was summarized in Chapter 3, provided the opportunity to: (1) discuss alliance management issues with practising managers, and (2) subject the concepts and relationships in the model to managerial scrutiny. The transcripts of the interviews were examined for common themes regarding determinants of alliance management and performance. The themes that emerged from the interviews were synthesized and reconciled with the hypothesized model. Consequently, the tested model was developed through both a synthesis of the literature and through discussions with alliance managers. This approach results from the goal of developing a theoretical model which accurately portrayed the issues and relationships important to management.

The second stage of the research program involved testing the model. This stage required that the model be operationalized, the data collected, and the model empirically tested. First, the model was operationalized, that is the measures for the constructs were determined. This was performed through a review of the literature, both academic and practitioner, and a review of the pilot study interview notes.

The resulting survey instrument was mailed to managers active in strategic alliance management. The returned surveys were used to create a database composed of managerial perceptions of effective strategic alliance management. The model was statistically tested using the Partial Least Squares (PLS) method of structural equation analysis. The analysis yielded results which allowed the evaluation of the model on two aspects; the validity of the hypothesized relationships and the adequacy of the measures used in the model.

There are several important features of this research program. The first is that the program followed steps that allowed each phase to build on the previous phase. For example, the literature review allowed the development of a preliminary model, which became the basis for the interview protocol for the pilot study. The pilot study, in turn, was the foundation from which the model was refined and operationalized. In all, the research program involved literature

FIGURE 6.1
The Two Stage Research Program



review, synthesis, and extension, case analyses, survey research, and empirical testing.

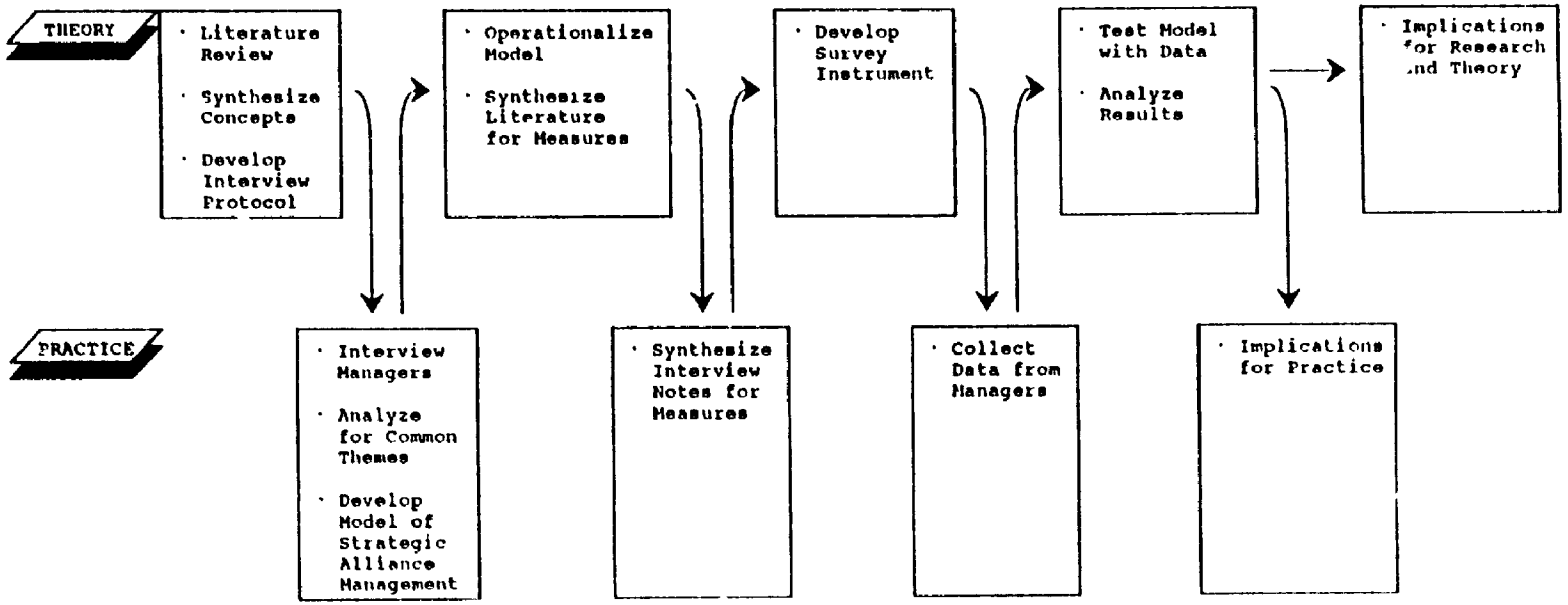
The second important feature of this research is its grounding in management practice. At every step in the research program, input from managers involved in making alliances work as a strategy was used to temper the model development and guide the overall research program. This iterative and integrative approach to blending theory and practice, as illustrated in Figure 6.2, may be its most important feature. Because of this approach, the findings represent the practices of current managers.

