

**MARKETING'S INTEGRATION WITH OTHER DEPARTMENTS**

by

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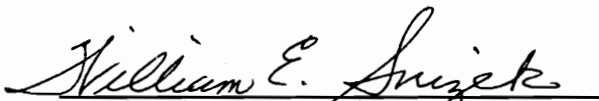
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Marketing

## Abstract

In light of greater emphasis on horizontal management and team-oriented approaches to product development/management, there is a growing need to better understand interdepartmental integration. To meet this need, this dissertation proposed a model of interdepartmental integration, which distinguished integration as a composite of interaction and collaboration. Incorporating contingency and sociotechnical theories, two main research propositions were developed and served as the foundation for the proposed model: 1) an individual department's attributes will influence its interaction behavior and 2) attribute differences between departments will influence departments' collaboration.

A mail survey of marketing, manufacturing, and R&D managers in 860 electronics firms was undertaken to investigate these two propositions and the hypotheses associated with the proposed model. While study results did

not convincingly support the given propositions nor a majority of hypotheses, results did indicate that collaboration has a primary influence on performance. Conversely, interaction was shown to have minimal influence on performance, and in certain cases, was shown to even reduce performance. Among other significant findings, interdependence and cooperative goals were identified as two key antecedents to collaboration.

This dissertation therefore highlights the need for departments to work together (collaborate) versus simply forcing communication through meetings and documented information exchange (interaction). Collaboration appears to be a key means by which all departments and the entire company can achieve and maintain performance success.

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Two organizations should be acknowledged. The Electronic Industries Association (EIA) provided me their membership directory free of charge so that I could have a sample from which to conduct this dissertation research. The Graduate Student Assembly (GSA) of Virginia Tech provided a grant of \$300 towards this dissertation to partly cover costs associated with this dissertation.

Of course I could not begin this dissertation without recognizing my father - Dr. Samuel G. Kahn, my mother - Irma B. Kahn, and my sister - Edith S. Kahn. Each of these individuals have had a profound impact on me, and through their love and devotion have encouraged me to continue with my studies. I wish to especially acknowledge my parents, who have instilled within me the belief that education and hard work lead to great achievements.

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## CHAPTER 1

### INTRODUCTION

The interrelationships that exist within business organizations prohibit individual departments from operating independently. Such interrelationships necessitate company-wide integrated efforts so that all departments can successfully perform their functions to accomplish their objectives. When interrelationships are inhibited, the accomplishment of department and company objectives will be inhibited. For example, marketing's decision to pursue a penetration price strategy without consulting the manufacturing department may doom the overall strategy; manufacturing may be unable to control costs sufficiently to permit establishing the low price, or the set price may be too low to provide the necessary margin to cover production and other company costs.

Product development research further illustrates that departmental integration promotes overall business success. This research shows that departmental integration reduces design time, lowers development costs, creates more efficient efforts, and develops products that rely on

company strengths (cf. Cooper 1979; Souder 1987; Adler, Riggs, and Wheelwright 1989; Zirger and Maidique 1990).

The above suggests that success of business departments and the overall firm is predicated on the successful integration of all departments' activities, not just their activities alone. From this evidence, integration should be considered a key strategic tool for achieving business success. Nevertheless, marketers primarily view marketing integration from the perspective of coordinating the marketing functions, i.e. product, distribution, promotion, and pricing decisions. Often overlooked is the broader perspective that concerns integration between marketing and other company functions. Hence, the marketing literature has focused primarily on internal coordination, rather than interfunctional coordination.

A deficiency in the marketing literature that has addressed interdepartmental/interfunctional integration is the lack of consensus on what integration is, or should be. This is illustrated by the varied terminology, which this marketing literature has used to characterize marketing's relationship with other company departments/functions. For example, Gupta, Raj, and Wilemon (1986) used the terminology of "integration," defined as unity of effort and a "continuous exchange of information between the parties, and if they agree on decisions and on decision-making authority"

(p. 15). Ruekert and Walker (1986) used the terminology of "interaction," which was not explicitly defined, but rather portrayed in terms of communication flows, work/resource transactions, and coordinating activities. Vessey (1992) used the terminology of "concurrent engineering" to denote the use of multifunctional teams to simultaneously consider product development activities before finalizing plans.

Although terminology differs, there appears to be a common factor between integration and concurrent engineering: collaboration. Underlying Gupta, Raj, and Wilemon's (1986) definition was Lawrence and Lorsch's (1967) definition of integration, i.e. unity of effort. Lawrence and Lorsch (1986) later expanded this definition to "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment" (p. 11). Similarly, an embellished definition of concurrent engineering by Dowlatshahi (1992) suggests concurrent engineering to comprise areas of collaboration.

Interaction appears separate from collaboration. The term collaboration was absent from Ruekert and Walker's (1987) work - in fact, the article did not mention working with other functions. Rather, interaction was operationalized in terms of communication flows, work/resource transactions, and coordinating activities.

Collaboration, on the other hand, corresponds to terms like teamwork and working together (a formal definition will follow shortly). This suggests that study of marketing's integration with other company functions should consider both concepts of interaction and collaboration.

Collaboration is especially deserving of consideration since literature has stressed its importance to successful product innovation (Souder 1987) and overall company success (Schrage 1990). However, collaboration is not addressed in most marketing literature concerning interdepartmental relationships as well as business literature concerning the workplace (Schrage 1990). With the marketing discipline and the field of business beginning to embrace the notion of "relationship marketing" in the contexts of supplier and customer channels (Sheth and Parvatiyar 1993), it is timely for marketing to also concentrate on the working relationships internal to the company, i.e., interdepartmental relationships.

#### **A MODEL OF INTERDEPARTMENTAL INTEGRATION**

Figure 1.1 presents a proposed model of marketing's integration with other departments. This model distinguishes integration as a composite process comprising the two constructs of interaction and collaboration. Predicated on this model, interdepartmental integration

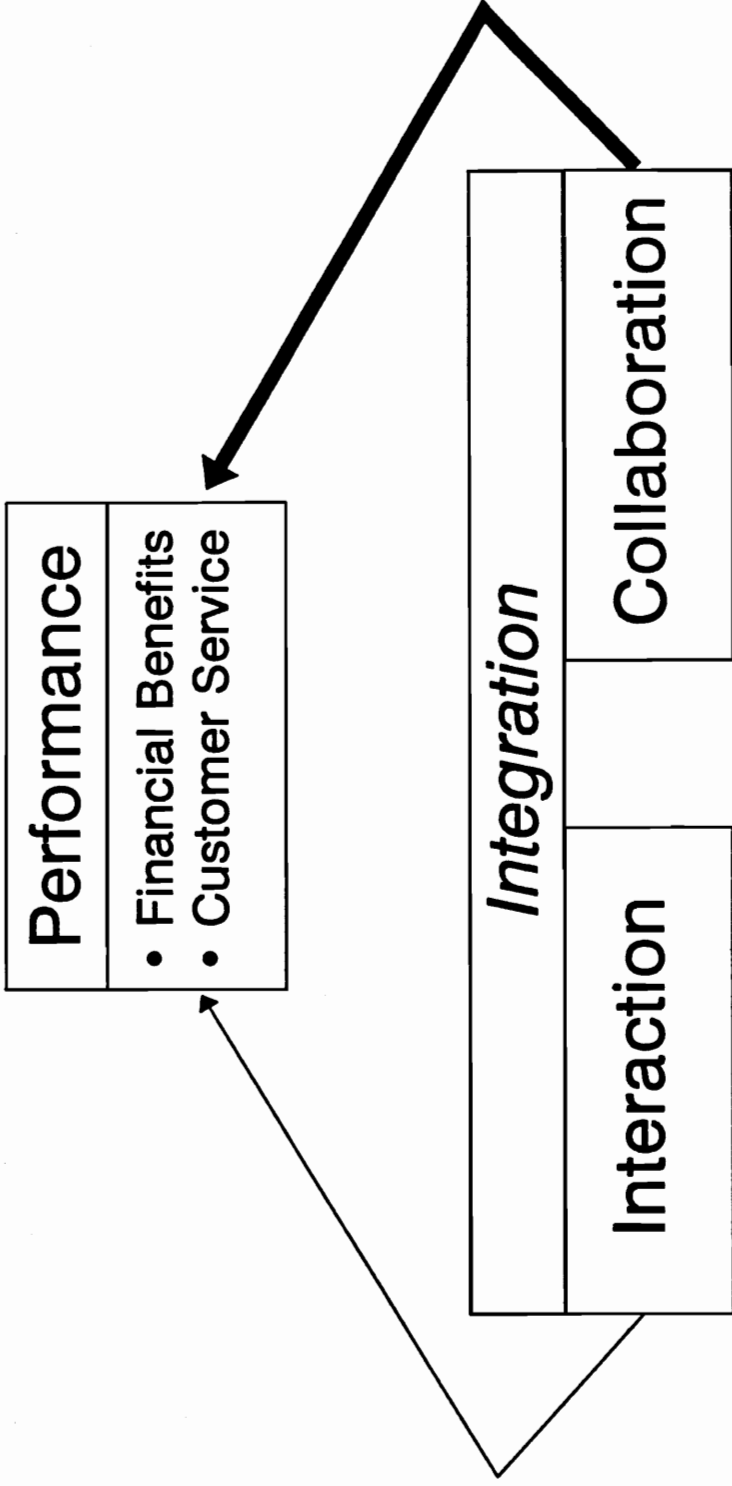


Figure 1.1: A Proposed Model of Integration



(hereafter referred to as integration) is defined as a process of interdepartmental interaction and interdepartmental collaboration that brings departments together into a cohesive organization.

Interdepartmental interaction (hereafter referred to as interaction) is characterized as the structural, nonaffective element of integration. It is defined as formalized coordinated actions between departments, including committee meetings, teleconferencing, conference calls, memorandums, and exchange of standard documentation. By their nature, these actions do not require emotions to be carried out. Rather, these actions can occur without emotions and are often regimented by previous planning.

Defined by various authors, collaboration is commonly characterized as affective. A sample of these definitions includes the following:

"... a value system upon which new solutions can be framed...a relational system in which: 1) individuals in a group share mutual aspirations and a common conceptual framework; 2) the interactions among individuals are characterized by "justice as fairness;" and 3) these aspirations and conceptualizations are characterized by each individual's consciousness of his/her motives toward the other; by caring or concern for the other; and by commitment to work with the other over time provided that this commitment is a matter of choice" (Appley and Winder 1977, p. 280-281).

"... the pooling of appreciations and/or tangible resources by two or more stakeholders to solve a set of problems which neither can solve individually" (Gray 1985, p. 912).

"...the process of shared creation: two or more individuals with complementary skills interacting to create a shared understanding that none previously possessed or could have come to on their own" (Schrage 1990, p. 40).

Together these definitions support the notion that collaboration is an affective and mutual/shared process. Collaboration is therefore distinguished from interaction in that collaboration focuses on working together, having mutual understanding and a common vision, sharing resources, and achieving collective goals; interaction focuses on the structure of both coordinated communication and the exchange of standard documentation. Applying this definition to the context of this dissertation, interdepartmental collaboration (hereafter referred to as collaboration) is defined as a process where departments work together informally with mutual understanding, common vision, and shared resources to achieve collective goals.

Although distinct, interaction and collaboration are related. In particular, greater collaboration will increase interaction since working together requires greater communication flow and greater accessibility to the other party's information and resources. The converse is not true. Interaction will not promote collaboration since a higher order of involvement, as well as a different approach to sharing and creating information, is required (Schrage

1990, p. 29). Woodward (1965) also found that in cases where interaction was forced, intergroup relationships tended to be the poorest.

It is stressed that collaboration is not a primary antecedent to interaction, but only an influence. Interaction often occurs without collaboration because of the department structure, task structure, goals, technology, environment, and a management mandate to interact. These structural elements of the organization should therefore have strong, direct influences on interaction.

As suggested by Figure 1.1, interaction and collaboration should influence performance in terms of financial benefits to the firm and customer service. Since the focus of this dissertation is the internal functioning of companies, customer service is taken from the perspective of internal customers, i.e., individual departments' satisfaction with interrelationships. The proposed model suggests that collaboration should have a stronger impact on performance factors since shared information and shared resources will be cost-effective and promote greater internal goodwill.

#### **UNDERLYING THEORETICAL BASES OF THE PROPOSED MODEL**

This dissertation adopts a system-structural perspective as used by Ruekert and Walker (1987, p. 2).

This perspective "holds that a social system can be examined by exploring the interrelationships among its environment, its organizational structural and processes, and its outcome" and that "there are contingent relationships among these three system dimensions" (Ruekert and Walker 1987, p. 2).

Two popular theories subsumed within the system-structural perspective are contingency theory (Lorsch 1965; Lawrence and Lorsch 1967, 1986) and sociotechnical theory (Woodward 1965; Perrow 1970). Contingency theory contends that the organizational structure responds to the variability of environments, while sociotechnical theory contends that organizational structure responds to the technologies employed within the organization (Bidwell and Kasarda 1985, p. 7). Both theories are considered complementary as illustrated by Thompson's (1967) synthesis of the two theories and the fact that Lawrence and Lorsch referenced sociotechnical theory to develop contingency theory.

To date, contingency theory has received greater attention within the marketing literature. Gupta, Raj, and Wilemon (1986) and Ruekert and Walker (1987) only referenced Lawrence and Lorsch (1967; 1986) and did not address sociotechnical theory. This dissertation incorporates both contingency theory and sociotechnical theory to develop a

model for integration within the business organization. As will be discussed in Chapter Two of this dissertation, these two theories suggest that interaction and collaboration are dependent upon department structure, task structure, occupational orientation, goals, technology, environment, and status. The empirical testing of this model thus partly examines strengths and weaknesses of each of the two theories.

#### **STATEMENT OF PURPOSE**

A variety of marketing literature has called for greater study of marketing's relationships with other company functions (cf. Wind 1981; Wind and Robertson 1983; Gupta, Raj, and Wilemon 1986; Ruekert and Walker 1987). In one way or another, this literature contends that marketing's neglect of this topic area has led to the "interdisciplinary isolation of marketing" (Wind and Robertson 1983, p. 14). Though the recent influx of marketing literature on this subject has begun to remedy this neglect (e.g. Barclay 1991; Gupta and Rogers 1991; Gupta and Wilemon 1991; Lim and Reid 1992; Crittenden et al 1993), the majority has been normative. Thus, the theoretical foundation of this research area needs further development since there is a limited understanding of the relationships between marketing and other functions (Ruekert

and Walker 1987, p. 1). The overriding purpose of this study is to improve this understanding by investigating factors which influence interaction and collaboration between departments.

A related purpose of this study is to examine the differences between interaction and collaboration. In particular, this dissertation attempts to identify antecedents of interaction and collaboration. This dissertation also investigates the role that each of these constructs plays within the business organization, i.e. in which situations would greater interaction exist? Furthermore, this dissertation examines the impacts of interaction and collaboration upon performance. Empirical evidence of such impacts helps to clarify various prescriptions which normative literature has made concerning interaction and collaboration.

Another purpose of this dissertation is to investigate contingency theory and sociotechnical theory. In particular, the intent is to determine whether each of the theories helps to explain interaction and/or collaboration between company departments. The rationale for using these two theories stems from Lorsch (1965), who studied the effects of differentiation upon integration, suggesting that greater differentiation would impede successful integration (as empirically measured, differentiation was the

differences in department structure, time orientation, interpersonal orientation, goals orientation, and perceived environment between each of the functions; integration was measured in terms of perceived collaboration). On the other hand, sociotechnical theory suggests that the direct effects of structure, technology, goals, and environment influence the social structure (Woodward (1965) and Perrow (1970) characterized the social structure as interaction). Overall, this study assesses the factors that influence integration, i.e. interaction and collaboration, specifically addressing whether these factors correspond to the differences between functions or the direct effects of the department structure, task structure, occupational orientation, goals, status, technology, and environment.

#### **POTENTIAL CONTRIBUTIONS OF THIS RESEARCH**

Disciplines that have a research interest in integrating functional groups will appreciate the theoretical and empirical developments emerging from this dissertation. Such disciplines include marketing, engineering management, organizational behavior, and sociology.

The dissertation hopefully improves the marketing discipline's (and other disciplines') limited understanding of the nature of these relationships by investigating

marketing's relationships with other company departments. The empirical nature of this study is especially welcome in an overwhelmingly normative literature stream.

The theoretical development and empirical study of interaction and collaboration should offer insight into antecedents of these two constructs as well as their impact upon performance. Study of interaction within the context of this dissertation is needed due to the lack of research attention to interaction across organizational subunits (Hall 1991, p. 175). The study of collaboration is also needed since it has been absent from marketing literature. As companies move toward team-oriented approaches to product development and product management (e.g. concurrent engineering), interaction and collaboration will only become more crucial. Thus, this study proactively addresses growing needs. Its results may possibly suggest how departments/functions could be integrated in terms of interaction (e.g. formally coordinated activities) and collaboration (e.g. mutual efforts).

Since this study is predicated on contingency and sociotechnical theories, it is expected that certain situations will require different levels of interaction and collaboration. Empirical investigation provides preliminary insight into the interaction and collaboration requirements



of varying situations. The ramifications of these situations are discussed.

In conjunction with the testing of the proposed model, an empirical test of contingency theory and sociotechnical theory is offered. The focus of this study is to determine whether a department's attributes influence interaction, as contended by sociotechnical theory, and whether attribute differences between departments influence collaboration, as contended by contingency theory. Hence, this study determines if individual attributes and/or attribute differences serve as a basis for the components of integration. This will benefit academics by providing a greater understanding of these theories. Managers will benefit by gaining greater insight into whether integration efforts should, as prescribed by sociotechnical theory, concentrate on directly modifying department structure, department tasks, employee orientations, goals, technologies, company markets (environments), status and/or should, as prescribed by contingency theory, concentrate on diminishing departmental differences.

#### **ORGANIZATION OF THIS DISSERTATION**

This dissertation is divided into five chapters as follows: Chapter One - Introduction, Chapter Two - Literature Review, Chapter Three - Methodology, Chapter Four

- Results and Discussion, and Chapter Five - Conclusions and Future Research.

Chapter One serves to introduce the impetus for studying marketing's integration with other departments; to define interdepartmental integration as a process comprising interaction and collaboration; to provide the statement of purpose; to present the potential contributions of this research; and to outline the organization of this dissertation.

Chapter Two presents the proposed model in greater detail. Contingency theory and sociotechnical theory are further discussed to provide a theoretical foundation for the proposed model of interdepartmental integration. Hypotheses for the relationships among the given constructs are generated for later empirical analysis.

Chapter Three discusses the methodology that was used to test the proposed hypotheses. Included are discussions on the research design, data analysis procedures, study sample, operationalization of constructs, and pretest procedures.

Chapter Four details the results of data analysis. The chapter begins with a description of the study participants, followed by a discussion of reliability analysis as applied to the measures used. The chapter then details findings concerning the direct effects of structural factors on

interaction, collaboration, and performance and findings concerning the effects of interdepartmental differences. The chapter concludes with a review of which hypotheses were supported, partially supported, or refuted.

Chapter Five summarizes the overall study and presents conclusions and managerial implications. Limitations of the research undertaken in this dissertations are noted, but while doing so, it is further noted that such limitations present challenging opportunities for future study in this research area.

## **CHAPTER 2**

### **LITERATURE REVIEW**

To provide the necessary theoretical foundation for the proposed model, the literature review begins with a thorough discussion of contingency theory and sociotechnical theory. This discussion specifically addresses the seminal work of Lorsch (1965) and Lawrence and Lorsch (1967; 1969; 1986) to outline contingency theory and the seminal work of Woodward (1965), Thompson (1967), and Perrow (1970) to outline sociotechnical theory. Following this discussion, the literature review incorporates these works and other literature to develop the proposed model and hypothesize relationships among the proposed model's constructs.