Limitations of the Study

Although strong evidence resulted from the research, this study is not without limitations. As mentioned earlier, the sample of companies was drawn from two similar industries. This may serve to limit the ability to generalize the results outside of the industry setting.

A second limitation is same source bias. All of the measures were survey respondents' perceptions. However, perceptions, to a great extent, drive behavior (Triandis 1979) and it can be argued that the measurement of perceptions provide a reasonable surrogate for objective measures.

FIGURE 6.2
An Iterative and Integrated Approach to Research



Common method variance is also a limitation of the findings since all of the constructs were measured in the same way using survey questionnaires. Given the logistics of the study, surveys were appropriate at this stage of the research.

Another limitation relates to construct development. A single data collection was used to test the structural model. Retesting the model using a second larger data collection would have been better. However, even the sample of senior managers used in this study was very expensive and time consuming to collect. A second round would have been prohibitive at this time.

The model and its findings, while not proving causality, provides strong evidence of the general applicability of the research model. Although the sample was a convenience sample, it was made up of senior managers from many different companies. The strength of the results, and their consistency with the literature and the pilot stud, , suggest that this is an accurate depiction of the determinants of effective alliances for product development.

A final weakness of the study is the small sample size. While the sample was sufficient for the methodology and constructs used, more robust results would be generated from a larger sample size. Accordingly, additional data could be collected and the model retested.

Avenues for Future Research

Empirical Extensions

Several extensions follow from the current research. These are creating matched pairs for data analysis, developing follow-up case studies, enlarging the sample size, and testing the model on other value chain alliances. These extensions are discussed below.

Creating data on matched pairs is one planned research extension. It was initially expected that getting matched pairs data would be relatively easy. However, as it transpired, this was not the case. In fact, it was not until it was pointed out to potential respondents that they did not have to provide the name, address or contact person in the partner firm, that they would return the questionnaire. For whatever reason, perhaps not yet trusting the researcher or the project, many were unwilling to share the partner information. If this research project is likened to an exchange situation, a solution can be suggested. At this point, the respondents have given what they certainly perceived as valuable and confidential information about their alliance. In return, they expect that the information will be kept confidential, as promised, and that a summary of the research results will be sent to them, as promised. To them, it may seem that as yet, the bargain has not yet been upheld. While they have no evidence to suggest that their confidentiality has been breached, neither do they have evidence that is has been kept. It is hoped that once the

results summary has been completed, in a manner that provides value to the manager, and they see that confidentiality is maintained, they will be willing to share partner information. If so, creating a matched pair data set will be attempted.

Following up on selected alliances as case studies is one way the research program will be continued. Several of the respondent firms have expressed a willingness to be sites for case studies. If both partners are included, this could proved to be a rich learning opportunity. Cases could be developed as discussion vehicles that address different issues over the development, or life, of the alliance. This would foliow the alliance research tradition at Western established by Killing (1972), Schaan (1983), and Beamish (1984) and continued by Inkpen (1992) and McLellan (1993). These cases could be used in working with the alliance partner firms as ways to better understand the dynamics of the processes involved. They could also be used in executive education to understand the workings of alliances.

Another extension is to expand the size of the data set. Under the current configuration of the PLS structural equation model, 30 data points were the required minimum for analysis. While, at 38 data points there was 27 percent more than the minimum required, a larger data set would add to the power of the analysis. This could be accomplished by adding other similar or

different industry groups.

In expanding the sample size, it could be interesting to expand internationally. There may be differences in alliance management determinants based on country or region of origin. For example, many Japanese firms take a much longer term view of performance than North American firms. Perhaps, the determinants of operational and strategic performance would differ for international partners. Also, the nature of these alliances may differ. For instance, most of the alliances in this study were between partners from the same country. From the comments of the managers, they seem to be *cooperative* alliances. In contrast are the alliances discussed by Hamel (1991). Some of these seemed to be *competitive* alliances, in which partner competed against partner in a learning race. Perhaps this is due to the companies in each of the studies. Perhaps it was due to the national origins of the firms.

The model developed and tested in this study could be refined and tested focusing on other points along the value chain. This study addressed only product development alliances. If some aspects of the relationships were maintained, such as vertical relations, manufacturing processes, or other technology intensive products, the model may be able to be extended with little modification. Other possible settings could be subcontracting and manufacturing alliances, distribution and logistics alliances, and other value

chain alliances that allow managers to compete in the face of rapidly changing industry conditions.

Theoretical Extensions

Trust is an aspect of alliance management that has consistently come up as important in this study and in others (McLellan 1993; Parkhe 1993; Inkpen 1992; Hamel 1991; Buckley and Casson 1988; Axelrod 1984; Thorelli 1986; Williamson 1985). In fact, it may serve as the foundation for an on-going alliance. Trust however has many different interpretations. Although some researchers conceive of trust as 'mutual forbearance' (Buckley and Casson 1988), the concept of trust may be more a belief founded on action or a lack of action. From this study, trust seems best described as *a belief based on prior experience* that the other firm will perform certain activities in an agreed upon manner and will not perform other detrimental actions. Moreover, trust is continually cited as the key factor that gets the alliance through rough times. As several managers said:

> *"Having trust, I think, is the important one. That you can have differing views and yet resolve those effectively."*
>
> *"The trust is based on performance, previous performance."*
>
> *"Once you get the lawyers involved, it gets too messed up to get it through. Because a lot of it is a trust relationship."*
>
> *"What characterizes the failure of most alliances is that the trust failed."*
>
> *"You generate more trust with some suppliers than others. You*

believe what they say. Others, you just leave their office and shake your head, 'Yeah, sure.'"

"Trust is built on knowledge of the fundamental core values of the other partner or, at least, it mitigates any risk down the road . . . I think I understand them. I know how they work. I trust them."

In spite of the importance of this concept to alliance management and, indeed, even ongoing business relationships, this concept still remains elusive to researchers. Williamson argued that markets fail because costs make market transactions inefficient. The reasons for transaction cost (bounded rationality, uncertaint, about the future, small numbers, and the possibility of opportunistic behavior) lead to a situation in which trust is not present. Opportunism "is a central concept in the study of transaction costs" (Williamson 1979, p. 234). The result is that, in addition to trying to lower transaction costs, firms must also act in manners that are motivated by defense of opportunism. If trust could be fostered among transaction parties, more effort could be allocated to lowering transaction costs.

Williamson (1979, p. 241) said "other things being equal, idiosyncratic exchange relationships [i.e., transactions involving specific assets] which feature personal trust will survive greater stress and display adaptability." However, the dilemma becomes: how can trust be generated? Who will take the first risk in laying its foundation? Jarillo (1988) offers that the initiator will have to act on two variables: the assumptions of the owner of the resources

CHAPTER FOUR

METHODOLOGY

The previous chapter discussed the development of the research model. This chapter outlines the methodology employed in the study. The discussion includes research design, operationalization, data collection, field procedures, data editing and file preparation, and the data analysis technique.

Research Design

General Approach

The research model was based on the literature review and synthesis and on the pilot study findings. This model (Figure 1.1) was operationalized as a multiple indicator structural equation model. Hypotheses were tested using a field survey research design in which pre-tested mail questionnaires were used to collect perceptual, self-reported information from managers involved in strategic alliances. These managers were solicited from firms in two similar industries, SIC 3661 (Telephone and Telegraph Apparatus) and 3663 (Radio and Television Communications Equipment). It was expected that this research design would generate sufficient responses for data analysis and hypothesis testing using the structural equation modeling algorithm Partial Least Squares (PLS). The following sections discuss the rationale for the research design and the limitations of this approach.

regarding (1) the entrepreneur's motivations and (2) the intrinsic situation. The first variable can be addressed through carefully selecting the partners to the different relationships. That is, searching out people who have similar values to those of the entrepreneur. Similar values and motivations should serve to facilitate trust between the parties. The second variable is the intrinsic situation. Blind trust cannot be expected if the parties to the relationship must put themselves at high risk. Trust can only be generated by showing that the entrepreneur would be worse off by acting opportunistically (Jarillo 1988). Past relationships and reputation can be accurate indicators of how a particular firm will act. Since good reputations are slowly established over time, yet destroyed quickly, the entrepreneur or firm will act to protect their good reputation, foregoing short term opportunistic gains.

The long term nature of the relationship is essential to the development of trust that adds to the value of the relationship itself. Opportunistic behavior would only serve to damage a valued relationship that has developed over time. It has been shown in game theory that the *possibility* of playing future valuable games can modify the 'prisoner's dilemma' by introducing cooperation (Jarillo and Ricart 1987; Frank 1988). The result is that emphasis is shifted from one time gains to long term mutual benefit and such a situation can be self-reinforcing.

STRATEGY ISSUES

S1. From where did the idea to develop an alliance with the buyer firm originate?

S2. What were the circumstances prompting the alliance?

S3. Do these circumstances still exist today?

S4. How important are any of the following issues to your decision to develop an alliance?

cost	product development timing
technology access	spreading risk
innovation	personnel

S5. How long has your firm had an alliance with this buyer firm?