### **CONTINGENCY THEORY**

Contingency theory attempts to answer the question "What kind of organization does it take to deal with various economic and market conditions" (Lawrence and Lorsch 1986, p. 1). The theory's premise is that organizational functioning is contingent upon the environment, thus there is no best way to organize for all situations, but rather,

there are various ways in which an organization may adapt to environmental situations.

Marketing has relied on this theory to explain and predict interfirm behavior within marketing channels and organizational buying scenarios (cf. Spekman and Stern 1979). However, marketing has overlooked the theory's tenets concerning intrafirm behavior, upon which the theory, as constructed by Lorsch (1967) and Lawrence and Lorsch (1967; 1986), places considerable emphasis. As stated by Lawrence and Lorsch (1967, p. 2), "Our interest in examining complex organizations is to study more systematically and empirically their internal functioning in relation to the demands of the external environment on the organization and the ability of the organization to cope effectively with these demands, contributing to a theory of the functioning of large organizations based on empirical research." The heavy emphasis on intrafirm behavior is also illustrated by Lawrence and Lorsch's definition of an organization: "a system of interrelated behaviors of people who are performing a task that has been differentiated into several distinct subsystems, each subsystem performing a portion of the task, and the efforts of each being integrated to achieve effective performance of the system" (Lawrence and Lorsch 1967, p. 3).

Though Lawrence and Lorsch's definition suggests that the organization's subsystems (i.e., departments/functional units) are paramount to the organization's functioning, it is not the subsystems themselves, but rather the differentiation and integration of these subsystems that are critical to an organization's functioning. As stated by Lawrence and Lorsch (1967, p. 2), the driving research question was "What pattern of differentiation and integration of the parts of a large organizational system is associated with the organization's coping effectively with a given external environment." Differentiation was defined as "the state of segmentation of the organizational system into subsystems, each of which tends to develop particular attributes in relation to the requirements posed by its relevant external conditions" (Lawrence and Lorsch 1967, pp. 3-4); later defined as "differences in orientation and in the formality of structure...the difference in cognitive and emotional orientation among managers in different functional departments" (Lawrence and Lorsch 1986, pp. 10-11). Integration was defined as "the process of achieving unity of effort among the various subsystems in the accomplishment of the organization's task" (Lawrence and Lorsch 1967, p. 4); later redefined as "the quality of the state of collaboration that exists among departments that are

required to achieve unity of effort by the demands of the environment" (Lawrence and Lorsch 1986, p. 11).

The major research objective was to examine the relationship between these two concepts. Building upon Seiler (1963), who found that greater differentiation increased difficulty in achieving collaboration, Lorsch (1965) and Lawrence and Lorsch (1967; 1986) considered the impact of "requisite integration," or task interdependence. They argued that the greater the degree of differentiation, given a similar degree of task interdependence, would promote greater integration problems.

Another hypothesis of Lawrence and Lorsch concerned the relationships between overall performance and the constructs of differentiation and integration. It was hypothesized that a degree of differentiation consistent with the requirements of subsystems' environments and a degree of integration consistent with requirements of the total environment would promote successful organizational performance (Lawrence and Lorsch 1967, p. 11).

An empirical study of six organizations within the chemical processing industry was undertaken to test these and other hypotheses. The construct of differentiation was characterized as comprising the four organizational attributes of degree of structure, interpersonal orientation, time orientation, and goal orientation

(Lawrence and Lorsch 1967, p. 5; 1986, pp. 9-11) [Note that Lorsch (1965, p. 11) had considered differentiation on two dimensions: 1) structure and 2) occupational orientation, which comprised task orientation, time orientation, and interpersonal orientation]. Differentiation was operationalized as the difference between paired scores of interdependent departments across these four attributes. Integration was operationalized as a department's perceived relationship with the given departments of sales, production, and research. Organizational performance was measured by objective sales data and subjective ratings by managers.

Empirical findings found a significant relationship between differentiation and integration. Specifically, highly differentiated pairs of subsystems (i.e., departments differing on various attributes) encountered more difficulty in achieving integrated efforts than less differentiated pairs. Interestingly, this relationship was significant for the total differentiation score, but not significant for all individual attributes. Lawrence and Lorsch (1967, p. 24) suggested that "it may be the sum effect of differences in orientations and differences in formalized structure between any two subsystems that is related to achieving effective integration, and not just a large difference in one attribute."



Findings concerning the effects of differentiation and integration on organizational performance tentatively suggested that within the given dynamic, heterogeneous environment of chemical processing, high differentiation coupled with high integration achieve high performance. However, findings pointed to integration as a better single predictor of performance than differentiation alone (Lawrence and Lorsch 1967, p. 46).

Besides differentiation, Lorsch (1965) and Lawrence and Lorsch (1967; 1986) emphasized the need for conflict resolution mechanisms to facilitate integration. Simply stated, "the different points of view held by various functional specialists are frequently going to lead to conflicts about what directions to take. To achieve effective integration these conflicts must be resolved" (Lawrence and Lorsch 1986, p. 12).

### **Implications For This Dissertation**

One implication of Lawrence and Lorsch's work is that high differentiation diminishes collaboration. That is, differences between departments in regards to department structure, task orientation, goal orientation, and environment will reduce collaboration. The lack of conflict resolution mechanisms also will reduce collaboration.

Lawrence and Lorsch contended that organizational performance would be influenced by differentiation and integration jointly, and that integration alone could also affect organizational performance. This suggests that differentiation (i.e., differences in orientations and the department structure) may have an indirect effect on performance through collaboration. This indicates that differences across attributes of departments will be related to the affective construct of collaboration, which in turn, will have a direct effect on performance.

#### **SOCIOTECHNICAL THEORY**

Whereas contingency theory focuses on the environment's impact upon structure, sociotechnical theory focuses on technology's impact upon the organization. The basis of sociotechnical theory is that different technologies impose different demands on the organization, and that these demands need to be met through an appropriate organizational structure (Woodward 1965, p. vi). Although marketing literature has overlooked sociotechnical theory, the theory deserves attention since it provides a systematic basis for noting differences among organizations (Perrow 1970, p. 21) as well as investigating interdepartmental interaction.

Two authors associated with sociotechnical theory are Woodward (1965) and Perrow (1967; 1970). Also associated

with sociotechnical theory is Thompson (1967), who synthesized contingency and sociotechnical theories by hypothesizing that both environment and technology have effects on the organizational structure (Bidwell and Kasarda 1985). This study portrays Thompson as a sociotheorist since his discussions of integration, like those of Woodward and Perrow, pertained to structural interactions of communications and resource interdependence, not the affective relationship of collaboration as characterized by Lawrence and Lorsch.

#### **Woodward (1965)**

Woodward (1965) used an empirical sociology approach to assess industrial management practices of firms. Her study's findings provided evidence to suggest a link between manufacturing techniques and organizational structure. "The survey findings suggested that the link between technology and organization persists in spite of, rather than because of, conscious behavior or deliberate policy, and in defiance of the tendency in management education to emphasize the independence of the administrative process from technical considerations" (Woodward 1965, pp. 77-78). Further evidence suggested a relationship between the technology-structure linkage and organizational success. Within the three manufacturing technique categories (unit and small

batch, large batch and mass production, and process production), successful firms reflected similar structures. Structure was operationalized in terms of number of employees, span of control, size of the management group, ratio of managers and supervisors to nonsupervisory personnel.

To investigate the hypothesis that technology influenced organization structure, Woodward undertook case studies of various industrial firms. Not only did these case studies confirm the hypothesis, but they afforded an analysis of the organization's infrastructure. With "particular emphasis on the relationships between the three main manufacturing tasks: development, production, and marketing " (p. 123), Woodward (1965) found that "the link between organization and technology was clearly discernible, for not only the nature of the development, production, and marketing functions, but also their sequence depended to a great extent on technical factors" (p. 126). Hence, production technology appeared to influence the sequencing and interaction between departments. Woodward (1965) noted that unit and small batch firms required daily meetings and "direct and speedy lines of communication" (p. 134), while large batch, mass production, and process production firms relied on formal information exchange only (p. 128).

An implication of Woodward's research is that technology, i.e. manufacturing techniques, appears to have a direct relationship on the nature of interaction between departments. A second related implication is that this direct relationship was predicated on a structural construct of interaction, which pertained to communication behavior and information exchange; this supports this dissertation's distinction between collaboration and interaction. A third implication concerns Woodward's observation that some form of interaction was necessary for day-to-day operations of the firms she studied. Presumably, interaction should have a relationship to performance.

#### **Perrow (1970)**

Perrow (1970) ascribed to Woodward's thesis of a technology-structure linkage, but differed slightly in regards to the definitions of technology and structure. Specifically, Perrow defined technology as the routineness of work, not the manufacturing process, and defined structure more broadly by equating structure with social relations among groups.

Perrow (1970), whose work heavily emphasized interorganizational and intrafunctional issues (i.e. the relationship between staff and line positions within a function), suggested that technology would impact the social

relations between departments. He contended that the nature of work, i.e. technology, would affect the lateral communication within the organization: routine situations would require less personal contact and information exchange than nonroutine situations (Perrow 1970, p. 20). In addition to technology's influence on the social structure, Perrow discussed the impacts of bureaucratic structure, environment, and goals on social relations. He commented that the key problem for any one organization is to insure that technology, structure, goals, and the means of relating to the environment are in harmony (Perrow 1970, p. 174).

The significance of Perrow's work is that it expanded sociotechnical theory beyond the variable of technology, thereby providing a more comprehensive view of organizations. His work also asserts the sociotheorist belief that the structural nature of social relations would be influenced directly by the work environment. As stated, "there is enormous potential in organizations for a direct attack on behavior, without intermediate efforts to alter attitudes or personality...Designing and managing the structure of the organization is the key" ((Perrow 1970, p. 176). This reaffirms this dissertation's contention that sociotechnical theory prescribes direct effects from the departmental structure, task structure, technology, goals, and the environment onto interaction.

### **Thompson (1967)**

Thompson's (1967) synthesis of contingency and sociotechnical theories was predicated on the contention that "technologies and environments are major sources of uncertainty for organizations" (Thompson 1967, p. 13). Organizations respond to these uncertainties through the specialization of functions and the coordination of these function's efforts.

Like Perrow, Thompson (1967) characterized technology as the nature of work and structure as social relations. However, Thompson considered technology as the degree of interdependence, with three types of internal technologies identified: pooled interdependence, where "each part renders a discrete contribution to the whole and each is supported by the whole" (p. 54); sequential interdependence, where the order of interdependence is specified in a serial, nonsymmetric format (p. 54); and reciprocal interdependence, where "the outputs of each become inputs for the others" (p. 55). Thompson (1967) suggested a hierarchy for these three types of interdependence, with organizations at least having pooled interdependence, progressing to sequential interdependence, and then reciprocal interdependence.

Based on the type of interdependence within the organization, Thompson (1967) contended that different types of coordination mechanisms would be necessary to bring about

"concerted action" (p. 55). Pooled interdependence would require "coordination by standardization," which was characterized as less frequent, routine communication. Sequential interdependence would require "coordination by plan," which comprised greater frequency and volume of communication. Reciprocal interdependence would require high frequency and volume of communication, which Thompson called "coordination by mutual adjustment" (Thompson 1967, p. 56). Thompson suggested various mechanisms that organizations would employ to satisfy these communication requirements. He hypothesized that liaisons would be used in the case of pooled interdependence, committees in the case of sequential interdependence, and task-forces in the case of reciprocal interdependence (p. 61).

As previously mentioned, Thompson's (1965) discussion of the environment pertained to the general organization, not interfunctional interaction. Yet, based on Thompson's propositions, individual departments would be assigned specific task environments on which to concentrate efforts to reduce uncertainty (pp. 70-73). Such efforts, which would comprise part of the organization's social structure, would be influenced by the complexity of the environment.

Beyond the implication that technology and the environment influence the social structure, i.e. interaction, Thompson (1967) provided the implication that



the task structure, characterized as interdependence, should influence the nature of interaction between functions. Another implication is that organizations will employ liaisons, committees, and task forces to promote the appropriate degree of communication. On the other hand, collaborative teams may be distinguished as having a greater purpose than just communication; that is, teams necessitate voluntary, unified effort, which Thompson does not address.

#### **RECAPITULATION OF THE ABOVE DISCUSSION**

The work of Lorsch (1965) and Lawrence and Lorsch (1967; 1986) is most closely related to the research agenda of this dissertation, i.e. the study of interdepartmental activity. Based on their work, differences on attributes between departments appear to influence collaborative efforts. Such attributes include departmental structure, task structure, occupational orientation, goal orientation, and environment.

Though sociotechnical theory has been used to compare organizations (i.e., interfirm analysis), the propositions and empirical observations of Woodward (1965), Perrow (1970), and Thompson (1967) have offered various organizational attributes that influence an organization's "social structure," or interaction behavior. Similar to Lorsch (1965) and Lawrence and Lorsch (1967; 1986), these

attributes include departmental structure, task structure, goal orientation, and environment in addition to technology, which sociotechnical theory characterizes as paramount to the organization's functioning. Each of these variables is proposed to directly influence social structure.

In sum, contingency theory and sociotechnical theory are complementary since they portray groups as contingent upon the aforementioned six attributes and the common, less discussed attribute of department status. Together these seven attributes represent key influencers of a department's integration activities. The two theories differ in regards to the key influence - the environment (contingency theory) or technology (sociotechnical theory), but another, more important difference is that the two theories diverge on how these attributes affect integration. Contingency theory states that high differentiation inhibits collaborative efforts, i.e., two departments of unlike attributes will not work together, nor desire a working relationship, since they lack a common tie between the two departments.

Sociotechnical theory states that attributes of an individual department influence its own interaction behavior, i.e., a department with attributes that allow or require boundary spanning will interact with other departments; this does not mean that the department wishes to work with other departments, but rather, the department

will perform a resource transaction, exchange information, and/or communicate and then resume its separate activities.

These two perspectives concerning interaction and collaboration suggest two propositions that guide this dissertation's research agenda and serve as the basis for the proposed model. These two propositions are as follows:

- P1: Individual attributes of a department will influence that department's interaction with other departments.
- P2: Differences in attributes between two departments will influence each department's collaboration with the other department.

#### **AN EXPANDED MODEL OF INTEGRATION**

Predicated on the two above propositions, Figure 2.1 presents an expanded model of marketing's integration with other departments. This expanded model incorporates the seven organizational attributes presented by Lorsch (1965), Lawrence and Lorsch (1967; 1986), Woodward (1965), Perrow (1970), and Thompson (1967), which pertain to interdepartmental relationships. As previously mentioned, these seven attributes include 1) department structure, 2) task structure, 3) occupational orientation, 4) goals, 5) technology, 6) environment, and 7) status.

In proposing the model of Figure 2.1, the specific research agenda is 1) to assess the roles of these attributes as antecedents to interaction and collaboration,

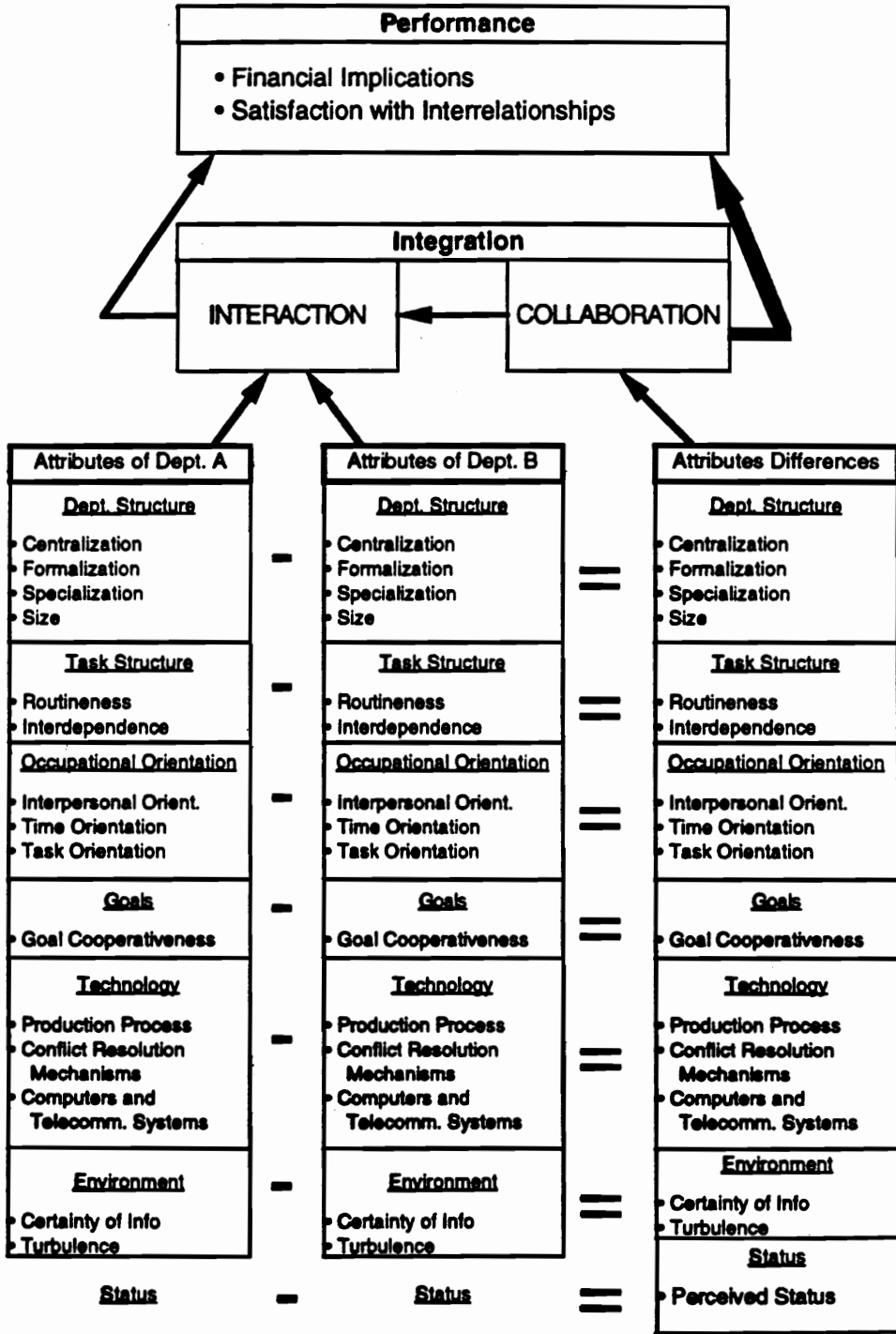


Figure 2.1: An Expanded Model of Integration

2) assess the relationship between interaction and collaboration, and 3) assess the effects of interaction and collaboration on performance. To simplify discussion of the roles of attributes as antecedents, each attribute is presented as a separate section.

### **Department Structure**

Both Woodward (1965) and Lawrence and Lorsch (1967, 1986) employed span of control as a primary determinant of department structure. As today's firms flatten and streamline their organization's hierarchy, span of control will become less significant compared to other structural measures. Consistent with the marketing literature of Barclay (1991), four elements of department structure are considered more viable: centralization, formalization, specialization, and size. Note that Barclay (1991) used these constructs to describe the overall company, while this dissertation intends to use these constructs to examine the structure of the individual department.

Centralization is the concentration of decision-making at higher levels in the department (adapted from Barclay 1991). In highly centralized departments, interaction will occur only at the managerial level, thus reducing opportunities for increased interaction. Decentralized departments will permit employees to span departmental

boundaries, thus increasing the propensity for interaction. Empirical research by Hage, Aiken, and Marrett (1971) has suggested that greater centralization diminishes interdepartmental communication. As for collaboration, departments with similar degrees of centralization should be more likely to collaborate. When different, the centralized department's inability to initiate action without approval should frustrate the less centralized department. Such frustration will diminish collaborative efforts.

H1a: An individual department's centralization will negatively influence its interaction with other departments.

H1b: Centralization differences between two departments will negatively influence each department's collaboration with the other department.

Formalization is the extent to which there are established rules and procedures for work within the department (adapted from Barclay 1991). Highly formalized departments will regulate their interaction, thus minimizing opportunities for spontaneously increased interaction. Less formalized departments will rely on impromptu interaction, which will allow greater latitude and opportunities for interaction. The empirical work of Hage, Aiken, and Marrett (1971) reflected a weak, negative relationship between formalization and interaction. Departments with similar degrees of formalization should have a greater tendency to

collaborate. When different, a more formalized department will appear strict, rigid, and unresponsive to a less formalized department, and a less formalized department will appear loose, disorganized, and uncontrolled to a more formalized department. These perceived differences will inhibit the willingness of each type of department to work jointly with an opposing type of department.

H2a: An individual department's formalization will negatively influence its interaction with other departments.

H2b: Formalization differences between two departments will negatively influence each department's collaboration with the other department.

Specialization is the division of labor in regards to task specialties (adapted from Barclay 1991). A department which utilizes specialized employees and/or directs individual employees to specific tasks will diminish opportunities for interaction since boundary spanning by employees will be minimized. Global employees, which are characteristic of low specialization, will be greater boundary spanners, thus requiring more communication and information to perform their jobs. Specialization differences between departments will decrease collaboration since highly specialized departments will disfavor the general orientation of less specialized departments, thus discouraging voluntary joint activities.

H3a: An individual department's specialization will negatively influence its interaction with other departments.

H3b: Specialization differences between two departments will negatively influence each department's collaboration with the other department.

Department size is defined as the scale of operations (adapted from Barclay 1991); operationalized as the number of employees assigned to a department. Assuming all things equal, larger departments will require greater resources and information to function adequately. Larger departments will therefore increase interactions with other departments to satisfy their resource and information needs. Size differences between departments will decrease collaborative efforts since smaller departments will be unable to satisfy the resource and/or information needs demanded by larger departments.

H4a: An individual department's size will positively influence its interaction with other departments.

H4b: Size differences between two departments will negatively influence each department's collaboration with the other department.

### **Task Structure**

Task structure comprises two elements that describe the nature of departmental work activities. Included are Perrow's (1970) and Thompson's (1967) notions of work technology: routineness and interdependence, respectively.



Note that these two elements parallel Lorsch's (1965) measures of task certainty and requisite integration.

Perrow (1970, p. 75) portrayed routineness as two conditions - the certainty of procedures and the nonvariability of raw materials. In cases of routine tasks, communication and information will be simplified to eliminate extraneous and irrelevant information (Perrow 1970, p. 20). Conversely, nonroutine tasks will require lateral communication to ensure proper coordination of departments (Perrow 1970, p. 20). Empirical research by Van de Ven and Ferry (1980) showed that task variability increased the frequency of reports, discussions, and meetings. Departments with similar task routineness will collaborate since such similarity will promote mutual understanding and shared experience of the task situation. Departments with differences will diminish their collaborative efforts since they will lack a joint understanding, thereby disagreeing on how situations should be managed.

H5a: An individual department's routineness will negatively influence its interaction with other departments.

H5b: Routineness differences between two departments will negatively influence each department's collaboration with the other department.

Thompson (1967) characterized three levels of interdependence. The lowest level - pooled interdependence, will require low degrees of interaction since activities can be controlled. The middle level - sequential interdependence, will require increased degrees of interaction since activities are less controllable. The highest level - reciprocal interdependence, will require the most interaction to coordinate variable activities (Thompson 1967, p. 56). Moreover, the work of Thompson implies that increasing interdependence corresponds to increasing interaction. Van de Ven and Ferry (1980) supported this implication by finding that dependence on other departments correlates to an increased frequency of reports, discussions, and meetings. As for collaboration, a department more dependent upon another department will wish to collaborate because it gains through collaboration; the less dependent department will have no incentive to collaborate since nothing is gained through such efforts. Hence, departments that differ in terms of their interdependence will not likely pursue collaborative activities. Departments of equal interdependence will see mutual gains and/or no losses to collaboration activities, thus, they will pursue such activities to maintain the equal relationship.

H6a: An individual department's interdependence will positively influence its interaction with other departments.

H6b: Interdependence differences between two departments will negatively influence each department's collaboration with the other department.

### **Occupational Orientation**

Lorsch (1965) and Lawrence and Lorsch (1967, 1986) identified three specific dimensions of ways of thinking and working that develop among managers in various functional units (1986, p. 9). These included interpersonal orientation, time orientation, and task orientation. With respect to the latter dimension of task orientation, Lawrence and Lorsch (1967, 1986) used the terminology of goal orientation, contrasting Lorsch (1965) who used the terminology of task orientation. This dissertation uses task orientation since the measure used by Lawrence and Lorsch did not truly assess goals, but rather, assessed criteria important to managers when reviewing new product ideas.

Interpersonal orientation characterizes the way in which managers of various departments deal with their colleagues (Lawrence and Lorsch 1986, p. 10). Managers preoccupied with getting the job done when dealing with others should be more likely to standardize communication, thereby minimizing extraneous and irrelevant interaction.

Managers preoccupied with maintaining social relationships should prefer more interaction to increase such relationships. Interpersonal differences between departments would promote personality conflicts, thus diminishing collaborative efforts.

H7a: An individual department's interpersonal orientation that favors social relationships will positively influence its interaction with other departments.

H7b: Differences between two departments' interpersonal orientations will negatively influence each department's collaboration with the other department.

Time orientation represents the timespan of definitive feedback for departmental activity (Lawrence and Lorsch 1967, p. 8). A department with a short-term orientation will be more likely to increase communication to insure prompt feedback. In contrast, a department with a long-term orientation will be likely to have lesser communication due to the non-urgency of feedback. Time differences among departments will promote frustration since a long-term perspective conflicts with a short-term perspective. Hence, time orientation differences will diminish collaboration.

H8a: An individual department's length of time orientation will negatively influence its interaction with other departments.

H8b: Differences between two departments' time orientations will negatively influence each department's collaboration with the other department.

Task orientation addresses the concerns of a particular department when undertaking activities. Traditionally, marketing would be concerned with customer satisfaction; production would be concerned with operations efficiency; development would be concerned with product technology; and finance would be concerned with return on investment. Those departments that take a nontraditional approach and concern themselves with a variety of issues versus a singular concern should be more likely to interact. Such interaction would be necessary to obtain information to keep the department abreast of multiple concerns. Differences in task orientation will impede mutual understanding plus promote personality conflicts due to each department positioning their concerns ahead of other departments' concerns. Both these factors - a lack of mutual understanding and personality conflicts - will diminish collaboration.

H9a: An individual department's breadth of task orientation will positively influence its interaction with other departments.

H9b: Differences between two departments' task orientations will negatively influence each department's collaboration with the other department.

## **Goals**

As suggested by Perrow (1970, p. 133), goals or ends must be examined to analyze organizational behavior.

However, Perrow did not detail how goals influence interaction. Lawrence and Lorsch (1967; 1986) also considered goals in the form of goal orientation, yet as previously discussed, they do not address specific department goals but general orientations. A unique approach is the work of Tjosvold (1988a, 1988b, 1990), which supports a relationship between goal cooperativeness and interaction and collaboration.

Tjosvold (1990, p. 1119) argued that "interaction could be usefully distinguished by whether people believed their goals are cooperative, competitive, or independent. In cooperation, people believe that their goal attainment is positively related so that the success of one helps the other to be successful. In competition, people understand that their goals are negatively linked so that as one moves toward goal attainment others are more likely to be frustrated. People with independent goals believe that one person's success neither assists nor frustrates others' goals." Empirical study by Tjosvold (1988a, 1988b, 1990) revealed that departments perceiving their goals as cooperative reflected greater interaction; departments perceiving competitive goals had a strong negative relationship with interaction activities; and departments with independent goals reflected a slight negative relationship with interaction.

Tjosvold (1988a, 1988b, 1990) also explored the construct of collaboration using interviews to document cases of effective and ineffective collaboration. Results tentatively suggested that cooperative goals promote collaboration. However, it is unclear whether one department perceiving cooperative goals promotes collaborative activity or whether joint departments perceiving cooperative goals promote collaborative activity. This dissertation supports the latter since it is more reasonable. Departments whose collective efforts can achieve both departments' goals (i.e. cooperative goals) will be likely to pursue collaborative efforts. In cases where departments have competitive or independent goals, there will be no advantage to pursue collaborative efforts.

H10a: An individual department's perceptions of cooperative goals will positively influence its interaction with other departments.

H10b: Differences between two departments' perceptions of cooperative goals will negatively influence each department's collaboration with the other department.

## **Technology**

Paramount to sociotechnical theory is the notion that technology will influence social structure. The notion of work technology, which was the basis of Perrow (1970) and Thompson (1967), has already been considered within the task

structure construct. Other characterizations of technology warrant investigation. These include production process technology (Woodward 1965); conflict resolution mechanisms (Lawrence and Lorsch 1967, 1986); and computer and telecommunication systems (Schrage 1990).

As previously discussed, Woodward (1965) revealed that different production processes promoted different degrees of interaction. Woodward did not explain these differences, but rather, reported that unit and small batch systems had higher levels of interaction, large batch and mass assembly systems had lesser levels of interaction, and process systems had the lowest levels of interaction. One possible explanation is that unit/small production systems permit greater product line diversity in comparison to process production systems. Greater product line diversity will require more communication to design the line, establish production schedules, organize the selling effort, distribute the product, etc. Differences over the nature of the production process will lead to disagreements over the management of the production function as well as instill inconsistent expectations of what the production process could provide for respective departments. Disagreements and inconsistent expectations will promote a lack of mutual understanding and shared vision for the production situation between departments, thus impeding collaborative efforts.



H11a: An individual department's perception of the diversity of the production process will positively influence its interaction with other departments.

H11b: Differences between two departments' perceptions of the diversity of the production process will negatively influence each department's collaboration with the other department.

Lawrence and Lorsch (1986, p. 12) contended that "the different points of view held by functional specialists are frequently going to lead to conflicts about what directions to take." Lawrence and Lorsch stated that effective integration will only be achieved if conflict can be resolved. They discussed the use of integrating teams, committees, and departments as viable conflict resolution mechanisms, but did not explain their viability. One explanation is that a department satisfied with existing conflict resolution mechanisms will likely communicate and exchange information since any disagreements will be adequately resolved. In those cases of dissatisfaction, interaction will be reduced to minimize conflictual episodes. Departments that disagree on the effectiveness of conflict resolution mechanisms will fail to collaborate since any outcomes from conflict will appear unequal. Conversely, departments that jointly find these mechanisms effective will accept such outcomes as fair, thus facilitating continued collaborative efforts.

H12a: An individual department's perception of the effectiveness of conflict resolution mechanisms will positively influence its interaction with other departments.

H12b: Differences between two departments' perceptions of the effectiveness of conflict resolutions mechanisms will negatively influence each department's collaboration with the other department.

Schrage (1990) prescribed that computer and telecommunication systems, e.g. computer-aided-design, electronic mail, and teleconferencing, will influence interaction and collaboration. This influence will derive from system effectiveness in facilitating communication and information exchange. Greater system effectiveness will promote greater interaction since barriers to communication and information exchange will be minimized. Departments that use the same computer and telecommunication systems will have ready access to each other and share communication and information linkages. Conversely, departments that use different computer and telecommunication systems will find it difficult to establish common communication and information linkages, thus collaboration will diminish.

H13a: An individual department's perception of the effectiveness of computers and telecommunication systems will positively influence its interaction with other departments.

H13b: Differences between two departments' perceptions of the effectiveness of computers and telecommunication systems will negatively influence each department's collaboration with the other department.

## **Environment**

Contingency theory's premise is that the environment primarily influences the social structure. Lorsch (1965) and Lawrence and Lorsch (1967; 1986) examined environmental conditions, suggesting that uncertain environments would require a flexible structure to permit communication, while certain environments would be managed via "preplanned and limited communication nets" (Lawrence and Lorsch 1967, p. 6).

As measured, the construct of environment was a composite of three factors: two environment factors - uncertainty of information and the rate of change - and a task-specific factor - time span of definitive feedback. Lorsch (1965) and Lawrence and Lorsch (1967; 1986) only analyzed the effect of the global environment construct, not the specific factors comprising the construct. Since the first two elements specifically addressed the external environment and since task specific issues have already been considered within this dissertation, only the two environment factors are considered further.

In cases of greater information uncertainty and/or environmental turbulence, there will be a greater need for more feedback and information to cope with the environmental situation. Correspondingly, there will be increased information searching, requiring expanded communication activities, i.e., greater interaction activities. Differences over the certainty of information and/or environmental turbulence will inhibit collaborative activities since such differences will promote misunderstandings and disagreements, which will diminish the attractiveness of collaborative efforts.

H14a: An individual department's perceived uncertainty of information will positively influence its interaction with other departments.

H14b: Differences between two departments' perceived uncertainty of information will negatively influence each department's collaboration with the other department.

H15a: An individual department's perceived environmental turbulence will positively influence its interaction with other departments.

H15b: Differences between two departments' perceived environmental turbulence will negatively influence each department's collaboration with the other department.

## **Status**

The least discussed of the identified organizational attributes has been departmental status. Though Woodward

(1965, p. 126-127) discussed "the critical function," Perrow (1970) acknowledged departmental power, and Thompson (1967) expanded on the dominant coalition, none of these authors related status to interaction. On the other hand, Lawrence and Lorsch (1986, p. 112) observed that an imbalance in status seemed to reduce the effectiveness of integration. It is suggested that no relationship exists between status and interaction since status should affect only cases where two departments can compare themselves, not cases where departments act individually, like those of interaction. Conceivably, higher status departments will not collaborate with lower status departments since nothing is gained from such collaboration. In fact, high status departments may fear losing status if they collaborate with lower status departments.

H16a: An individual department's status will be unrelated to its interaction with other departments.

H16b: Differences between two departments' status levels will negatively influence each department's collaboration with the other department.

### **The Relationship Between Interaction and Collaboration**

Much literature confuses the relationship between interaction and collaboration. For instance, Tjosvold (1988a, 1988b, 1990) used interaction as a synonym for collaboration. This dissertation contends that they should

be considered separately. As Schrage (1990, p. 31) states, "collaboration means that people are less interested in displaying data than in creating a shared place to play collectively with ideas and information."

Typically, literature has prescribed that greater communication improves relationships. Schrage (1990, p. 29) contends that such literature overlooks the fact that communications do not promote involvement, creativity, nor the sharing of information. "In a communication-oriented environment, people discuss what they want to do and then go off and do what they think they've agreed on; in a collaborative environment, people spend as much time understanding what they are doing as actually doing it" (Schrage 1990, p. 31-32). Schrage (1990, p. 31) adds that more communication may diminish collaboration due to frustration from misunderstandings, confusions, ambiguities, and uncertainties. Woodward's (1965) research also showed that forced interaction led to poor intergroup relationships. Conversely, collaboration promotes interaction since there is a shared/common understanding from which to facilitate future interaction. Schrage (1990, p. 32) elaborates that "communication is the contractor to collaboration's architect."

H17: A department's collaboration with another department will positively influence its interaction with that department.

H18: A department's interaction with another department will not influence its collaboration with that department.

### **The Effects of Interaction and Collaboration on Performance**

The findings of Lorsch (1965) and Lawrence and Lorsch (1967; 1986) evidenced that high performers will have high degrees of differentiation coupled with high degrees of integration. As stated by Lawrence and Lorsch (1967, p. 30), "it is clear that to be effective, the organization will have to achieve integration between specialists, while simultaneously encouraging increased differentiation." Differentiation allows the organization to deal with the specifics of the environment, while integration manifests a collective organizational task of coping with the external environment (Lawrence and Lorsch 1967, p. 11). Interestingly, Lawrence and Lorsch (1967, p. 46) noted that collaboration "appeared a better predictor of performance than differentiation alone." This suggests that there exists a relationship between collaboration and performance. Lawrence and Lorsch did not pursue this research issue, leaving it for future research.

The exploratory work of Tjosvold (1988b) provides a somewhat better perspective of collaboration's relationship to performance. Tjosvold (1988b, p. 284) found that collaboration promoted winning contracts, greater customer

satisfaction, improved productivity, improved morale, and departmental confidence. This suggests that collaboration will enhance performance in terms of satisfaction with interrelationships and financial implications. Also, performance will be enhanced because collaboration facilitates the sharing of resources, which promotes goodwill and minimizes potential costs that would have been expended by departments separately. As for interaction, financial performance should improve since interaction will reduce costs associated with searching beyond the organization to obtain information and resources. However, it is questionable whether the individual nature of interaction will promote a department's satisfaction with other interrelationships. Since collaboration appears to influence the two components of performance, it is expected that collaboration will have a greater impact on performance than interaction.

H19a: Interaction will increase performance.

H19b: Collaboration will increase performance.

H19c: Collaboration will have a stronger effect on performance than interaction.



## CHAPTER 3

### METHODOLOGY

Admittedly this dissertation only addresses a subset of issues subsumed within contingency and sociotechnical theories. These theories encompass a wider perspective, including the interactions among and moderating effects of organizational attributes upon an organization's internal functioning. However, at beginning of this study, consideration of interaction effects and moderating effects would have been premature. There was an immediate need to identify pertinent antecedents of interaction and collaboration and an immediate need to specify the nature of the relationships between these antecedents and interaction and collaboration. There was also an immediate need to assess the impact of interaction and collaboration upon performance. Having addressed these three needs in this dissertation, future study can begin to investigate the complex relationships of interactions and moderating effects.

## RESEARCH DESIGN

This dissertation employed a mail survey methodology to investigate antecedents and consequences of interaction and collaboration. These antecedents and consequences derived from the hypothesized relationships specified within Chapter Two of this dissertation. Although mail surveys incur biases associated with nonresponse, false reporting, incorrect reporting, and late responses, a mail survey was preferred since a larger sample was reached in a relatively shorter time period at a lower cost.

The recipient for the survey was department managers. Individual department managers served as one unit of analysis, while differences between managers served as a second unit of analysis. Use of departmental managers relied heavily upon the assumption that managers represent the sentiments of their departments (Phillips 1981). Since managers oversee the functioning of their respective departments as well as deal directly with other departmental managers, they should be most involved with interaction and collaborative activities, and therefore, most able to reflect appropriate characterizations of the departmental situation.

To limit the scope of departments analyzed, only the three departments of marketing, manufacturing, and research and development (R&D) were canvassed. These three

departments were chosen due to their clear, direct impact on product development and product management success.

Furthermore, Woodward (1965), Lorsch (1965), and Lawrence and Lorsch (1967; 1986) distinguished marketing/sales, production, and R&D as the key "task functions" within manufacturing organizations.

### **DESCRIPTION OF ANALYSES**

Two analyses were undertaken. The first analysis employed structural equation modelling (cf. Joreskog and Sorbom 1989) to assess the direct causal contributions of antecedent variables onto interaction, collaboration, and performance; the direct causal contributions between interaction and collaboration; and the direct causal contributions of interaction and collaboration on performance. This first analysis therefore addressed the first proposition and the given hypotheses concerning direct effects of structural variables, interaction, and collaboration. As hypothesized, relationships between antecedents and interaction should have been statistically significant. Also hypothesized, collaboration should have significantly influenced interaction and had a stronger relationship with performance than interaction. Since this dissertation did not predict any relationships between the antecedents and collaboration and the antecedents and

performance, all statistically significant relationships among these variables are discussed post-hoc to guide future study.