S6. Has your firm's corporate strategy changed since it started using strategic buyer-supplier alliances? In what ways has it changed?

S7. Are these changes seen as better? In what way?

S8. What have been some benefits of the alliance?

S9. Are there any potential drawbacks to the alliance?

RELATIONSHIP ISSUES

R1. Have there been any changes in the amount of resources allocated to the activity this alliance concerns? (reduction in budgets, shifting of funds or personnel from one area to another, etc.)

R2. Has your firm made any investments in equipment or facilities that are specific to this buyer firm or the alliance?

indicated by "a record of prior exchange, often obtained secondhand or by imputation from outcomes of prior exchange" (Zucker 1986, p. 60). The information required is considerable, person-specific or firm-specific, and is not easily transferred to others. This leads to investments in reputations or brand names. Reputation, past experience, ability to perform as expected, and an orientation toward the long-term characterize the indicators of trust discussed in this study.

However, characteristic-based trust may also have a place in alliance research. In characteristic-based trust, all that is necessary is information concerning social similarity. As Zucker explains (p. 61), others with similar characteristics may be sought out for exchanges under the premise that many background understandings will be held in common, smoothing the terms of exchange and making it more likely that the outcome of the exchange will be satisfactory to both parties. These situations are usually ascribed to characteristics such as family background, group membership, or national origin. These characteristics serve as indicators of membership in a common cultural system or shared background expectations. Geertz (1963) describes the Islamic traders in Modjokuto and the ruling family in Tabanan as examples of groups which operate on characteristic-based trust.

The case could be made that characteristic-based trust may be part of

the resurgence of California's Silicon Valley. Saxenian (1990) describes how semiconductor firms in the area built on Silicon Valley's technical and institutional infrastructure and its dense networks of social and professional relationships. Many of the successful 1980s start-up firms formalized collaborative relationships with customers and suppliers, both within and outside the region. A sense of community has developed which characterizes the region. A shared commitment to advancing technology, derived originally from the common formative and professional experiences of engineers in the region, transcends interfirm rivalries (Saxenian 1990). This sense of community can be characterized as more than professional affiliation. The case can be made that it has developed into a clan or tribal cohesiveness that produces it's own characteristic-based trust. If this is the case, the resulting trust could serve to facilitate smooth and efficient exchanges between members of the 'Silicon Valley tribe.'

An examination of trust, in light of the different production bases, could be appropriate given the current interest in the topic. Assessing the development of different trust bases in different geographic areas could provide more insights to understanding the nature of and development of trust. From the above discussion and the indicated importance of trust in strategic alliances, it can be argued that a further examination of trust is required. Indeed, our current understanding of trust is lacking.

Concluding Remarks

This report began by describing some of the international forces facing North American managers in technology intensive manufacturing industries. Rapid technology changes, high development costs, and short product lives are forcing managers to find new ways to compete. Strategic buyer-supplier alliances represent a way for firms to leverage their unique skills and resources into a competitive advantage for the partner firms. As each firm focuses on its area of specialization, the alliance structure offers the promise of a creating a formidable world class competitor.

The key to making the alliance work successfully is for each firm to be proficient at their specialized roles while being able to rely on their partner firm to execute their tasks as expected. Managing the alliance to meet today's challenges while developing the knowledge, experience, and skills to capitalize on future opportunities is a difficult task. The results of this research program are offered as assistance to these managers in the hope that they will maintain their international competitiveness.

APPENDICES

APPENDIX A

Pilot Study Interview Guide: Buyer Firm

MANAGEMENT OF SUPPLIER ALLIANCES
INTERVIEW GUIDE
Electronics-based Industry: Buyer Firm

The purpose of this study is to investigate the strategic implications of supplier alliances in a high technology manufacturing industry. We are interested in alliances involving upstream activities in the electronics industry, such as product design and development. These questions ask you to describe your firm's relationship with a supplier firm that designs, develops, and/or manufactures an important component or product for another firm.

All of your responses will be held in strict confidence.

BACKGROUND INFORMATION ON YOUR FIRM

Your name and position:

Your firm:

Your firm's location:

Your firm's primary products:

Type of product this interview addresses:

Your firm's level of revenues for 1991:

BACKGROUND ON ALLIANCE PARTNER

Name and location of the supplier firm:

Type of product the supplier firm provides to your firm:

Total purchases from this supplier for this product in 1991:

STRATEGY ISSUES

S1. From where did the idea to develop an alliance with the supplier firm originate?

S2. What were the circumstances prompting the alliance?

S3. Do these circumstances still exist today?

S4. How important are any of the following issues to your decision to develop an alliance?

cost	product development timing
technology access	spreading risk
innovation	personnel

S5. How long has your firm had an alliance with this supplier firm?