The second analysis examined the differences between departments, thereby addressing the second proposition and the given hypotheses concerning attribute differences of structural variables. Differences consisted of the antecedent scores from each department being contrasted against other departments within the same organization. The absolute value of these contrasts served as the difference scores. For example, if the departments of marketing, production, and development from the same company responded, three difference scores would be calculated: marketing-production (which would be equivalent to production-marketing), marketing-development (which would be equivalent to development-marketing), and production-development (which would be equivalent to development-production). The benefit in using absolute values of differences between departments is that it helps to simplify interpretation of relationships. A negative correlation would suggest that low differentiation promotes interaction, collaboration, and/or performance. As hypothesized, attribute differences between departments should have significant negative relationships to a department's collaboration. Since this dissertation did not predict relationships between attribute

differences and interaction and attribute differences and performance, any statistically significant relationships are discussed post-hoc to guide future study.

#### **SURVEY SAMPLE**

The survey sample comprised department managers of member manufacturers in the Electronic Industries Association (EIA), which had given permission to use the EIA membership directory. The decision to concentrate on the electronics industry was deemed appropriate since the nature of the industry requires companies to carefully manage marketing, manufacturing, and R&D departments. Since a dyadic (interdepartmental) analysis was undertaken as well as an individual department analysis, a minimum response of two departments per company was desired.

Since this dissertation employed a structural analysis approach, a total of 980 manufacturing companies were initially canvassed. The large initial sample size was deemed necessary in order to achieve an appropriate response rate. Based on an expected 25% response rate, this study attempted to achieve Bagozzi and Yi's (1988) recommended minimum sample size of 200.

## OPERATIONALIZATION OF CONSTRUCTS

In accordance with the mail survey methodology, appropriate measures were necessary to tap the given constructs of department structure, task structure, occupational orientation, goals, technology, environmental conditions, status, interaction, collaboration, and performance. The measures used in this study were adapted, adopted, or newly constructed. A description of each of these measures now follows. Note that Appendix I provides a complete listing of the measures used to investigate the constructs of this dissertation. Appendix II presents the cover letters and the actual questionnaires that were sent to marketing, manufacturing, and R&D managers.

Department structure was characterized as the four variables of centralization, formalization, specialization, and size. Scales for the first three variables were adapted from Barclay (1991) and Hage (1974) and rated on a five point scale of "definitely false" to "definitely true." Measures of centralization, formalization, and specialization consisted of four, six, and three items, respectively. Size was the number of full-time employees within the department. Size was also evaluated by a check question, which asked respondents to describe their department employment as small, medium, large, or very large.

Task structure comprised the two variables of routineness and interdependence. Adapted from Hage (1974), routineness consisted of four items rated on a five point scale of "definitely false" to "definitely true." Interdependence, which is adapted from Van de Ven and Ferry (1980) and Ruekert and Walker (1987), queried the dependence between the respective department and other departments using a five point scale of "not at all" to "very much."

Occupational orientation represented the constructs of Lorsch (1965) and Lawrence and Lorsch (1967, 1986), i.e. interpersonal orientation, time orientation, and task orientation. The same scales used by these authors were used in this dissertation, though some modifications were made to update the scales. Interpersonal orientation was measured by Lawrence and Lorsch's scale for assessing the interpersonal styles of task versus social relationships. Since Lawrence and Lorsch adapted their scale from Fiedler (1967), Fiedler's most recent (1987) version of this scale was used. Time orientation was assessed by respondents specifying the time period it takes for their department's activities to impact the company's profit and loss statements. Task orientation was measured by having respondents select top criteria for new products, which then was used to characterize the department as marketing-

oriented, manufacturing-oriented, R&D-oriented, and/or general business-oriented.

Goals, as previously discussed, was examined with respect to their "cooperative" nature. Since Tjosvold (1988a, 1988b, 1990) used interviews, not questionnaires, a new scale was constructed, addressing the compatibility ("cooperativeness") of goals between various departments. A five point scale of "very incompatible" to "very compatible" was used.

Status was assessed by asking respondents to rate their status in relation to other departments. A new, exploratory measure was created, using a five point scale of "much less status" to "much more status."

Technology comprised the three elements of production process technology, conflict reduction mechanisms, and computers and telecommunication technology. In adapted Woodward's (1965) scale of production process technology, production process was characterized as a job shop, small batch flow, large batch flow, assembly line, continuous flow, or other. Conflict reduction mechanisms was measured using the scale from Ruekert and Walker (1987). This scale identified avoidance, smoothing, confrontation, and mediation options for conflict resolution. Respondents replied as to the degree these mechanisms were used on a five point scale from "never" to "almost always." A second



scale assessed the effectiveness of these mechanisms, using the three point scale of "not effective at all," "somewhat effective," and "very effective." The overall score for conflict resolution mechanisms was the summation of each mechanism's usage rate multiplied by its effectiveness. The measure of computer and telecommunications technology comprised two new scales. The first concerned the usage of such systems on a five point scale from "never" to "quite frequently." The second scale assessed the effectiveness of such systems on the three point scale from "not effective at all" to "very effective." The overall score for computer and telecommunication technology was the summation of each technology's usage rate multiplied by its effectiveness.

Environment included the two elements of certainty of information and turbulence. The scales for these constructs incorporated aspects of McCabe's (1987) environmental uncertainty scale plus new items. Certainty of information comprise four items, and environmental turbulence will comprise five items. Both scales were evaluated on the five point scale of "definitely false" to "definitely true."

Interaction incorporated aspects of Van de Ven and Ferry's (1980) measure of information flow. Respondents were asked to evaluate the degree to which their department interacted with other departments in terms of meetings, committees, teleconferencing, phone conversations, phone

mail, electronic mail, and the exchange of various standard documentation. The five point scale of "never" to "quite frequently" was employed. Respondents also were asked to identify the department(s) with which they interacted most. This latter question served as a check to see if departments with high scores of interaction corresponded to departments which labeled themselves as being departments where much interaction occurs.

Collaboration was a newly constructed scale that asked respondents to evaluate the degree to which their department and other departments achieved collective goals, had mutual understanding, informally worked together, shared the same vision for the company, and shared ideas, information, and/or resources. The five point scale of "never" to "quite frequently" was used. Respondents also were asked to identify those departments with which their department had the best relationships. This latter question served as a check to see if departments with high scores of collaboration corresponded to departments which labeled themselves as experiencing the best interdepartmental relationships.

Measures of performance were adapted from Lorsch (1965) and Lawrence and Lorsch (1967, 1986). One measure asked respondents to grade their department's performance, the company's overall performance, the company's product

development performance, and the company's product management performance. A second measure asked for annual dollar sales, which during analysis, was divided by company employment (which was also provided by respondents) to give a sales/employee statistic.

Two new scales of performance were also employed. The first new scale asked respondents about their satisfaction with relationships between their department and other departments. The five point scale of "very dissatisfied" to "very satisfied" was used. The second new scale asked respondents to describe their current market position. The degrees of market position listed in the question included leader for the market, i.e., dominant position; definite edge over competitors, but not dominant; unique position due to a market niche; slight difficulty in gaining/retaining market share; and unstable/weak position.

Note that all multi-item measures underwent reliability procedures in accordance with the recommendations of Nunnally (1977) and Churchill (1979). This included calculation of Cronbach Alpha and factor analysis. Since reliability of single item measures and single item composite measures are inappropriate for this type of reliability analysis, these measures were evaluated by their associations to the previously noted checks.

## **SURVEY PRETEST**

Prior to the survey, a pretest was undertaken to check comprehensibility of the survey questionnaire. Participating managers of local manufacturers were instructed to comment on questions that they did not understand or could not answer. Following return of six pretest questionnaires, short interviews with participants were conducted to gather general comments on clarity, ease of filling, and attitudes toward the survey. Corrections to the survey were made with respect to improving reliability, phrasing of certain questions, layout, and overall appearance of the survey. At the conclusion of the pretesting phase, various questions were rephrased to improve their comprehensibility.

## CHAPTER 4

### RESULTS AND DISCUSSION

All analyses were applied to the data collected from the mail survey, which reflected a response rate of 20% following two mailing waves of the survey instrument. Prior to the proposed analyses concerning direct effects, a reliability analysis was undertaken. This assessment consisted of factor analysis and calculation of Cronbach alpha to indicate unidimensionality and internal consistency of each measure. Taken together these criteria suggested the appropriateness of each measure for tapping its corresponding construct. Those items of a particular measure which reflected unidimensionality and acceptable internal consistency,  $\alpha > .6$  as set forth by Nunnally (1967), were summed to represent the respective construct.

The first analysis concerning direct effects was the use of structural equation modelling to investigate the direct effects of structural variables on interaction, collaboration, and performance. As hypothesized, structural variables should have influenced interaction, which in turn, would mediate the effect of structural variables on performance. This stage of analysis also investigated the

direct effects of interaction and collaboration on performance and the relationship between interaction and collaboration. As hypothesized, collaboration should have a greater magnitude of effect on performance variables and have a significant, positive effect on interaction.

The second analysis concerning direct effects examined the direct effect of differences on interaction, collaboration, and performance. As hypothesized, differences should have reduced collaboration, which in turn, would have mediated the effect of differences on performance.

#### **SURVEY RESPONSE**

After qualifying survey participants, a sample of 860 "valid companies" were identified from the EIA membership directory. A "valid" company was a manufacturer having the three departments of marketing (or sales), manufacturing (or operations), and R&D (or engineering). Examples of "invalid" companies included consulting firms, distributors, publishers, contract laboratories, and "out-of-business" companies.

The response rate after two mailing waves of the survey was 514 managers. Of these 514 managers, 177 were marketing managers, 157 manufacturing managers, and 180 R&D managers. In terms of response rate percentages, the study achieved an

overall response rate of 20% (514 / (860\*3)); group response rates were 21% (177/860), 18% (157/860), and 21% (180/860) for marketing, manufacturing, and R&D managers, respectively. While a larger response rate had been expected, the achieved response rate is deemed acceptable since 20% is common for many industrial surveys. Further support for the acceptability of the response rate is based on the sample size magnitudes for each of the manager groups in this study. These magnitudes are well above the sample sizes of studies referenced in Chapter Two and the sample sizes of other studies investigating interdepartmental relationships.

A comparison of sales, company employment, and department employment demographics between each wave's respondents revealed no statistically significant differences at  $\alpha \leq 0.05$ . The characteristics of responding departments therefore did not appear to be biased by response time, which thereby supports the representativeness of this response sample for electronic manufacturers with marketing, manufacturing, and R&D departments.

Overall, the mean responding company was a manufacturer of industrial products with annual sales of \$223,801,501 and employment of 1,371. The mean marketing department had 23 employees, the mean manufacturing department had 363 employees, and the mean R&D department had 57 employees.

## RELIABILITY ANALYSIS

Reliability analysis was applied to the entire data set to assure scale reliability across all manager groups (cf. Kahn and Mentzer 1994). Multiple item constructs were analyzed by way of factor analysis and calculation of Cronbach Alpha to determine reliability. Factor analysis was first applied to identify those items that formed a unidimensional scale. Cronbach alpha was then calculated to determine the internal consistency of responses. As previously mentioned, scales with Cronbach alpha of greater than .6 were deemed acceptable, which is based on Nunnally's (1967) recommendation for exploratory research. While reliability of the single item scales in this study were not examined rigorously, several of these scales were tentatively assessed by matching them with "check" questions. Table 4.1 summarizes the results of the reliability analysis. A discussion of the reliability of survey measures now follows.

### Department Structure

Department structure comprised the constructs of centralization, formalization, specialization, and department size. Of these, centralization, formalization, and specialization were multiple item scales. Size was the number of full-time employees within the department. As a



Table 4.1

Reliability Analysis of Multiple Item Scales

FINAL DEPARTMENT STRUCTURE SCALES

| <u>Construct</u>      | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|-----------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Centralization</b> | 4                 | .82                   | 2.61 (1)                     | 65                          |

Circle the appropriate response that identifies the degree to which the following is true about your department [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

|   | <u>Factor Loadings</u> |
|---|------------------------|
| - Little action is taken until a manager approves a decision.     | .79                    |
| - Individuals are discouraged from making their own decisions.    | .72                    |
| - All matters have to be referred to managers for a final answer. | .85                    |
| - Any decision has to have a manager's approval.                  | .86                    |

| <u>Construct</u>     | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|----------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Formalization</b> | 5                 | .67                   | 2.22 (1)                     | 44                          |

Circle the appropriate response that identifies the degree to which the following is true about your department [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

|   | <u>Factor Loadings</u> |
|---|------------------------|
| - Following policies, rules, and regulations is stressed in my department.                | .71                    |
| - There are specific procedures to deal with most situations that arise in my department. | .65                    |
| - There is a historical record of everyone's job performance.                             | .56                    |
| - Everyone knows specifically what they should be doing.                                  | .71                    |
| - Problems are resolved in a specific, systematic manner.                                 | .65                    |

**Table 4.1 - continued**

| <u>Construct</u>      | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|-----------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Specialization</b> | 2                 | .31                   | N/A                          | N/A                         |

Circle the appropriate response that identifies the degree to which the following is true about your department  
 [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

|   | <u>Factor Loadings</u> |
|---|------------------------|
| - Employees are assigned to unique activities in my department. | N/A                    |
| - Everyone here is considered an expert in their own area.      | N/A                    |

| <u>Construct</u>          | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|---------------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Size (Single Item)</b> | 1                 | N/A                   | N/A                          | N/A                         |

- Number of full-time employees in your department

**FINAL TASK STRUCTURE SCALES**

| <u>Construct</u>   | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|--------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Routineness</b> | 4                 | .54                   | 1.72 (1)                     | 43                          |

Circle the appropriate response that identify the degree to which the following is true about your department  
 [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

|  | <u>Factor Loadings</u> |
|--|------------------------|
| - Everyone here does the same job in the same way every day.           | .55                    |
| - One thing people like around here is the variety of work. [Reversed] | .69                    |
| - Most jobs have something new happening everyday. [Reversed]          | .60                    |
| - Much of the activity in my department can be considered routine.     | .76                    |

**Table 4.1 - continued**

| <u>Construct</u>       | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|------------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Interdependence</b> | 6                 | .74                   | 2.60 (1)                     | 43                          |
|                        |                   |                       | 1.18 (2)                     | 20                          |

For the other two departments to accomplish their goals and responsibilities, how much do they need your department's [5 point scale ranging from "1-small extent" to "5-great extent"]

|  | <u>Mean Factor 1 Loadings*</u> |
|--|--------------------------------|
| - Resources (e.g. \$, personnel, equipment, info)                      | .82                            |
| - Support (e.g. advice or technical assistance)                        | .83                            |
| - Outputs (e.g. customer data, new technologies, manufactured product) | .40                            |

For your department to accomplish its goals and responsibilities, how much do it needs the other two departments' [5 point scale ranging from "1-small extent" to "5-great extent"]

|  | <u>Mean Factor 2 Loadings*</u> |
|--|--------------------------------|
| - Resources (e.g. \$, personnel, equipment, info)                      | .70                            |
| - Support (e.g. advice or technical assistance)                        | .84                            |
| - Outputs (e.g. customer data, new technologies, manufactured product) | .86                            |

\*NOTE: Each questionnaire asked two questions about the respective department's interdependence with the other two departments. Factor loadings are the mean of factor loadings across these two questions/measures; both were the same question except for the departments involved.

Table 4.1 - continued

FINAL OCCUPATIONAL ORIENTATION SCALES

| <u>Construct</u>                               | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|--|-------------------|-----------------------|------------------------------|-----------------------------|
| Interpersonal Orient.<br>(Single Item Measure) | 18                | N/A                   | N/A                          | N/A                         |

Below are pairs of words which are opposite in meaning. You are asked to describe the person in your department with whom you can work least well. He or she does not have to be the person you like least, but should be the person with whom you've had the most difficulty in getting a job done. Look at the words at both ends of each line before you circle your response. Do not omit any items. Mark each item only once.

|               |   |   |   |   |   |               |
|---------------|---|---|---|---|---|---------------|
| pleasant      | 1 | 2 | 3 | 4 | 5 | unpleasant    |
| friendly      | 1 | 2 | 3 | 4 | 5 | unfriendly    |
| rejecting     | 1 | 2 | 3 | 4 | 5 | accepting     |
| tense         | 1 | 2 | 3 | 4 | 5 | relaxed       |
| distant       | 1 | 2 | 3 | 4 | 5 | close         |
| cold          | 1 | 2 | 3 | 4 | 5 | warm          |
| supportive    | 1 | 2 | 3 | 4 | 5 | hostile       |
| boring        | 1 | 2 | 3 | 4 | 5 | interesting   |
| quarrelsome   | 1 | 2 | 3 | 4 | 5 | harmonious    |
| gloomy        | 1 | 2 | 3 | 4 | 5 | cheerful      |
| open          | 1 | 2 | 3 | 4 | 5 | guarded       |
| backbiting    | 1 | 2 | 3 | 4 | 5 | loyal         |
| untrustworthy | 1 | 2 | 3 | 4 | 5 | trustworthy   |
| considerate   | 1 | 2 | 3 | 4 | 5 | inconsiderate |
| nasty         | 1 | 2 | 3 | 4 | 5 | nice          |
| agreeable     | 1 | 2 | 3 | 4 | 5 | disagreeable  |
| insincere     | 1 | 2 | 3 | 4 | 5 | sincere       |
| kind          | 1 | 2 | 3 | 4 | 5 | unkind        |

**Table 4.1 - continued**

| <u>Construct</u>                                 | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|--|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Time Orientation</b><br>(Single Item Measure) | 6                 | N/A                   | N/A                          | N/A                         |

What percent of your department's time is spent working on matters which will directly impact your company within each of the indicated. Your answers should total 100%.

- |                         |       |                        |       |
|-------------------------|-------|------------------------|-------|
| a) less than 1 week     | _____ | d) 1 quarter to 1 year | _____ |
| b) 1 week to 1 month    | _____ | e) 1 year to 5 years   | _____ |
| c) 1 month to 1 quarter | _____ | f) over 5 years        | _____ |

| <u>Construct</u>                                 | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|--|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Task Orientation</b><br>(Single Item Measure) | 18                | N/A                   | N/A                          | N/A                         |

In evaluating and considering the potential of a new product, there are many considerations that will concern different departments. While all of those below are new product concerns, which are most important to your department? Place a "1" by the three criteria that are the biggest concerns to your department. Place a "2" by the next three criteria that are the second biggest concerns to your department.

- \_\_\_\_\_ Manufacturing costs
- \_\_\_\_\_ Technical processing problems
- \_\_\_\_\_ Contribution to scientific knowledge
- \_\_\_\_\_ Equipment requirements
- \_\_\_\_\_ Impact on other product lines
- \_\_\_\_\_ Product/service quality
- \_\_\_\_\_ Maintenance schedules
- \_\_\_\_\_ Profit
- \_\_\_\_\_ Potential for patent and/or scientific publication
- \_\_\_\_\_ Competitors' responses
- \_\_\_\_\_ Customer Satisfaction
- \_\_\_\_\_ Sales potential
- \_\_\_\_\_ Personnel requirements
- \_\_\_\_\_ Procurement of raw materials
- \_\_\_\_\_ Distribution through existing channels
- \_\_\_\_\_ Market Share
- \_\_\_\_\_ Return on investment
- \_\_\_\_\_ Other (Please specify \_\_\_\_\_)

**Table 4.1 - continued**

**FINAL GOALS (COOPERATIVE GOALS) SCALE**

| <u>Construct</u>                                  | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|---|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Cooperative Goals</b><br>(Single Item Measure) | 1                 | N/A                   | N/A                          | N/A                         |

Circle the appropriate response that best describes the relationships between the goals of your department and those goals of the other two departments. Use the following definitions:

Competitive Goals - a department's goal attainment interferes with/makes less likely goal attainment of another department

Independent Goals - a department's goal attainment neither helps or interferes with goal attainment of another department.

Cooperative Goals - a department's goal attainment helps another department reach its goals

The goals of your department and...      are...

|              |   |  |
|--------------|---|--|
| Department A | Very Competitive<br>Independent<br>Very Cooperative | Somewhat Competitive<br>Somewhat Cooperative |
|--------------|---|--|

|              |   |  |
|--------------|---|--|
| Department B | Very Competitive<br>Independent<br>Very Cooperative | Somewhat Competitive<br>Somewhat Cooperative |
|--------------|---|--|

Table 4.1 - continued

**FINAL TECHNOLOGY SCALES**

| <u>Construct</u>  | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|---|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Production Process Technology</b><br>(Single Item Measure) | 1                 | N/A                   | N/A                          | N/A                         |

Circle the response that identifies the type of production process that your company/division primarily uses:

1-Job Shop, 2-Small Batch Flow, 3-Large Batch Flow, 4-Assembly Line, 5-Continuous Flow, 6-Other (Please specify \_\_\_\_\_)

Approximately how many product lines can your primary production process readily produce? \_\_\_\_\_

| <u>Construct</u>                      | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|---------------------------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Conflict Resolution Mechanisms</b> | 4                 | .38                   | 1.53                         | 38                          |

During the past three months when disagreements or disputes arose between your department and the other department (specified one of the other two departments), circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. [Usage: N-Never, S-Seldom, OCC-Occasionally, O-Often, A-Almost Always; Effectiveness: NE-Not Effective at All, SE-Somewhat Effective, VE-Very Effective]  
(Final Scale = Usage X Effectiveness)

|   | <u>Mean Factor Loadings*</u> |
|---|------------------------------|
| - Ignoring or avoiding the issue  | .73                          |
| - Smoothing over the issues   | .78                          |
| - Bringing the issues out in the open and working them out among the parties involved | .39                          |
| - Having upper management resolve the issue between the parties involved              | .49                          |

\*NOTE: Each questionnaire asked two questions about the respective department's conflict resolution with the other two departments. Factor loadings are the mean of factor loadings across these two questions/measures; both were the same question except for the departments involved.

**Table 4.1 - continued**

| <u>Construct</u>                 | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|----------------------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Computer Systems</b>          | 4                 | .70                   | 2.15                         | 54                          |
| <b>Telecommunication Systems</b> | 4                 | .64                   | 1.96                         | 49                          |

Circle the appropriate response to describe your departments usage and the effectiveness of the following information technologies. [Usage: N-Never, S-Seldom, OCC-Occasionally, O-Often, QF-Quite Frequently; Effectiveness: NE-Not Effective at All, SE-Somewhat Effective, VE-Very Effective] (Final Scale = Usage X Effectiveness)

|                                   | <u>Factor Loadings</u> |
|-----------------------------------|------------------------|
| <b>Computer Systems:</b>          |                        |
| - Computers in general            | .80                    |
| - Computer databases              | .74                    |
| - Computer Spreadsheets           | .75                    |
| - Word Processing                 | .65                    |
| <b>Telecommunication Systems:</b> |                        |
| - Electronic Mail                 | .63                    |
| - Phone Mail                      | .68                    |
| - Conference Calling              | .80                    |
| - Teleconferencing                | .69                    |

**FINAL ENVIRONMENT SCALES**

| <u>Construct</u>                | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|---------------------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Certainty of Information</b> | 4                 | .85                   | 2.76                         | 69                          |

Circle the appropriate response that identify the degree to which the following are true about your department [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

|  | <u>Factor Loadings</u> |
|--|------------------------|
| - My department can get the information it needs to make decisions.        | .84                    |
| - My department can get reliable information to help with decision-making. | .86                    |
| - My department has easy access to credible information.                   | .85                    |
| - The information my department obtains allows for confident decisions.    | .77                    |



**Table 4.1 - continued**

| <u>Construct</u>  | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|-------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Turbulence</b> | 3                 | .68                   | 1.73                         | 58                          |

Circle the appropriate response that identifies the degree to which the following are true about your company's primary markets [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

|   | <u>Factor Loadings</u> |
|---|------------------------|
| - The overall customer base is stable. [Reversed] | .82                    |
| - The majority of markets are turbulent.          | .82                    |
| - Market demand can be forecasted accurately.     | .63                    |

**FINAL STATUS SCALE**

| <u>Construct</u>                       | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|--|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Status</b><br>(Single Item Measure) | 1                 | N/A                   | N/A                          | N/A                         |

Circle the appropriate response that identifies the degree of status that your department has in relation to the other two departments.

Compared to...

Your department has...

Department A

Much Less Status  
Somewhat Less Status  
Equal Status  
Somewhat More Status  
Much More Status

Department B

Much Less Status  
Somewhat Less Status  
Equal Status  
Somewhat More Status  
Much More Status

Table 4.1 - continued

**FINAL INTEGRATION SCALES**

| <u>Construct</u>                       | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|--|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Meetings</b>                        | 5                 | .75                   | 2.52                         | 51                          |
| <b>Documented Information Exchange</b> | 4                 | .78                   | 2.49                         | 62                          |

During the past 3 months, to what degree did your department interact with the other two departments in regards to the below activities. [N-Never, S-Seldom, OCC-Occasionally, O-Often, QF-Quite Frequently]

|   | <u>Mean Factor Loadings*</u> |
|---|------------------------------|
| <b>Meetings:</b>                        |                              |
| - Meetings                              | .71                          |
| - Committees/Task Forces                | .75                          |
| - Phone Conversations                   | .73                          |
| - Phone Mail                            | .75                          |
| - Electronic Mail                       | .60                          |
| <b>Documented Information Exchange:</b> |                              |
| - Exchange of forms                     | .74                          |
| - Exchange of reports                   | .87                          |
| - Exchange of memorandums               | .85                          |
| - Exchange of FAX materials             | .69                          |

\*NOTE: Each questionnaire asked two questions about the respective department's collaboration with the other two departments. Factor loadings are the mean of factor loadings across these two questions/measures; both were the same question except for the departments involved.

**Table 4.1 - continued**

| <u>Construct</u>     | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|----------------------|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Collaboration</b> | 6                 | .92                   | 4.30                         | 72                          |

During the past 3 months, to what degree did your department pursue the following activities with the other two departments. [N-Never, S-Seldom, OCC-Occasionally, O-Often, QF-Quite Frequently]

|  | <u>Mean Factor Loadings*</u> |
|--|------------------------------|
| - Achieve goals collectively                 | .84                          |
| - Have a mutual understanding                | .87                          |
| - Informally work together                   | .84                          |
| - Share ideas, information, and/or resources | .86                          |
| - Share the same vision for the company      | .78                          |
| - Work together as a team                    | .90                          |

\*NOTE: Each questionnaire asked two questions about the respective department's collaboration with the other two departments. Factor loadings are the mean of factor loadings across these two questions/measures; both were the same question except for the departments involved.

**FINAL PERFORMANCE SCALES**

| <u>Construct</u>                                     | <u># of Items</u> | <u>Cronbach Alpha</u> | <u>Eigenvalue (Factor #)</u> | <u>% Variance Explained</u> |
|--|-------------------|-----------------------|------------------------------|-----------------------------|
| <b>Department Performance</b>                        | 1                 | N/A                   | N/A                          | N/A                         |
| <b>Company/Division Performance</b>                  | 1                 | N/A                   | N/A                          | N/A                         |
| <b>Product Development Performance</b>               | 1                 | N/A                   | N/A                          | N/A                         |
| <b>Product Management Performance</b>                | 1                 | N/A                   | N/A                          | N/A                         |
| <b>Sales/Employees</b>                               | 1                 | N/A                   | N/A                          | N/A                         |
| <b>Satisfaction</b>                                  | 1                 | N/A                   | N/A                          | N/A                         |
| <b>Market Position</b><br>(All Single Item Measures) | 1                 | N/A                   | N/A                          | N/A                         |

**Table 4.1 - continued**

Considering your company's (division's) overall business activity in the past year, please grade the following on a scale of 0% to 100%, with 100% meaning perfect performance.

- Your department's overall performance \_\_\_\_\_
- Your company's/division's overall performance \_\_\_\_\_
- Your company's/division's performance in product development \_\_\_\_\_
- Your company's/division's performance in product management \_\_\_\_\_

Approximately what is the Annual Sales in US Dollars of your company/division? \_\_\_\_\_

Approximately what is the number of employees for your company/division? \_\_\_\_\_

Circle the appropriate response that identifies the degree of your satisfaction with your department's relationship with the other two departments.

Department A                      Very Dissatisfied  
  Dissatisfied  
  Neither Dissatisfied Nor Satisfied  
  Satisfied  
  Very Satisfied

Department B                      Very Dissatisfied  
  Dissatisfied  
  Neither Dissatisfied Nor Satisfied  
  Satisfied  
  Very Satisfied

Check the appropriate response that describes your company's/division's current market position.

- \_\_\_\_\_ Leader for the market, i.e., dominant position
- \_\_\_\_\_ Definite edge over competitors, but not dominant
- \_\_\_\_\_ Unique position due to a market niche
- \_\_\_\_\_ Slight difficulty in gaining/retaining market share
- \_\_\_\_\_ Unstable/Weak position

check of department size, it was found that respondents who gave a higher number for department size also characterized their department as larger.

The final **centralization** scale contained all four items as given on the survey instrument. It was unidimensional with a lambda equal to 2.61 and 65% of the variance explained. Cronbach Alpha was .82, which is deemed quite acceptable.

The final **formalization** scale contained five of the six items listed on the survey instrument. The scale was unidimensional with lambda equal to 2.22 and 44% of the variance explained. Cronbach alpha was .67, which is acceptable for exploratory research.

The **specialization** scale was problematic. The three items presented on the survey instrument were not found to be unidimensional. The item concerning responsibility for a wide range of tasks appeared to be conceptually different from being an expert in one's area and assignment to unique activities. Admitting the limitations of the specialization scale, the final specialization scale comprised only the latter two highly correlated items. The scale used in this study serves to suggest possible effects of specialization, but all findings related to specialization in this study should be taken with caution. Future research needs to

further study the construct of specialization and develop a suitable measure.

### **Task Structure**

Task structure consisted of routineness and interdependence. **Routineness** was problematic since the highest Alpha value was .54 with all four of the items listed on the survey. This four item scale, however, was unidimensional with lambda equal to 1.72 and 43.1% of the variance explained. As with the specialization construct, this scale was used in subsequent analysis to suggest possible effects of routineness and to encourage future research on the routineness construct. All findings related to routineness should be taken with caution.

**Interdependence** comprised three questions on the dependence of one's department on another department and three questions on the other department's dependence on one's department. Factor analysis revealed the two sets of questions to be unidimensional separately. However, the first set of questions reflected only a marginal Cronbach alpha value. As a composite function, there was strong internal consistency of  $\alpha=.74$  and greater explained variance - 43% for factor 1, 63% for factor 2 (factor 1 lambda = 2.60; factor 2 lambda = 1.18). Since the given hypotheses concerned the collective interdependence of departments, not

separately assessing a department's dependence on other departments or another department's dependence on the particular department, a composite function was used. Future research might consider efforts to develop a unidimensional measure of interdependence.

### **Occupational Orientation**

No reliability analyses were performed on the three constructs of occupational orientation, i.e., interpersonal orientation, time orientation, and task/goal orientation. **Time orientation** and **task orientation** were single-item measures and were not checked for reliability. The scale for time orientation asked respondents to partition the percentage of time spent working on activities across six time intervals. Length of time orientation was calculated by multiplying these percentages with the midpoint of each time interval. For example, a respondent who partitioned 20% across the first two intervals and 15% across the last four intervals would have a time orientation score of 485.5 days  $[(3.5*20\%)+(18.5*20\%)+(60*15\%)+(227.5*15\%)+(1095*15\%)+(1825*15\%)]$ . Findings regarding the time orientation construct suggested possible effects of a short-term versus long-term perspective.

The task orientation scale asked respondents to identify the top six criteria for product development

activities. Those items selected were used to characterize departments as marketing-oriented, manufacturing-oriented, R&D-oriented, and/or general business-oriented. This procedure was akin to the methodology of Lawrence and Lorsch (1967, 1986). Since respondents were limited to choosing only six criteria, a breadth of task orientation score was infeasible. A surrogate score was respondents' general orientation based on the assumption that the more general goals pursued by the department, the broader its task orientation. Nevertheless, the characterization of departments across the four dimensions allowed a different investigation in regards to the effects of a marketing-orientation, manufacturing-orientation, R&D-orientation, and general orientation on departments' functioning and interrelationships. Results from this latter investigation help to identify future research opportunities, including the impact of a market orientation on performance success.

**Interpersonal orientation** was measured using Fiedler's Least Preferred Co-Worker (LPC) scale, as used by Lawrence and Lorsch (1967, 1986). While the LPC scale has been criticized, Fiedler and Garcia (1987, p. 73) reported that the scale has a median split-half reliability of between .89 and .90 across studies and has reflected test-retest reliability as high as  $r=.92$  (p. 75). Consequently, the scale is used without a reliability analysis, but it is



acknowledged that the reliability of findings may be questioned.

### **Goals**

The scale for **goal cooperativeness** was a single item scale, adopted from Tjosvold (1988a, 1988b, and 1990). While it is admitted that use of a single-item scale to assess goals is limiting, the measure can help to identify key issues to explore in future research. In particular, this goal measure helps to determine the antecedental role of cooperative goals to interaction and collaboration. A significant relationship with this measure would highlight the importance of strategic planning to integration and encourage research on interdepartmental goal-setting.

### **Technology**

The technology category contained the constructs of production process technology, conflict resolution mechanisms, and computers and telecommunication systems. **Production process technology** was measured using two single item measures: one measure asking the respondent to characterize the type of process, the other measure asking for the number of product lines that could be readily produced in the production process. Since both of these measures were single items, reliability analysis was not

applied. Findings related to these measures serve to outline the impact of the production process on interdepartmental relations. Thus, to some degree, the use of these measures replicate Woodward's (1965) research.

While Ruekert and Walker (1987) characterized the scale for conflict resolution mechanisms as a composite of four single item scales, this study performed a reliability analysis on the same scale. **Conflict resolution mechanisms** was measured by multiplying the effectiveness score by the frequency of use score, thereby providing an overall effectiveness measure for conflict resolution. Analysis showed the scale to be unidimensional with lambda equal to 1.53 and 38.3% of the variance explained. Unfortunately, there were shortcomings with the internal consistency of the scale since  $\alpha=.38$ . Still, the conflict resolution mechanisms scale was used in the subsequent analyses to suggest possible effects of conflict resolution mechanisms. All findings related to this construct will need to be replicated in future research.

The **computer and telecommunications systems** scale measured the effectiveness of these two information systems. Like the conflict resolution mechanisms scale, overall effectiveness was measured by multiplying the effectiveness score by the frequency of use score. Factor analysis revealed the scale to comprise two obvious factors:

computer systems and telecommunication systems. Since these two systems are distinct, the scale was redefined as the two distinct constructs of computer systems and telecommunications systems. The computer systems scale contained four of the original five computer-related items listed on the survey instrument. The item concerning computer-aided-design was removed since it was found to have low correlations with the other computer items. The computer systems scale was unidimensional with lambda equal to 2.15 and 53.7% of the variance explained;  $\alpha$  equaled .70.

The telecommunications systems scale contained all four of the telecommunications-related items. The scale was unidimensional with lambda equal to 1.96 and 49% of the variance explained. Cronbach  $\alpha$  equaled .64, which is appropriate for exploratory research.

## **Environment**

Environment addressed the two constructs of certainty of information and turbulence. The final scale for **certainty of information** consisted of four items, was unidimensional with lambda equal to 2.76, and explained 69% of the variance. Cronbach  $\alpha$  equaled .85.

The final **turbulence** scale included three of the given five items. These items were stability of the customer base, turbulence of markets, and forecasting accuracy of

market demand. The three item scale was unidimensional with lambda equal to 1.73, 58% of the variance explained, and  $\alpha$  equal to .68.

### **Status**

The scale for **status** was a single item Likert scale question. The use of a single-item scale to assess status has limitations, however, the minimal research on status supports preliminary research to explore this construct. Significant findings related to the status measure help to tentatively clarify the role of status in interdepartmental relations. However, such significant findings will require further study.

### **Interaction**

Reliability analysis on the **interaction** construct determined two dimensions: meetings and documented information exchange. While the interaction construct was initially believed to be unidimensional, the discovery of these two dimensions is not surprising. The meetings construct concerned verbal information flow and immediate exchange between departments. The documented information exchange construct concerned the distribution of written, documented information across departments. Since it is conceivable that both of these dimensions would be important

to maintaining interdepartmental relations, these two constructs were left separate for the subsequent analyses.

The meetings construct contained the items of meetings, committees, phone conversations, phone mail, and electronic mail. Electronic mail is considered meeting-related since electronic messages are instantaneous and may represent a real-time dialogue. The meetings construct was unidimensional with lambda equaling 2.52 and 51% of the variance explained. Cronbach  $\alpha$  equaled .75.

The written information exchange construct included the items of exchange of forms, exchange of reports, exchange of memorandums, and exchange of FAX materials. The construct was unidimensional with lambda equal to 2.50 and 62% of the variance explained. Cronbach  $\alpha$  equaled .78.

### **Collaboration**

The **collaboration** scale was found to be the best measure in the study. The six item scale was unidimensional with lambda equal to 4.30 and 72% of the variance explained; the collaboration scale reflected very high internal consistency with  $\alpha$  equal to .92.

### **Performance**

Each of the **performance** measures represented a single item, prohibiting application of reliability analysis as

discussed. Department performance, company performance, product development performance, and product management performance were measured by having respondents grade performance from 0 to 100%. The measure for sales was simply the yearly sales for the company/division, while employment was the annual employment for the company/division. Satisfaction was a single item likert scale. Market position was a categorical scale where respondents identified the market position of their company/division.

As previously mentioned, the use of single-item measures has limitations. However, the performance measures used in this study are akin to those used by Lawrence and Lorsch (1967, 1986) and other studies. There is therefore a research precedence for using these measures.

#### **DIRECT EFFECTS OF STRUCTURAL VARIABLES**

The first analysis concerning direct effects comprised two parts. Part one tested the proposed propositions and hypotheses concerning the direct effects of each structural variable on interaction, collaboration, and performance variables. To accomplish this, a regression model containing twenty-two structural variables as independent variables were regressed onto each of the performance, interaction, and collaboration variables, which individually

served as the dependent variable. The twenty-two structural variables included centralization, formalization, specialization, size, routineness, interdependence, interpersonal orientation, time orientation, marketing-task orientation, manufacturing-task orientation, R&D-task orientation, general business-orientation, cooperative goals, production process type, product line breadth, conflict resolution mechanisms, computer systems, telecommunication systems, certainty of information, turbulence, status, and proximal distance. Of these, only proximal distance has not been discussed. This factor addressed the distance between departments to tentatively examine the effect of proximity on interdepartmental relationships. This factor was measured by asking respondents to estimate the number of miles between departments.

Part two of the first analysis addressed the relationships among the integration variables, i.e. interaction and collaboration, and their direct contribution to each of the performance variables. These contributions were evaluated by path analysis, which simultaneously examined the relationships among the three integration variables (i.e., meetings, documented information exchange, and collaboration) and the relationships between integration and performance.

The computer program LISREL 7.13 was used for both parts of this first analysis. While LISREL is commonly associated with unobserved latent variable models, the regression model represents the basic form of a structural equation model (Norusis 1989). Further, a detailed unobserved latent variable model was inappropriate due to restrictions caused by the sample sizes of each manager type. Based on the recommendation that there be at least five observations per free parameter, regression was the most suitable approach for simultaneously investigating the direct effects of structural variables. Those independent variables found significant at  $\alpha \leq .10$  were identified as potential influential variables, which future research should continue to investigate.