S6. Has your firm's corporate strategy changed since it started using strategic buyer-supplier alliances? In what ways has it changed?

S7. Are these changes seen as better? In what way?

S8. Have there been any changes in your firm's organizational structure because of the alliance?

S9. Have there been any changes in your firm's systems, procedures, or routines because of the alliance?

S10. What have been some benefits of the alliance?

S11. Are there any potential drawbacks to the alliance?

RELATIONSHIP ISSUES

R1. Have there been any changes in the amount of resources allocated to the activity this alliance concerns?
(reduction in budgets, shifting of funds or personnel from one area to another, etc.)

R2. Has your firm made any investments in equipment or facilities that are specific to this supplier firm or the alliance?

R3. Has your firms added or changed any systems, procedures or routines that are specific to this buyer firm? What are they and their effect?

R4. Have your firm and the buyer firm exchanged any personnel to work on projects?
Who was involved, what was the project, and what are the responsibilities?

MANAGEMENT ISSUES

M1. How important are any the following issues to the continuance of this buyer-supplier alliance?

supplier certification	*quality assurance*
reputation	*technology sharing*
innovation	*management of other suppliers*
price or cost	*spreading development risk*

allows for specialization by each firm (focus)

M2. Does the supplier firm provide your firm with technology (product or process) that it did not have? Could not or would not develop on its own?

M3. Does your firm see the supplier firm as an extension of its capabilities?

M4. Does your firm exchange information with the supplier concerning: design specifications, cost, profits.

M5. Do you and the supplier have compatible information systems? Are they linked?

M6. Does the supplier have open access to your information system?

CONFLICT

C1. What tend to be the most common areas of conflict with the supplier?

C2. Are these areas of conflict reasonable or to be expected?

C3. How do you settle disputes with the supplier?

C4. Was this settlement process set up when the alliance began?

C5. Are you satisfied with this approach? Is the supplier?

PERFORMANCE

P1. On what basis do you evaluate the performance or success of this relationship?
What makes it a success?

P2. Has it been successful to date? Better than expected?

P3. What would cause you to end this alliance?

P4. Is there second source for this product/activity?

APPENDIX B

Pilot Study Interview Guide: Supplier Firm

MANAGEMENT OF SUPPLIER ALLIANCES
INTERVIEW GUIDE
Electronics-based Industry: Supplier Firm

The purpose of this study is to investigate the strategic implications of supplier alliances in a high technology manufacturing industry. We are interested in alliances involving upstream activities in the electronics industry, such as product design and development. These questions ask you to describe your firm's relationship as a supplier firm that designs, develops, and/or manufactures an important component or product for another firm.

All of your responses will be held in strict confidence.

BACKGROUND INFORMATION ON YOUR FIRM

Your name and position:

Your firm:

Your firm's location:

Your firm's primary products:

Type of product this interview addresses:

Your firm's level of revenues for 1991:

BACKGROUND ON ALLIANCE PARTNER

Name and location of the buyer firm:

Type of product your firm provides to the buyer firm:

Total purchases from this supplier for this product in 1991:

STRATEGY ISSUES

S1. From where did the idea to develop an alliance with the buyer firm originate?

S2. What were the circumstances prompting the alliance?

S3. Do these circumstances still exist today?

S4. How important are any of the following issues to your decision to develop an alliance?

cost	product development timing
technology access	spreading risk
innovation	personnel

S5. How long has your firm had an alliance with this buyer firm?

S6. Has your firm's corporate strategy changed since it started using strategic buyer-supplier alliances? In what ways has it changed?

S7. Are these changes seen as better? In what way?

S8. What have been some benefits of the alliance?

S9. Are there any potential drawbacks to the alliance?

RELATIONSHIP ISSUES

R1. Have there been any changes in the amount of resources allocated to the activity this alliance concerns? (reduction in budgets, shifting of funds or personnel from one area to another, etc.)

R2. Has your firm made any investments in equipment or facilities that are specific to this buyer firm or the alliance?

R3. Has your firms added or changed any systems, procedures or routines that are specific to this buyer firm? What are they and their effect?

R4. Have your firm and the buyer firm exchanged any personnel to work on projects?
Who was involved, what was the project, and what are the responsibilities?

R5. What actions by your firm and the partner firm are important to the day-to-day operation of this alliance?

R6. What actions by your firm and the partner firm are important in building this relationship as an alliance (as distinguished from other vendor relationships)?

MANAGEMENT ISSUES

M1 How important are any the following issues to the continuance of this buyer-supplier alliance?

supplier certification	*quality assurance*
reputation	*technology sharing*
innovation	*management of other suppliers*
price or cost	*spreading development risk*

allows for specialization by each firm (focus)

M2. Does you firm provide the buyer firm with technology (product or process) that it did not have? Could not or would not develop on its own?

M3. Does the buyer firm see your firm as an extension of its capabilities?

M4. Does your firm exchange information with the buyer concerning: design specifications, cost, profits, others?.

M5. Do you and the buyer have compatible information systems? Are they linked?

M6. Does the supplier have open access to your information system?

M7. Have there been any changes in your firm's organizational structure because of the alliance?

M8. Have there been any changes in your firm's systems, procedures, or routines because of
the alliance?

CONFLICT

C1. What tend to be the most common areas of conflict with the buyer?

C2. Are these areas of conflict reasonable or to be expected?

C3. How do you settle disputes with the buyer?

C4. Was this settlement process set up when the alliance began?

C5. Are you satisfied with this approach? Is the buyer?

PERFORMANCE

P1. On what basis do you evaluate the performance or success of this relationship?
What makes it a success?

P2. Has it been successful to date? Better than expected?

P3. What would cause you to end this alliance?

P4. Is there second source for this product/activity?

APPENDIX C

Introduction Letter and Research Overview

The UNIVERSITY *of* WESTERN ONTARIO
Western Business School

February 15, 1993

Dear

The Business School at the University of Western Ontario is conducting a study on the management of strategic buyer-supplier alliances in manufacturing industries. The study focuses on how product development alliances are managed and the subsequent impact on performance A brief research overview is attached.

We are contacting you because of your work in the telecommunications industry. If you have been or are currently involved in a close working relationship with another firm for the design, development, or manufacture of a product or component, we would like your firm to participate. Only a small amount of your time will be needed to answer several questions. Any information that you provide will be treated as strictly confidential. In particular, information that may be sensitive, proprietary or firm-identifying will not be presented, published, or otherwise divulged.

The purpose of this research is not commercial. The goal is to assess the importance of various management actions in implementing alliances. We would appreciate your evaluation of the importance of these actions and their effect on performance. In return for your help, we will provide you with a summary report of the findings, which we believe will be of benefit to you in managing buyer-supplier alliances.

The overall objective is to carry out managerially relevant research. That is why it is important that firms, such as yours, participate. Without the help of managers, the research has little value or application. I will call you next week to ask if you will be able to participate in the study If you have any comments or questions, please contact us at 519-679-2111, extension 4544 or (fax) 519-661-3959.

With best regards,

Kent Neupert

Kent Neupert

London Ontario • Canada • N6A 3K7 • Telephone (519) 661-3206
Fax (519) 661-3485 • Telex 064-7134 CWO TEL LDN

The UNIVERSITY *of* WESTERN ONTARIO
Western Business School

Implementing Strategic Buyer-Supplier Alliances
For Product Development
Research Overview

WHAT

This study addresses the management of strategic buyer-supplier alliances in manufacturing industries for product development. Strategic buyer-supplier alliances are cooperative inter-firm relationships between industrial buyers and suppliers. These alliances involve products or components which are important to the firm's competitive position, *or* with which the firm is closely identified, *or* which represent significant sales or manufacturing volume. Product development includes the design, development or manufacture of these products or components. The purpose of the study is to investigate the importance of various activities in managing alliances, and the impact on performance.

WHY

Most prior research on alliances has focused on motivations for entering an alliance. Some research has looked at the partner selection process. Usually, the research has focused on alliances for downstream activities such as market entry and distribution. This study addresses an important and overlooked aspect: *how they are effectively managed*. It is different from other studies in that it focuses on the crucial upstream activities of product design, development and manufacture.

This research has important implications for managers. As firms follow an alliance strategy, they commit valuable resources to operations related to the alliance. Often these alliances require that the firms involved specialize in particular aspects of the production process. As a result the success of these alliances can have a significant impact on the firms' performance. Therefore, the identification of which activities have the strongest impact on implementation and performance is important to managers.

HOW

The project is in three stages. The first stage involved interviews with senior executives of firms in buyer-supplier alliances for product design, development and manufacture. The findings from these interviews helped form the framework for the next stages. This current stage involves a structured survey of senior executives about the importance of various activities in managing these inter-firm relationships. We are asking the presidents, or their senior managers in the company most familiar with the alliance, to complete a short questionnaire. The data collected will be used to assess the importance of particular activities, and the impact on firm and alliance performance. Ideally, managers on both sides of an alliance will participate so that experiences and perceptions can be compared. Unless both sides request, responses will be kept confidential. The final stage will involve follow-up interviews with several participating firms which will focus on the development of the alliance over time.