Note that the performance variable of sales per employee was found to be problematic across all manager sets. When the statistic was included in analysis, the Sigma matrix in the LISREL program could not be identified. This prevented any solution from being generated. Because of this problem, which suggests that sales per employee is an inappropriate measure of performance, the sales per employee statistic was not investigated in this study.



### **Common Findings Across Manager Sets**

As summarized in Table 4.2, structural factors influence meetings and documented information exchange, thereby supporting various hypotheses of this study. However, the influence of structural variables was not consistent across each of the manager sets. Thus, only partial support exists for most hypotheses.

The hypothesis receiving the strongest support was H13a since telecommunications system effectiveness had a significant positive relationship to meetings across all manager sets. H6a received the second strongest support since a majority of manager sets reflected a significant positive relationship between interdependence and meetings and a significant positive relationship between interdependence and documented information flow. The significance of these hypotheses indicates that departments will have more meetings with another department if telecommunication systems are perceived effective. More meetings also will occur if departments see themselves interdependent with other departments. Departments will exchange documented information with another department when there is a perceived interdependence with that department.

While not hypothesized, collaboration had significant positive relationships with interdependence and goals across a majority of manager sets. It would appear that

Table 4.2

Regression of Structural Variables onto Performance, Interaction, and Collaboration: Summary of Manager Sets

|                      |          | PERFORMANCE |      |    |    |       |        |
|----------------------|----------|-------------|------|----|----|-------|--------|
|                      |          | DEPT        | COMP | PD | PM | SATIS | MKTPOS |
| STRUCTURAL VARIABLES | CENT     |             |      |    |    |       |        |
|                      | FORM     |             |      |    |    |       |        |
|                      | SPEC     |             |      |    |    |       |        |
|                      | SIZE     |             |      |    |    |       |        |
|                      | ROUT     |             |      |    |    |       |        |
|                      | ID       |             |      |    |    |       |        |
|                      | INTERPOC |             |      |    |    |       |        |
|                      | TIMEOC   |             |      |    |    |       |        |

Table 4.2 - continued

|                      |          | PERFORMANCE |      |    |    |       |        |
|----------------------|----------|-------------|------|----|----|-------|--------|
|                      |          | DEPT        | COMP | PD | PM | SATIS | MKTPOS |
| STRUCTURAL VARIABLES | TASKMFG  |             |      |    |    |       |        |
|                      | TASKRD   |             |      |    |    |       |        |
|                      | TASKMKTG |             |      |    |    |       |        |
|                      | TASKGEN  |             |      |    |    |       |        |
|                      | GOAL     |             |      |    |    |       |        |
|                      | PRODPROC |             |      |    |    |       |        |
|                      | PRODLINS |             |      |    |    |       |        |
|                      | CONFLICT |             |      |    |    |       |        |

Table 4.2 - continued

































|                      |          | PERFORMANCE  |   |  |  |   |   |
|----------------------|----------|--|---|--|--|---|---|
|                      |          | DEPT   | COMP  | ED   | PM   | SATIS   | MKTPOS  |
| STRUCTURAL VARIABLES | COMPUTER |  |    |   |  |   |    |
|                      | TELECOMM |  |   |  | <br> |   |   |
|                      | INFOCERT |   |    |   |   |   |    |
|                      | TURB     |  |  |   |   |   |  |
|                      | STATUS   | <br> |   | <br> |   | <br><br> |  |
|                      | PRXDIST  |  |  |   |   |   |  |

Table 4.2 - continued

|                      |          | INTEGRATION |             |               |
|----------------------|----------|-------------|-------------|---------------|
|                      |          | <u>MEET</u> | <u>INFO</u> | <u>COLLAB</u> |
| STRUCTURAL VARIABLES | CENT     |             |             |               |
|                      | FORM     |             |             |               |
|                      | SPEC     |             |             |               |
|                      | SIZE     |             |             |               |
|                      | ROUT     |             |             |               |
|                      | ID       |             |             |               |
|                      | INTERPOC |             |             |               |
|                      | TIMEOC   |             |             |               |

Table 4.2 - continued







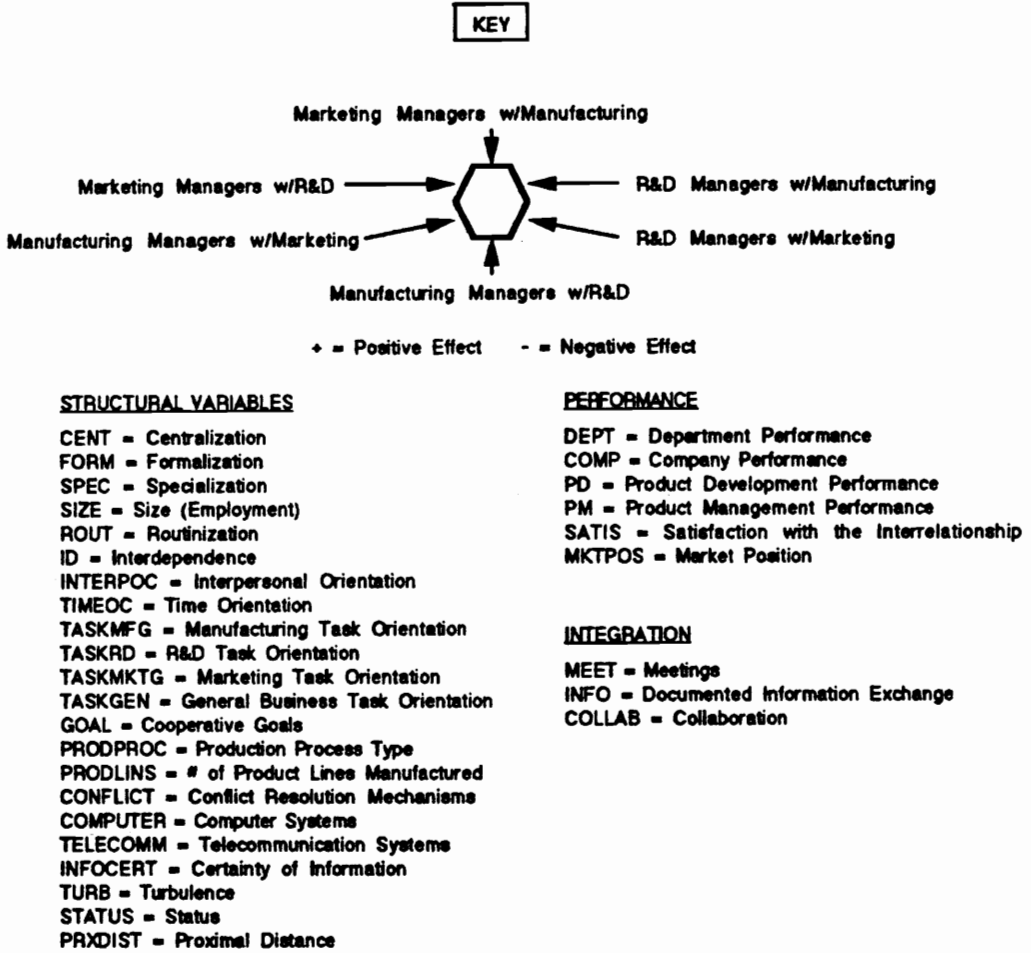
|                      |          | INTEGRATION  |   |   |
|----------------------|----------|--|---|---|
|                      |          | MEET   | INFO  | COLLAB  |
| STRUCTURAL VARIABLES | TASKMFG  |  | \   | \   |
|                      | TASKRD   |  | -<br>/  |   |
|                      | TASKMKTG |  |   |   |
|                      | TASKGEN  | \      | \   | -   |
|                      | GOAL     |  \    | /   |    |
|                      | PRODPROC | <br>- | /  | \   |
|                      | PRODLINS |  |   | -   |
|                      | CONFLICT | /  | /   |  / |

Table 4.2 - continued

|                      |          | INTEGRATION |      |        |
|----------------------|----------|-------------|------|--------|
|                      |          | MEET        | INFO | COLLAB |
| STRUCTURAL VARIABLES | COMPUTER |             |      |        |
|                      | TELECOMM |             |      |        |
|                      | INFOCERT |             |      |        |
|                      | TURB     |             |      |        |
|                      | STATUS   |             |      |        |
|                      | PRXDIST  |             |      |        |

**Table 4.2 - continued**





departments that perceive themselves interdependent with another department and perceive themselves as having cooperative goals with that department will collaborate. This may be because departments wish to pool resources and/or achieve goals jointly. A special note should be made concerning the cooperative goals construct: While this construct is considered a structural factor, in effect, it is asking the department to compare their goals with another department. The significance of the relationship between goal cooperativeness and collaboration may therefore provide support for the proposition that differences affect collaboration. It is explained that a department might go through a process of comparing themselves to other departments with respect to goals. Departments will only collaborate with those departments that have goals similar to themselves or where goals are cooperative; the respective departments will not collaborate with departments that, after comparison, have different goals.

Contrary to the supposition of this study that interaction and collaboration will mediate effects from structural factors to performance variables, it was revealed that certain structural variables may directly influence certain performance variables. Findings indicate that a longer time orientation for marketing and manufacturing managers leads to greater company and department performance

in these departments. R&D managers did not reflect this relationship, possibly because work in this department is typically of a longer time orientation and that performance may diminish after the length of time orientation has reached a certain limit.

Findings also indicate that a marketing orientation may influence product development performance. Interestingly, a marketing orientation has a significant positive effect on product development performance for marketing managers, while a significant negative effect was reflected in the case of manufacturing managers. This difference is speculated to be a result of the two departments' varying perceptions of product development performance. Marketing managers may perceive better product development performance in terms of greater sales volume and customer satisfaction, which are synonymous with marketing goals. Conversely, manufacturing managers may view better product development performance as product quality and efficient production of the new product (no breakdowns), which is not necessarily synonymous with marketing goals.

Goal cooperativeness appears to directly influence a department's satisfaction with its relationship with another department. This relationship is significant and positive across all manager sets. It is explained that if goals are cooperative, i.e., goal achievement by one department helps

another department achieve its goals, then naturally a department would be satisfied with another department whose activities assist the respective department to accomplish its goals. Additionally, a department's dealings with another department would be satisfying via cooperative goals since there would be minimal disagreement over the direction of activities and what goals to accomplish.

While not significant across all manager sets, conflict resolution mechanisms have a significant positive relationship to satisfaction in a majority of cases. The existence of effective conflict resolution mechanisms may help to resolve differences and/or impasses between two departments so interdepartmental activities can continue without delay. With a productive relationship, departments will be satisfied, not frustrated.

Certainty of information appears to lead to better product development performance and greater satisfaction for all manager sets. Certainty of information also appears to lead to better department performance across a majority of manager sets. It is intuitive that certain (more accurate) information will lead to better performance. If a department can predict market conditions, it will be able to better plan, resulting in better department and product development performance. Further, if a department can develop contingencies to meet future events, it will be

prepared to deal with other departments, and thus, more satisfied in its interdepartmental relationships.

For marketing and manufacturing managers, there appears to be a significant and positive relationship between turbulence and market position. As measured, a greater market position score meant a weaker market position; thus, it appears that marketing and manufacturing managers experience a weaker market position when there is increasing turbulence. This is not too surprising since a weaker market position would be typically characterized as more turbulent. Corresponding to this finding, marketing and manufacturing managers also reflected a negative relationship between turbulence and company performance. This latter finding suggests that marketing and manufacturing managers who experience greater market turbulence will experience lower company performance. Together these findings indicate that turbulence is an important factor to marketing's and manufacturing's perceptions of performance.

Marketing and manufacturing managers also reflected the finding that greater proximal distance between departments leads to better company performance. While such a finding is peculiar since it implies that departments should be separated by greater distances, this finding might be due to a bias from large, successful global companies in the survey

sample. Such companies typically reflected having manufacturing in the Far East while marketing and/or R&D remained in the United States. By reflecting great distances between departments and better overall company performance, study results may have been skewed.

Having discussed the common findings across manager sets, a discussion of significant direct effects related to each department's relationship with the other two departments now follows (i.e., marketing with manufacturing, marketing with R&D, manufacturing with marketing, manufacturing with R&D, R&D with marketing, and R&D with manufacturing). This discussion presents additional findings to those previously discussed that may be department-specific and/or relationship-specific. Such discussion will particularly address significant, unhypothesized findings and those significant findings that refuted the given hypotheses.

### **Marketing's Integration With Manufacturing**

Based on those relationships found significant in the case of marketing's integration with manufacturing (refer to Table 4.3), marketing's meetings with manufacturing seem positively influenced by a general task orientation (partially supporting H9a), cooperative goals (supporting H10a), and effective telecommunications systems (supporting

Table 4.3

Regression of Structural Variables onto  
Performance, Interaction, and Collaboration:  
Marketing Managers With Manufacturing

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MARKETING MANAGERS WITH MANUFACTURING

| TO:   |          | PERFORMANCE VARIABLES . . . . . |                  |                 |                  |                  | INTEGRATION . .  |                  |                  |                  |
|-------|----------|---------------------------------|------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |          | DEPT                            | COMP             | PD              | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| FROM: | CENT     | -0.20<br>(-2.46)                | -0.09<br>(-1.01) | 0.03<br>(.35)   | -0.14<br>(-1.73) | -0.01<br>(-.10)  | 0.06<br>(.74)    | -0.03<br>(-.44)  | 0.19<br>(2.33)   | -0.12<br>(-1.56) |
|       | FORM     | 0.12<br>(1.44)                  | 0.03<br>(.38)    | -0.07<br>(-.79) | -0.01<br>(-.16)  | 0.02<br>(.28)    | -0.14<br>(-1.59) | -0.01<br>(-.15)  | 0.00<br>(.04)    | 0.07<br>(.88)    |
|       | SPEC     | -0.02<br>(-.22)                 | -0.04<br>(-.47)  | 0.04<br>(.51)   | 0.02<br>(.19)    | -0.09<br>(1.38)  | 0.00<br>(.01)    | 0.08<br>(1.05)   | 0.15<br>(1.88)   | 0.04<br>(.53)    |
|       | SIZE     | 0.05<br>(.70)                   | 0.07<br>(.92)    | 0.05<br>(.69)   | 0.08<br>(1.05)   | -0.01<br>(-.21)  | -0.10<br>(-1.23) | 0.03<br>(.48)    | 0.05<br>(.65)    | -0.03<br>(-.46)  |
|       | ROUT     | -0.02<br>(-.21)                 | -0.05<br>(-.57)  | 0.05<br>(.58)   | -0.03<br>(-.34)  | -0.06<br>(-.94)  | -0.01<br>(-.17)  | 0.04<br>(.61)    | 0.12<br>(1.59)   | 0.02<br>(.34)    |
|       | ID       | -.01<br>(-.09)                  | 0.04<br>(.52)    | -0.02<br>(-.24) | -0.03<br>(-.35)  | -0.04<br>(-.56)  | -0.04<br>(-.48)  | 0.08<br>(1.20)   | 0.20<br>(2.69)   | 0.16<br>(2.36)   |
|       | INTERPOC | 0.09<br>(1.25)                  | 0.10<br>(1.27)   | 0.05<br>(.66)   | 0.11<br>(1.40)   | 0.01<br>(.23)    | 0.02<br>(.30)    | 0.01<br>(.21)    | 0.08<br>(1.12)   | 0.05<br>(.71)    |
|       | TIMEOC   | 0.10<br>(1.24)                  | 0.15<br>(1.87)   | 0.17<br>(2.07)  | 0.11<br>(1.33)   | 0.10<br>(1.50)   | -0.14<br>(-1.66) | -0.11<br>(-1.49) | -0.08<br>(-1.05) | -0.03<br>(-.46)  |
|       | TASKMFG  | 0.11<br>(1.03)                  | -0.05<br>(-.46)  | 0.06<br>(.55)   | -0.03<br>(-.24)  | 0.11<br>(1.28)   | -0.09<br>(-.83)  | 0.10<br>(.99)    | -0.11<br>(-1.01) | 0.09<br>(.90)    |
|       | TASKRD   | 0.06<br>(.86)                   | 0.11<br>(1.41)   | 0.13<br>(1.68)  | 0.06<br>(.82)    | -0.00<br>(-.07)  | -0.02<br>(-.21)  | -0.06<br>(-.86)  | -0.13<br>(-1.80) | 0.02<br>(.36)    |
|       | TASKMKTG | 0.23<br>(2.13)                  | 0.08<br>(.71)    | 0.22<br>(1.84)  | 0.16<br>(1.40)   | 0.05<br>(.51)    | -0.15<br>(-1.33) | 0.17<br>(1.62)   | 0.00<br>(.04)    | 0.06<br>(.55)    |
|       | TASKGEN  | 0.19<br>(2.02)                  | 0.04<br>(.39)    | 0.15<br>(1.43)  | 0.17<br>(1.74)   | 0.05<br>(.57)    | -0.08<br>(-.83)  | 0.16<br>(1.75)   | 0.04<br>(.47)    | 0.15<br>(1.75)   |
|       | GOALS    | 0.00<br>(.06)                   | 0.03<br>(.39)    | 0.04<br>(.53)   | 0.05<br>(.70)    | 0.53<br>(8.22)   | -0.02<br>(-.31)  | 0.24<br>(3.31)   | 0.07<br>(.91)    | 0.38<br>(5.37)   |
|       | PRODPROC | -0.17<br>(-2.20)                | -0.11<br>(-1.36) | -0.04<br>(-.49) | -0.02<br>(-.22)  | -0.07<br>(-1.08) | -0.13<br>(-1.54) | 0.05<br>(.74)    | 0.06<br>(.81)    | 0.07<br>(1.04)   |
|       | PRODLINS | -0.11<br>(-1.44)                | 0.00<br>(.06)    | -0.02<br>(-.28) | 0.01<br>(.07)    | 0.00<br>(.00)    | -0.07<br>(-.93)  | -0.03<br>(-.48)  | 0.11<br>(1.40)   | -0.06<br>(-.80)  |

**Table 4.3 - continued**

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MARKETING MANAGERS WITH MANUFACTURING (CONT)**

|                                 | TO:             |                  |                  |                  |                  |                  |                  |                |                 |
|---------------------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|----------------|-----------------|
|                                 | DEPT            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO           | COLLAB          |
| CONFLICT                        | 0.13<br>(1.61)  | 0.08<br>(.95)    | 0.05<br>(.60)    | 0.11<br>(1.34)   | 0.13<br>(1.88)   | -0.04<br>(-.46)  | -0.12<br>(-1.55) | 0.10<br>(1.29) | 0.09<br>(1.19)  |
| COMPUTER                        | 0.11<br>(1.39)  | -0.02<br>(-.29)  | -0.00<br>(-.02)  | 0.07<br>(.82)    | 0.01<br>(.09)    | 0.06<br>(.74)    | 0.08<br>(1.07)   | 0.12<br>(1.52) | 0.08<br>(1.12)  |
| TELECOMM                        | -0.02<br>(-.26) | 0.00<br>(.01)    | 0.07<br>(.75)    | 0.10<br>(1.17)   | 0.08<br>(1.17)   | -0.11<br>(-1.32) | 0.43<br>(5.62)   | 0.09<br>(1.09) | -0.06<br>(-.78) |
| INFOCERT                        | 0.14<br>(1.71)  | 0.08<br>(.90)    | 0.18<br>(2.00)   | 0.06<br>(.66)    | 0.19<br>(2.69)   | 0.18<br>(1.97)   | 0.03<br>(.35)    | 0.14<br>(1.67) | 0.18<br>(2.24)  |
| TURB                            | -0.07<br>(-.97) | -0.18<br>(-2.20) | -0.10<br>(-1.25) | -0.14<br>(-1.74) | -0.11<br>(-1.70) | 0.16<br>(1.97)   | 0.06<br>(.88)    | 0.14<br>(1.78) | -0.02<br>(-.30) |
| STATUS                          | -0.01<br>(-.16) | 0.10<br>(1.22)   | 0.02<br>(.30)    | 0.02<br>(.28)    | -0.01<br>(-.13)  | -0.16<br>(-1.98) | -0.08<br>(-1.07) | 0.08<br>(1.07) | -0.04<br>(-.60) |
| PRXDIST                         | 0.12<br>(1.55)  | 0.17<br>(2.06)   | 0.15<br>(1.80)   | 0.15<br>(1.78)   | 0.01<br>(.19)    | 0.08<br>(1.00)   | -0.11<br>(-1.48) | 0.02<br>(.23)  | -0.07<br>(-.92) |
| COEFFICIENT<br>OF DETERMINATION | 0.29            | 0.20             | 0.17             | 0.24             | 0.48             | 0.18             | 0.37             | 0.26           | 0.38            |

- KEY:**
- |                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

T-VALUES ARE GIVEN IN THE PARENTHESES

H13a). In regards to the finding concerning a general (broader) orientation, it may be that a general task orientation (e.g. product quality, profit, return on investment) may provide greater breadth in marketing goals, which as hypothesized, will require greater information needs.

Marketing's documented information exchange with manufacturing seems positively influenced by centralization (refuting H1a), specialization (refuting H3a), interdependence (supporting H6a), certainty of information (refuting H14a), and turbulence (supporting H15a). Several speculations are made concerning the unsupported hypotheses. A centralized marketing department may demand more documented information to facilitate management's decision-making. A specialized marketing department may demand more documented information to educate the "specialized" personnel on other issues. Certainty of information may actually encourage documented information exchange since there will be greater confidence to document information. Another significant finding was the negative relationship between a R&D orientation and documented information exchange. While it is possible that marketing departments with an R&D orientation will prefer to exchange information with R&D, not manufacturing, this was not evidenced in the marketing-R&D analysis (refer to Table 4.4 in the



"Marketing's Integration With R&D" section). In light of no evidence to support this finding and the minimal significance of this construct across manager sets, this relationship may be spurious.

While direct effects from structural variables onto collaboration were not hypothesized, marketing's collaboration with manufacturing appears positively influenced by interdependence and cooperative goals, as already discussed, along with a general orientation and certainty of information. Marketing managers with a broader, more general orientation (e.g. product quality, profit, and return on investment) may feel a need to work with manufacturing to achieve these goals. Certain information may encourage the marketing department to work with manufacturing since certain information will reduce manufacturing complaints concerning product demand and production scheduling.

#### **Marketing's Integration With R&D**

As presented in Table 4.4, marketing's meetings with R&D seem positively influenced by interdependence (supporting H6a), cooperative goals (supporting H10a), production process type (not hypothesized), effective telecommunication systems (supporting H13a), and turbulence (supporting H15a). The finding concerning production

Table 4.4

Regression of Structural Variables onto Performance, Interaction, and Collaboration: Marketing Managers With R&D

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MARKETING MANAGERS WITH R&D

| TO:   |          | PERFORMANCE VARIABLES . . . . . |                  |                 |                  |                  |                  |                  | INTEGRATION . .  |                  |
|-------|----------|---------------------------------|------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |          | DEPT                            | COMP             | PD              | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| FROM: | CENT     | -0.19<br>(-2.39)                | -0.09<br>(-1.09) | 0.04<br>(.42)   | -0.13<br>(-1.67) | -0.11<br>(-1.68) | 0.09<br>(1.08)   | 0.05<br>(.72)    | 0.20<br>(2.48)   | -0.11<br>(-1.50) |
|       | FORM     | 0.14<br>(1.81)                  | 0.07<br>(.87)    | -0.03<br>(-.38) | 0.03<br>(.34)    | -0.01<br>(-.08)  | -0.16<br>(-1.84) | 0.03<br>(.37)    | 0.15<br>(1.84)   | -0.04<br>(-.53)  |
|       | SPEC     | -0.03<br>(-.44)                 | -0.07<br>(-.81)  | 0.00<br>(.04)   | -0.01<br>(-.17)  | 0.05<br>(.76)    | -0.01<br>(-.14)  | 0.04<br>(.51)    | 0.08<br>(1.01)   | 0.15<br>(2.12)   |
|       | SIZE     | 0.04<br>(.60)                   | 0.05<br>(.60)    | 0.03<br>(.37)   | 0.08<br>(1.03)   | 0.02<br>(.36)    | -0.11<br>(-1.38) | -0.10<br>(-1.47) | -0.11<br>(-1.41) | -0.19<br>(-2.79) |
|       | ROUT     | -0.04<br>(-.52)                 | -0.05<br>(-.60)  | 0.05<br>(.57)   | -0.03<br>(-.42)  | -0.04<br>(-.57)  | -0.04<br>(-.53)  | 0.00<br>(.02)    | 0.00<br>(.05)    | 0.05<br>(.68)    |
|       | ID       | 0.04<br>(.58)                   | 0.03<br>(.43)    | 0.04<br>(.55)   | 0.10<br>(1.28)   | 0.03<br>(.51)    | -0.09<br>(-1.18) | 0.17<br>(2.53)   | 0.18<br>(2.36)   | 0.14<br>(2.05)   |
|       | INTERPOC | 0.12<br>(1.63)                  | 0.09<br>(1.14)   | 0.04<br>(.52)   | 0.13<br>(1.65)   | 0.06<br>(1.03)   | 0.05<br>(.67)    | 0.02<br>(.29)    | 0.01<br>(.09)    | 0.01<br>(.20)    |
|       | TIMEOC   | 0.10<br>(1.33)                  | 0.15<br>(1.89)   | 0.18<br>(2.21)  | 0.12<br>(1.69)   | 0.21<br>(3.19)   | -0.15<br>(-1.77) | 0.03<br>(.38)    | 0.00<br>(.03)    | 0.15<br>(2.15)   |
|       | TASKMFG  | 0.12<br>(1.17)                  | -0.04<br>(-.38)  | 0.08<br>(.70)   | 0.00<br>(.02)    | 0.05<br>(.52)    | -0.08<br>(-.73)  | 0.09<br>(.98)    | -0.07<br>(-.63)  | 0.05<br>(.51)    |
|       | TASKRD   | 0.07<br>(.89)                   | 0.09<br>(1.21)   | 0.11<br>(1.46)  | 0.05<br>(.70)    | 0.14<br>(2.28)   | -0.01<br>(-.08)  | -0.03<br>(-.52)  | -0.12<br>(-1.59) | -0.00<br>(-.07)  |
|       | TASKMKTG | 0.24<br>(2.16)                  | 0.08<br>(.67)    | 0.24<br>(2.06)  | 0.19<br>(1.72)   | 0.05<br>(.48)    | -0.15<br>(-1.30) | 0.10<br>(.98)    | -0.06<br>(-.53)  | 0.01<br>(.15)    |
|       | TASKGEN  | 0.16<br>(1.69)                  | 0.02<br>(.18)    | 0.11<br>(1.16)  | 0.14<br>(1.49)   | 0.06<br>(.77)    | -0.11<br>(-1.08) | 0.04<br>(.46)    | -0.03<br>(-.31)  | 0.12<br>(1.38)   |
|       | GOALS    | 0.05<br>(.64)                   | 0.12<br>(1.54)   | 0.20<br>(2.53)  | 0.15<br>(1.93)   | 0.40<br>(6.10)   | -0.03<br>(-.35)  | 0.20<br>(2.80)   | 0.19<br>(2.44)   | 0.38<br>(5.33)   |
|       | PRODPROC | -0.12<br>(-1.61)                | -0.10<br>(-1.32) | -0.04<br>(-.48) | 0.01<br>(.12)    | -0.08<br>(-1.24) | -0.10<br>(-1.24) | 0.14<br>(2.00)   | 0.13<br>(1.69)   | 0.00<br>(.07)    |
|       | PRODLINS | -0.11<br>(-1.45)                | 0.01<br>(.14)    | -0.01<br>(-.11) | 0.01<br>(.15)    | -0.03<br>(-.51)  | -0.09<br>(-1.12) | 0.00<br>(.00)    | 0.10<br>(1.27)   | 0.03<br>(.41)    |

**Table 4.4 - continued**

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MARKETING MANAGERS WITH R&D**

|                                 | TO:             |                  |                  |                  |                  |                  |                  |                 |                  |
|---------------------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|
|                                 | DEPT            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO            | COLLAB           |
| CONFLICT                        | -0.05<br>(-.65) | 0.05<br>(.66)    | 0.05<br>(.68)    | 0.03<br>(.38)    | 0.16<br>(2.57)   | -0.10<br>(-1.26) | -0.18<br>(-2.63) | -0.04<br>(-.50) | 0.14<br>(2.12)   |
| COMPUTER                        | 0.12<br>(1.47)  | 0.01<br>(.07)    | 0.03<br>(.37)    | 0.09<br>(1.14)   | -0.16<br>(-2.45) | 0.05<br>(.63)    | 0.05<br>(.72)    | 0.07<br>(.86)   | 0.04<br>(.57)    |
| TELECOMM                        | -0.05<br>(-.57) | -0.02<br>(-.29)  | 0.03<br>(.35)    | 0.04<br>(.50)    | 0.02<br>(.32)    | -0.09<br>(-1.01) | 0.46<br>(6.16)   | 0.04<br>(.52)   | 0.05<br>(.64)    |
| INFOCERT                        | 0.17<br>(2.03)  | 0.12<br>(1.30)   | 0.21<br>(2.38)   | 0.06<br>(.75)    | 0.16<br>(2.23)   | 0.17<br>(1.83)   | -0.02<br>(-.23)  | 0.13<br>(1.51)  | 0.14<br>(1.83)   |
| TURB                            | -0.06<br>(-.78) | -0.15<br>(-1.81) | -0.06<br>(-.72)  | -0.10<br>(-1.35) | -0.04<br>(-.58)  | 0.16<br>(2.02)   | 0.16<br>(2.27)   | 0.19<br>(2.42)  | 0.08<br>(1.10)   |
| STATUS                          | 0.05<br>(.72)   | -0.00<br>(-.04)  | -0.09<br>(-1.17) | 0.10<br>(1.32)   | 0.12<br>(1.97)   | -0.04<br>(-.47)  | 0.04<br>(.57)    | 0.07<br>(.87)   | -0.10<br>(-1.56) |
| PRXDIST                         | 0.09<br>(1.24)  | 0.17<br>(2.10)   | 0.14<br>(1.82)   | 0.09<br>(1.20)   | 0.10<br>(1.58)   | 0.13<br>(1.67)   | -0.11<br>(-1.58) | -0.04<br>(-.48) | 0.01<br>(.18)    |
| COEFFICIENT<br>OF DETERMINATION | 0.29            | 0.21             | 0.21             | 0.27             | 0.48             | 0.18             | 0.40             | 0.24            | 0.40             |

**KEY:**

|                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

T-VALUES ARE GIVEN IN THE PARENTHESES

process type is interesting since it implies that the more continuous a production process becomes, the more meetings between marketing and R&D. This contradicts Woodward's (1965) finding that job shops will reflect higher degrees of interaction between departments. It may be that continuous manufacturers focus on incremental product changes to keep the production process fairly constant, but require marketing and R&D to discuss what is market-acceptable and technologically feasible. In turn, R&D would meet with manufacturing to discuss options. This scenario is supported by the significant, positive findings of production process type and meetings for manufacturing with R&D and R&D with manufacturing, i.e., manufacturing and R&D departments meet more in companies with continuous production processes. It is further speculated that R&D departments in continuous manufacturing firms are more aligned to process R&D than product R&D. Thus, R&D departments in continuous manufacturing firms would have closer ties to manufacturing.

Another interesting, surprising finding was meetings with R&D were negatively influenced by effective conflict resolution mechanisms (contradicting H12a). This suggests that marketing meets more with R&D when there are minimal devices for resolving conflict. Explaining this is difficult, and it is possible that this finding is spurious

since no other manager set exhibited this relationship. Still, the significance of this relationship ( $t=-2.63$ ) strongly suggests that there is such a relationship.

Marketing's documented information exchange with R&D seems positively influenced by centralization (refuting H1a), formalization (refuting H2a), interdependence (supporting H6a), cooperative goals (supporting H10a), production process type (not hypothesized), and turbulence (supporting H15a). Akin to findings in the case of marketing's integration with manufacturing, it appears that the marketing department may demand more documented information if it is centralized. The significance of this relationship across both marketing cases and lack of this relationship in the cases for manufacturing or R&D managers indicates that this phenomenon may be a unique characteristic of marketing departments.

Findings also show that formalized marketing departments exchange more documented information, possibly to maintain a historical record of its dealings with R&D. The significant positive relationship between production process type and documented information exchange is explained in the same manner as its relationship with meetings. By focusing on incremental product changes, continuous manufacturers will keep the production process fairly constant and require that marketing and R&D exchange

documented market and technology information to best determine market and technology possibilities.

Marketing's collaboration with R&D appears positively influenced by specialization, department size, interdependence, time orientation, cooperative goals, effective conflict resolution mechanisms, and certainty of information - none of which were hypothesized relationships. Marketing's collaboration with R&D appears negatively influenced by department size, also not hypothesized. Since the relationships of interdependence, cooperative goals, and certainty of information have been discussed previously, they are not further discussed. However, it should be noted that certainty of information appears to be a key factor for collaboration since its relationship to collaboration was significant in both marketing manager cases.

The relationship between specialization and collaboration suggests that marketing departments which are more specialized will collaborate with R&D. It is possible that marketing's dealings with R&D require specialized knowledge. Interestingly, R&D managers reflected an opposite relationship; that is, R&D departments which are more specialized will decrease collaboration with marketing. This duality might be a cause for conflict between marketing and R&D. However, the limited reliability of the

specialization measure calls into question the findings concerning specialization.

The findings concerning department size suggest that larger marketing departments reduce their collaboration with R&D. As with several other relations, an explanation is difficult, and thus, the finding may be spurious since no other manager set exhibited this relationship. Nevertheless, the significance of the relationship ( $t=-2.79$ ) strongly warrants attention.

As for the relationship between time orientation and collaboration, it seems that marketing managers with a longer time orientation will collaborate more with R&D. While this too is a single relationship that is not reflected by other cases, it may be suggested that marketing managers with a longer time orientation will get along better with R&D managers, who also typically have a longer time orientation. As for the last significant relationship, effective conflict resolution mechanisms appear to facilitate marketing's collaboration with R&D. Collaboration may be facilitated since disputes that emerge can be resolved in a jointly agreeable, effective manner.

### **Manufacturing's Integration With Marketing**

Based on the significant findings for the manufacturing with marketing case (see Table 4.5), manufacturing's

Table 4.5

Regression of Structural Variables onto  
Performance, Interaction, and Collaboration:  
Manufacturing Managers With Marketing

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MANUFACTURING MANAGERS WITH MARKETING

| TO:   |          | PERFORMANCE VARIABLES . . . . . |                  |                  |                 |                  |                  | INTEGRATION . .  |                  |                  |
|-------|----------|---------------------------------|------------------|------------------|-----------------|------------------|------------------|------------------|------------------|------------------|
|       |          | DEPT                            | COMP             | PD               | PM              | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| FROM: | CENT     | -0.10<br>(-1.19)                | -0.10<br>(-1.15) | 0.03<br>(.30)    | 0.03<br>(.35)   | -0.12<br>(-1.49) | -0.04<br>(-.43)  | -0.04<br>(-.55)  | 0.11<br>(1.16)   | -0.09<br>(-1.04) |
|       | FORM     | 0.01<br>(.16)                   | -0.08<br>(-.96)  | -0.05<br>(-.59)  | 0.01<br>(.11)   | 0.03<br>(.32)    | 0.10<br>(1.12)   | 0.13<br>(1.92)   | 0.15<br>(1.72)   | 0.02<br>(.27)    |
|       | SPEC     | 0.12<br>(1.51)                  | 0.11<br>(1.28)   | 0.09<br>(1.06)   | 0.14<br>(1.81)  | -0.02<br>(-.29)  | 0.06<br>(.71)    | 0.13<br>(1.94)   | 0.08<br>(1.00)   | 0.04<br>(.50)    |
|       | SIZE     | 0.00<br>(.03)                   | 0.11<br>(1.47)   | 0.07<br>(.89)    | 0.08<br>(1.01)  | 0.05<br>(.75)    | -0.15<br>(-1.84) | 0.11<br>(1.81)   | 0.08<br>(1.04)   | -0.01<br>(-.17)  |
|       | ROUT     | -0.03<br>(-.35)                 | -0.04<br>(-.41)  | 0.00<br>(.01)    | 0.01<br>(.09)   | -0.11<br>(-1.37) | -0.01<br>(-.09)  | -0.13<br>(-1.92) | -0.13<br>(-1.46) | -0.19<br>(-2.41) |
|       | ID       | -0.09<br>(-1.19)                | -0.10<br>(-1.30) | -0.09<br>(-1.16) | 0.07<br>(.88)   | -0.10<br>(-1.37) | -0.03<br>(-.40)  | 0.06<br>(.96)    | 0.12<br>(1.48)   | 0.06<br>(.88)    |
|       | INTERPOC | 0.02<br>(.32)                   | 0.08<br>(1.01)   | 0.09<br>(1.17)   | 0.05<br>(.62)   | 0.06<br>(.78)    | -0.02<br>(-.30)  | -0.02<br>(-.28)  | 0.09<br>(1.11)   | -0.04<br>(-.54)  |
|       | TIMEOC   | 0.13<br>(1.57)                  | 0.16<br>(1.92)   | 0.16<br>(1.87)   | 0.09<br>(1.07)  | 0.05<br>(.61)    | -0.09<br>(-1.00) | 0.08<br>(1.23)   | 0.00<br>(.06)    | 0.05<br>(.68)    |
|       | TASKMFG  | -0.03<br>(-.38)                 | -0.06<br>(-.78)  | -0.07<br>(-.78)  | 0.07<br>(.91)   | -0.06<br>(-.81)  | 0.01<br>(.12)    | -0.03<br>(-.50)  | -0.17<br>(-2.04) | -0.13<br>(-1.66) |
|       | TASKRD   | n.a.                            | n.a.             | n.a.             | n.a.            | n.a.             | n.a.             | n.a.             | n.a.             | n.a.             |
|       | TASKMKTG | 0.05<br>(.58)                   | -0.01<br>(-.11)  | -0.18<br>(-1.97) | -0.06<br>(-.65) | 0.02<br>(.26)    | -0.05<br>(-.52)  | -0.01<br>(-.12)  | 0.08<br>(.86)    | 0.06<br>(.73)    |
|       | TASKGEN  | 0.04<br>(.40)                   | 0.03<br>(.33)    | 0.16<br>(1.65)   | 0.09<br>(.95)   | -0.04<br>(-.51)  | -0.04<br>(-.37)  | -0.16<br>(-2.16) | -0.13<br>(1.30)  | -0.06<br>(-.64)  |
|       | GOALS    | -0.22<br>(-2.74)                | -0.09<br>(-1.07) | -0.01<br>(-.06)  | 0.06<br>(.80)   | 0.36<br>(4.83)   | -0.04<br>(-.50)  | 0.03<br>(.43)    | -0.03<br>(-.41)  | 0.27<br>(3.55)   |
|       | PRODPROC | 0.15<br>(1.94)                  | 0.04<br>(.56)    | 0.13<br>(1.60)   | 0.13<br>(1.66)  | -0.05<br>(-.69)  | 0.04<br>(.50)    | -0.06<br>(-.91)  | -0.04<br>(-.47)  | -0.16<br>(-2.12) |
|       | PRODLINS | 0.13<br>(1.79)                  | 0.19<br>(2.44)   | 0.15<br>(1.89)   | 0.19<br>(2.59)  | 0.05<br>(.76)    | -0.03<br>(-.39)  | -0.07<br>(-1.12) | -0.03<br>(-.44)  | 0.01<br>(.09)    |