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Fax (519) 661-3485 • Telex 064-7134 UWO TEL LDN

APPENDIX D

Research Questionnaire

Western Business School
The University *of* Western Ontario

MANAGING SUPPLIER ALLIANCES

This study addresses the management of strategic buyer-supplier alliances in manufacturing industries for product development. Product development includes the design, development or manufacture of products or components. The results of this survey will provide valuable feedback on the importance of various activities in managing alliances, and their impact on performance. Therefore, we ask you to give your candid perceptions regarding your alliance experience.

Please answer all questions. If you wish to comment on any of the questions, use the space in the margins or another sheet of paper. Any information you provide will be kept strictly confidential. In particular, any information that may be sensitive, proprietary, or firm-identifying will not be presented, published or otherwise divulged. Surveys will be used only for the purpose of compiling aggregate statistics.

The questionnaire should take about 15-20 minutes to complete. Please complete it and return it by fax or mail no later than one week from receiving it. If you have any questions on this survey or the research, please contact Kent Neupert of the Western Business School at (519) 661-3206, extension 4544, or by FAX at 519-661-3959.

Thank you for participating in the study.
All of your responses will be held in strict confidence.

BACKGROUND INFORMATION

Your name and position: _____

Your firm's name: _____

Your firm's address: _____

Your firm's primary industry: _____

Type of product this alliance involves: _____

Is your firm the buyer or supplier of the product? *(circle one)* buyer supplier

What was your firm's or the relevant division's level of revenues for 1991?
(circle one and note type)

under $10 million	$10 to $99 million	$100 to $249 million	$250 to $499 million	$500 million or more	Type	firm	division

Percentage of these sales outside North America? _____%

Approximate sales for your firm for this product or products using this component in 1991?
(circle one)

under $1 million	$1 to $9 million	$10 to $49 million	$50 to $99 million	$100 million or more

Total purchases from the supplier for this product or component in 1991? *(circle one)*

under $1 million	$1 to $9 million	$10 to $49 million	$50 to $99 million	$100 million or more

From how many suppliers (including this supplier) is this product sourced? *(circle one)*

1	2	3	4	more than 4

What percent of purchases of this product are sourced from this supplier? *(circle one)*

less than 20%	20% to 40%	40% to 60%	60% to 80%	80% to 100%

How long has the buyer firm sourced this product from this supplier? *(circle one)*

less than 1 year	1 to 3 years	4 to 6 years	7 to 9 years	10 or more years

Has the buyer firm sourced other products from this supplier? *(circle one)* yes no

How long do you expect this relationship to continue? *(circle one)*

less than 1 year	1 to 3 years	4 to 6 years	7 or more years	unsure

The other firm's name: *(not required)* _____

The other firm's address: *(not required)* _____

Name and title of your primary contact in the other firm: *(not required)* _____

How important are the following items in *beginning* or *establishing* the supplier relationship? *(circle one response per item; circle NA if not applicable)*

	very important			moderately important	not important	
Setting common project goals	1	2	3	4	5	NA
Providing supplier with specific plans	1	2	3	4	5	NA
Letting supplier lead development effort	1	2	3	4	5	NA
Establishing common measures (standard vs. metric)	1	2	3	4	5	NA
Establishing material specifications	1	2	3	4	5	NA
Discussing product expectations	1	2	3	4	5	NA
Discussing role expectations	1	2	3	4	5	NA
Past experience with supplier	1	2	3	4	5	NA

How important are the following items in *building* the *long-term* aspects of the supplier relationship? *(circle one response per item; circle NA if not applicable)*

	very important			moderately important	not important	
Developing trust in each other	1	2	3	4	5	NA
Expecting the relationship to continue	1	2	3	4	5	NA
Developing mutual long-term goals	1	2	3	4	5	NA
Exchanging personnel to work on projects	1	2	3	4	5	NA
Developing personal relationships in other firm	1	2	3	4	5	NA
Management visits to each other's facilities	1	2	3	4	5	NA
Public announcements about performance	1	2	3	4	5	NA
Sharing information about the industry	1	2	3	4	5	NA
Sharing information about strategies	1	2	3	4	5	NA
Sharing financial risks	1	2	3	4	5	NA
Making investments specific to the other firm	1	2	3	4	5	NA
Adapting our systems and processes to fit the other firm	1	2	3	4	5	NA
Sharing development risk	1	2	3	4	5	NA
Engaging in joint development activities	1	2	3	4	5	NA
Resolving conflicts between the firms	1	2	3	4	5	NA

How important are the following items in *maintaining* the *daily* aspects of the supplier relationship? *(circle one response per item; circle NA if not applicable)*

	very important			moderately important	not important	
Adjusting our systems and procedures to accommodate the other firm	1	2	3	4	5	NA
Sharing work process information	1	2	3	4	5	NA
Establishing a measurement and control system	1	2	3	4	5	NA
Having well-trained people for activities that the other firm relies on	1	2	3	4	5	NA
Having our people understand the importance of the alliance	1	2	3	4	5	NA
Meeting production schedules	1	2	3	4	5	NA
Meeting delivery schedules	1	2	3	4	5	NA
Meeting quality standards	1	2	3	4	5	NA
Exchanging information on operations	1	2	3	4	5	NA
Exchanging information on costs	1	2	3	4	5	NA
Exchanging information on delivery	1	2	3	4	5	NA

How important are the following items in *evaluating* the *strategic performance* of this supplier relationship? *(circle one response per item; circle NA if not applicable)*

How well has this relationship *performed* in regard to these areas? *(circle one response per item; circle NA if not applicable)*

	very important		moderately important		not important		high performance		average performance		low performance	
Enables process innovation	1	2	3	4	5	NA	1	2	3	4	5	NA
Enables product innovation	1	2	3	4	5	NA	1	2	3	4	5	NA
Allows us to share development risk	1	2	3	4	5	NA	1	2	3	4	5	NA
Allows us to share financial risk	1	2	3	4	5	NA	1	2	3	4	5	NA
Provides access to technology we did not have	1	2	3	4	5	NA	1	2	3	4	5	NA
Product introduction is successful	1	2	3	4	5	NA	1	2	3	4	5	NA
Provides for other opportunities with partner	1	2	3	4	5	NA	1	2	3	4	5	NA
Improves our market position	1	2	3	4	5	NA	1	2	3	4	5	NA
Strengthens the alliance	1	2	3	4	5	NA	1	2	3	4	5	NA
Allows us to specialize in certain operations or activities	1	2	3	4	5	NA	1	2	3	4	5	NA
Allows us to focus on some aspects of project while leaving others to partner	1	2	3	4	5	NA	1	2	3	4	5	NA

How important are the following items in *evaluating* the *operational performance* of this relationship? *(circle one response per item; circle NA if not applicable)*

How well has this relationship *performed* in regard to these areas? *(circle one response per item; circle NA if not applicable)*

	very important		moderately important		not important		high performance		average performance		low performance	
Develops the product on time	1	2	3	4	5	NA	1	2	3	4	5	NA
Develops the product at cost	1	2	3	4	5	NA	1	2	3	4	5	NA
Develops the product to specification	1	2	3	4	5	NA	1	2	3	4	5	NA
Increases revenues	1	2	3	4	5	NA	1	2	3	4	5	NA
Decreases costs	1	2	3	4	5	NA	1	2	3	4	5	NA
Increases market share	1	2	3	4	5	NA	1	2	3	4	5	NA
Increases product scope	1	2	3	4	5	NA	1	2	3	4	5	NA
The relationship is profitable	1	2	3	4	5	NA	1	2	3	4	5	NA

When development of the product was ***started***, to what extent were the following resources ***contributed*** by your firm and the other firm?
(circle one response per item; circle NA if not applicable)

	your firm		shared		other firm	
Design expertise	1	2	3	4	5	NA
Development technology	1	2	3	4	5	NA
Prototype testing	1	2	3	4	5	NA
Materials procurement	1	2	3	4	5	NA
Production expertise	1	2	3	4	5	NA
Production facilities	1	2	3	4	5	NA
Product standards	1	2	3	4	5	NA
Quality assurance standards	1	2	3	4	5	NA
Inventory control	1	2	3	4	5	NA
Warehousing facilities	1	2	3	4	5	NA
Technical personnel	1	2	3	4	5	NA
Financing	1	2	3	4	5	NA
Project management	1	2	3	4	5	NA

Who ***currently controls*** decisions regarding the following resources?
(circle one response per item; circle NA if not applicable)

	your firm		shared		other firm	
Design expertise	1	2	3	4	5	NA
Development technology	1	2	3	4	5	NA
Prototype testing	1	2	3	4	5	NA
Materials procurement	1	2	3	4	5	NA
Production expertise	1	2	3	4	5	NA
Production facilities	1	2	3	4	5	NA
Product standards	1	2	3	4	5	NA
Quality assurance standards	1	2	3	4	5	NA
Inventory control	1	2	3	4	5	NA
Warehousing facilities	1	2	3	4	5	NA
Technical personnel	1	2	3	4	5	NA
Financing	1	2	3	4	5	NA
Project management	1	2	3	4	5	NA

Please fax or mail the completed questionnaire to:

Kent Neupert
Western Business School
The University of Western Ontario
London, Ontario N6A 3K7
FAX: 519-661-3959 Telephone: (519) 661-3206 ext. 4544

THANK YOU FOR PARTICIPATING.

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