**Table 4.5 - continued**

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MANUFACTURING MANAGERS WITH MARKETING**

|                                 | TO:              |                  |                  |                  |                  |                  |                  |                  |                  |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                                 | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| CONFLICT                        | -0.00<br>(-.05)  | 0.05<br>(.66)    | 0.08<br>(.95)    | 0.20<br>(2.64)   | 0.18<br>(2.46)   | -0.10<br>(-1.13) | -0.09<br>(-1.51) | -0.03<br>(-.36)  | 0.18<br>(2.36)   |
| COMPUTER                        | -0.00<br>(-.03)  | -0.00<br>(-.01)  | 0.18<br>(2.00)   | 0.08<br>(.94)    | -0.03<br>(-.36)  | -0.25<br>(-2.69) | 0.16<br>(2.32)   | 0.25<br>(2.81)   | 0.21<br>(2.64)   |
| TELECOMM                        | 0.06<br>(.71)    | 0.05<br>(.52)    | -0.12<br>(-1.30) | -0.15<br>(-1.72) | -0.04<br>(-.48)  | -0.05<br>(-.58)  | 0.47<br>(6.74)   | 0.02<br>(.25)    | -0.06<br>(-.77)  |
| INFOCERT                        | 0.29<br>(3.11)   | 0.15<br>(1.60)   | 0.19<br>(1.97)   | 0.14<br>(1.48)   | 0.24<br>(2.78)   | -0.05<br>(-.48)  | -0.14<br>(-1.82) | -0.02<br>(-.21)  | 0.13<br>(1.49)   |
| TURB                            | -0.10<br>(-1.21) | -0.27<br>(-3.31) | -0.18<br>(-2.13) | -0.26<br>(-3.40) | -0.17<br>(-2.30) | 0.25<br>(2.90)   | 0.08<br>(1.26)   | -0.13<br>(-1.51) | -0.06<br>(-.80)  |
| STATUS                          | 0.14<br>(1.81)   | 0.12<br>(1.53)   | -0.06<br>(-.69)  | 0.05<br>(.69)    | 0.05<br>(.71)    | -0.06<br>(-.71)  | -0.02<br>(-.35)  | 0.03<br>(.40)    | 0.04<br>(.50)    |
| PRXDIST                         | 0.03<br>(.37)    | 0.18<br>(2.32)   | 0.12<br>(1.46)   | 0.07<br>(.91)    | 0.13<br>(1.84)   | -0.07<br>(-.81)  | -0.02<br>(-.39)  | 0.03<br>(.35)    | -0.14<br>(-1.93) |
| COEFFICIENT<br>OF DETERMINATION | 0.33             | 0.29             | 0.25             | 0.34             | 0.39             | 0.21             | 0.56             | 0.25             | 0.39             |

- KEY:**
- |                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TINEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

T-VALUES ARE GIVEN IN THE PARENTHESES

meetings with marketing were positively influenced by formalization (refuting H2a), specialization (refuting H3a), department size (supporting H4a), effective computer systems (supporting H13a), and effective telecommunication systems (supporting H13a). Those factors having significant, negative relationships with meetings include routineness (supporting H5a), a general orientation (partially refuting H9a), and certainty of information (supporting H14a).

Among the findings that refute hypotheses, it appears that the manufacturing department's formalization will increase meetings with the marketing department. While this finding may be spurious since it was only significant in this case, it is possible that a formalized manufacturing department may increase its meetings with marketing to regiment a monitoring of market characteristics. As for specialization, it is possible that more specialized manufacturing departments will increase its meeting activities with marketing since manufacturing will require knowledge outside of the department's specialty. It is again noted that the reliability problems with the specialization measure prohibit any certain generalizations. As for the negative relationship between a general orientation and meetings, an explanation is difficult. However, it is interesting to observe that marketing managers increase their meeting activities with

manufacturing when they have a greater general orientation, which contrasts the negative effect that a general orientation has on manufacturing managers' meetings with marketing. This contrasting finding may cause a certain friction between the two departments.

Two factors had significant, positive effects on manufacturing's documented information exchange with marketing. These included formalization (refuting H2a) and effective computer systems (supporting H13a). A formalized manufacturing department may desire greater documented information exchange to maintain a historical record of market characteristics as well as document activities with the marketing department. The only significant negative factor for documented information exchange was a manufacturing orientation (partially supporting H9a). It is conceivable that a less production-focused, broader manufacturing department will require greater information to do its job.

While not hypothesized, three factors were found significant and positively related to manufacturing's collaboration with marketing: cooperative goals (as previously discussed), effective conflict resolution mechanisms, and effective computer systems. As previously discussed, effective conflict resolution mechanisms may facilitate collaboration because emerging disputes can be

resolved in an jointly agreeable, effective manner. Effective computer systems may promote manufacturing's collaboration with marketing for they can facilitate the instantaneous sharing of information.

Four additional unhypothesized relationships were found significant and negatively related to manufacturing's collaboration with marketing: routineness, a manufacturing orientation, production process type, and proximal distance. The negative relationship between routineness and collaboration indicates that the manufacturing department with nonroutine tasks will collaborate with marketing. A nonroutine manufacturing department may need to work closely with marketing to determine what should be produced to meet customer demand. The second finding of manufacturing orientation indicates that a manufacturing department with a reduced manufacturing orientation will collaborate with marketing. With a reduced manufacturing (production) orientation, the respective manufacturing department may be more likely to share certain marketing goals and/or other goals, which would promote collaboration. As for production process type, manufacturing departments in job shops appear more likely to collaborate with marketing. It is conceivable that in a job shop where work is typically "made-to-order," manufacturing and marketing will have to work together to get the customer order completed - as

prescribed by Woodward (1965). Interestingly, marketing does not reflect this relationship, which suggests that manufacturing in job shop companies believe that they are collaborating with marketing, while marketing departments in job shop companies do not perceive such collaboration. This may be a another area of dispute between marketing and manufacturing. The fourth factor negatively affecting manufacturing's collaboration with marketing was proximal distance. The significance of this relationship indicates that the greater distances between marketing and manufacturing, the less manufacturing perceives collaboration with marketing. Once again, it is interesting to note that this relationship does not exist for marketing managers. This may be viewed as another area of dispute between marketing and manufacturing departments.

#### **Manufacturing's Integration With R&D**

Referring to Table 4.6, manufacturing's meetings with R&D appear positively influenced by specialization (refuting H3a), interdependence (supporting H6a), production process type (no hypothesis), effective computer systems (supporting H13a), and effective telecommunication systems (supporting H13a). As in the case of manufacturing's meetings with marketing, the effect of specialization is again significant. It is speculated that specialization is

Table 4.6

Regression of Structural Variables onto  
Performance, Interaction, and Collaboration:  
Manufacturing Managers With R&D

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MANUFACTURING MANAGERS WITH R&D

|       |          | TO:                             |                  |                  |                 |                  |                  |                  |                  |                  |
|-------|----------|---------------------------------|------------------|------------------|-----------------|------------------|------------------|------------------|------------------|------------------|
|       |          | PERFORMANCE VARIABLES . . . . . |                  |                  |                 |                  | INTEGRATION . .  |                  |                  |                  |
| FROM: |          | DEPT                            | COMP             | PD               | PM              | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
|       | CENT     | -0.12<br>(-1.37)                | -0.10<br>(-1.05) | 0.02<br>(.26)    | 0.05<br>(.52)   | -0.01<br>(-.10)  | -0.09<br>(-.98)  | 0.02<br>(.25)    | -0.02<br>(-.19)  | -0.00<br>(-.04)  |
|       | FORM     | 0.06<br>(.70)                   | -0.06<br>(-.72)  | -0.08<br>(-.91)  | 0.01<br>(.08)   | 0.07<br>(.90)    | 0.11<br>(1.23)   | 0.11<br>(1.63)   | 0.07<br>(.76)    | 0.04<br>(.56)    |
|       | SPEC     | 0.11<br>(1.39)                  | 0.09<br>(1.04)   | 0.06<br>(.67)    | 0.12<br>(1.54)  | -0.06<br>(-.80)  | 0.05<br>(.61)    | 0.11<br>(1.72)   | -0.01<br>(.13)   | 0.00<br>(.04)    |
|       | SIZE     | 0.01<br>(.07)                   | 0.11<br>(1.42)   | 0.05<br>(.70)    | 0.09<br>(1.16)  | 0.09<br>(1.36)   | -0.15<br>(-1.80) | 0.07<br>(1.19)   | -0.00<br>(-.04)  | 0.04<br>(.58)    |
|       | ROUT     | -0.07<br>(-.82)                 | -0.06<br>(-.72)  | 0.00<br>(.03)    | 0.01<br>(.13)   | 0.01<br>(.10)    | -0.01<br>(-.09)  | -0.10<br>(-1.47) | -0.05<br>(-.51)  | -0.24<br>(-2.96) |
|       | ID       | -0.03<br>(-.33)                 | -0.06<br>(-.68)  | -0.08<br>(-.90)  | 0.00<br>(.05)   | -0.14<br>(-1.90) | -0.12<br>(-1.35) | 0.20<br>(3.17)   | 0.25<br>(2.83)   | 0.17<br>(2.22)   |
|       | INTERPOC | 0.02<br>(.28)                   | 0.09<br>(1.06)   | 0.10<br>(1.32)   | 0.05<br>(.67)   | 0.14<br>(2.12)   | -0.03<br>(-.37)  | 0.00<br>(.08)    | 0.12<br>(1.41)   | 0.14<br>(1.93)   |
|       | TIMEDC   | 0.15<br>(1.87)                  | 0.18<br>(2.07)   | 0.15<br>(1.72)   | 0.09<br>(1.09)  | 0.01<br>(.15)    | -0.10<br>(-1.19) | 0.08<br>(1.28)   | 0.05<br>(.58)    | 0.10<br>(1.29)   |
|       | TASKMFG  | -0.02<br>(-.30)                 | -0.06<br>(-.75)  | -0.06<br>(-.72)  | 0.07<br>(.83)   | -0.05<br>(-.64)  | 0.03<br>(.36)    | -0.06<br>(-1.03) | -0.12<br>(-1.35) | -0.02<br>(-.26)  |
|       | TASKRD   | n.a.                            | n.a.             | n.a.             | n.a.            | n.a.             | n.a.             | n.a.             | n.a.             | n.a.             |
|       | TASKMKTG | 0.02<br>(.28)                   | -0.02<br>(-.18)  | -0.17<br>(-1.96) | -0.06<br>(-.64) | 0.09<br>(1.22)   | -0.05<br>(-.59)  | -0.08<br>(-1.20) | 0.03<br>(.31)    | -0.03<br>(-.40)  |
|       | TASKGEN  | 0.06<br>(.64)                   | 0.03<br>(.33)    | 0.16<br>(1.71)   | 0.06<br>(.70)   | -0.17<br>(-2.04) | -0.04<br>(-.40)  | -0.09<br>(-1.28) | 0.00<br>(.03)    | -0.06<br>(-.69)  |
|       | GOALS    | -0.21<br>(-2.47)                | -0.09<br>(-1.04) | 0.19<br>(2.18)   | 0.13<br>(1.57)  | 0.47<br>(6.23)   | -0.07<br>(-.75)  | 0.01<br>(.18)    | -0.01<br>(-.11)  | 0.22<br>(2.73)   |
|       | PRODPROC | 0.16<br>(2.01)                  | 0.06<br>(.70)    | 0.15<br>(1.80)   | 0.13<br>(1.61)  | -0.07<br>(-.94)  | 0.05<br>(.55)    | 0.10<br>(1.65)   | 0.04<br>(.50)    | -0.11<br>(-1.47) |
|       | PRODLINS | 0.14<br>(1.77)                  | 0.18<br>(2.29)   | 0.15<br>(1.93)   | 0.17<br>(2.18)  | 0.03<br>(.50)    | -0.03<br>(-.37)  | -0.04<br>(-.73)  | -0.05<br>(-.63)  | 0.14<br>(2.00)   |

Table 4.6 - continued

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MANUFACTURING MANAGERS WITH R&D

|                                 | TO:             |                  |                  |                  |                  |                  |                  |                 |                  |  |
|---------------------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|--|
|                                 | DEPT            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO            | COLLAB           |  |
| CONFLICT                        | 0.03<br>(.38)   | 0.04<br>(.50)    | 0.04<br>(.54)    | 0.05<br>(.58)    | 0.06<br>(.87)    | 0.09<br>(1.10)   | -0.03<br>(-.48)  | 0.06<br>(.66)   | 0.05<br>(.72)    |  |
| COMPUTER                        | 0.00<br>(.05)   | 0.00<br>(.03)    | 0.13<br>(1.45)   | 0.09<br>(.97)    | -0.12<br>(-1.55) | -0.27<br>(-2.89) | 0.12<br>(1.77)   | 0.17<br>(1.81)  | 0.09<br>(1.10)   |  |
| TELECOMM                        | -0.01<br>(-.06) | 0.03<br>(.32)    | -0.10<br>(-1.09) | -0.13<br>(-1.56) | 0.17<br>(2.16)   | -0.06<br>(-.64)  | 0.47<br>(6.98)   | 0.10<br>(1.11)  | 0.11<br>(1.32)   |  |
| INFOCERT                        | 0.30<br>(3.29)  | 0.18<br>(1.88)   | 0.16<br>(1.70)   | 0.18<br>(1.97)   | 0.21<br>(2.63)   | -0.09<br>(-.95)  | -0.09<br>(-1.26) | -0.02<br>(-.16) | 0.10<br>(1.21)   |  |
| TURB                            | -0.06<br>(-.77) | -0.24<br>(-2.81) | -0.18<br>(-2.21) | -0.23<br>(-2.88) | -0.11<br>(-1.48) | 0.24<br>(2.80)   | 0.06<br>(.93)    | -0.04<br>(-.49) | -0.09<br>(-1.21) |  |
| STATUS                          | 0.04<br>(.49)   | 0.04<br>(.46)    | -0.14<br>(-1.72) | 0.07<br>(.84)    | 0.12<br>(1.71)   | -0.03<br>(-.34)  | -0.05<br>(-.88)  | 0.01<br>(.14)   | -0.07<br>(-.93)  |  |
| PRXDIST                         | 0.02<br>(.22)   | 0.14<br>(1.72)   | 0.08<br>(.96)    | 0.05<br>(.69)    | 0.03<br>(.47)    | 0.01<br>(.11)    | -0.08<br>(-1.34) | 0.09<br>(1.05)  | -0.23<br>(-3.28) |  |
| COEFFICIENT<br>OF DETERMINATION | 0.31            | 0.25             | 0.27             | 0.32             | 0.46             | 0.21             | 0.58             | 0.21            | 0.41             |  |

- KEY:
- |                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

T-VALUES ARE GIVEN IN THE PARENTHESES

important to manufacturing's meetings with the other department. This may be due to specialized manufacturing departments needing immediate information to successfully perform their functions. As noted before, the reliability problems with the specialization measure prohibit any certain generalizations. The positive finding of effective computer systems was also common across both manufacturing cases regarding meetings. Since no other manager set reflected a significant relationship, the possible effect of computer systems may be unique to manufacturing departments.

The significance of production process type and its positive relationship to meetings indicates that manufacturing department's in continuous flow manufacturers will increase their meetings with R&D. The basis for this finding may be that R&D departments in continuous manufacturers are more process-oriented, thereby focusing on improvement of production efficiencies. Manufacturing and R&D departments in continuous manufacturers therefore have similar goals, and thus, will meet more to properly design and implement efficiency-improving technologies.

Two factors were significantly and positively related to manufacturing's documented information exchange with R&D. These included interdependence (supporting H6a) and effective computer systems (supporting H13a). As found with manufacturing's documented information exchange with



marketing, computer systems promote documented information exchange. Since this finding was common across both manufacturing cases but not reflected by other manager sets, it is possible that effective computer systems have a unique effect on manufacturing departments.

Six factors had significant, but unhypothesized, influences on manufacturing's collaboration with R&D. Interdependence, an interpersonal orientation, cooperative goals, and the number of product lines each reflected significant, positive influences; routineness and proximal distance reflected significant, negative influences.

As already discussed, manufacturing's perceptions of interdependence and cooperative goals with R&D will increase its collaboration with R&D. In addition, those manufacturing managers that are less task-oriented and more people-oriented will have a greater likelihood of collaborating with R&D, possibly because of personality. It also appears that there will be greater manufacturing collaboration with R&D when there is a greater number of product lines. It is speculated that R&D activity is high in those companies with a great number of product lines. Manufacturing may feel a need to work with R&D in these companies to insure that products can be successfully produced.

As for the factors that reduce manufacturing's collaboration with R&D, it appears that greater routineness of manufacturing tasks diminishes this collaboration. Manufacturing may see little need to work with R&D when circumstances are regular, whereas irregular events might require assistance from R&D in regards to technical specifications. The other negative finding of proximal distance was also reflected by manufacturing managers' collaboration with marketing. It appears that the farther manufacturing is from R&D (and marketing), the less collaboration between these departments. A possible explanation may be that production facilities that are located away from headquarters, where marketing and R&D reside, might become isolated. Because of this isolation, manufacturing may see less connection with R&D and/or marketing, and thus, find less interest in collaborating with either of the two departments. Since both routineness and proximal distance were significantly negative for manufacturing's collaboration with marketing and nonexistent for the remaining marketing and R&D manager cases, the effects of these two factors may be unique to manufacturing departments.

## **R&D's Integration With Marketing**

Table 4.7 presents findings concerning R&D's integration with marketing. The significant factors that positively influenced R&D's meetings with marketing included the previously discussed common findings of interdependence (supporting H6a) and effective telecommunication systems (supporting H13a) along with social interpersonal orientation (supporting H7a). It appears that the R&D department's meeting activity with marketing will be influenced by its manager's personality. However, this finding was not found with R&D's meetings with manufacturing, thus this finding may be spurious or unique to R&D's relationship with marketing.

Six factors reflected significant and positive influences on R&D's documented information exchange with marketing: formalization (refuting H2a), interdependence (H6a), an R&D goal orientation (no hypothesis), production process type (no hypothesis), effective conflict resolution mechanisms (supporting H12a), and status (refuting H16a). Length of time orientation had a significant, negative influence on R&D's documented information exchange with marketing, supporting H8a.

Contrary to what was hypothesized, it appears that a formalized R&D department will increase documented information exchange with marketing. As speculated with the

Table 4.7

Regression of Structural Variables onto  
Performance, Interaction, and Collaboration:  
R&D Managers With Marketing

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR R&D MANAGERS WITH MARKETING

|       |          | TO:                             |                  |                  |                  |                  |                  |                  |                  |                  |  |
|-------|----------|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|
|       |          | PERFORMANCE VARIABLES . . . . . |                  |                  |                  |                  | INTEGRATION . .  |                  |                  |                  |  |
|       |          | DEPT                            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |  |
| FROM: | CENT     | -0.08<br>(-1.00)                | 0.01<br>(.09)    | -0.09<br>(-1.13) | 0.06<br>(.71)    | 0.15<br>(2.02)   | 0.25<br>(3.12)   | 0.00<br>(.03)    | 0.05<br>(.67)    | -0.03<br>(-.45)  |  |
|       | FORM     | 0.14<br>(1.63)                  | -0.03<br>(-.35)  | -0.00<br>(-.03)  | -0.13<br>(-1.59) | -0.11<br>(-1.51) | 0.16<br>(2.00)   | 0.09<br>(1.46)   | 0.15<br>(1.92)   | 0.11<br>(1.49)   |  |
|       | SPEC     | 0.08<br>(1.00)                  | 0.05<br>(.59)    | -0.01<br>(-.09)  | -0.06<br>(-.83)  | -0.02<br>(-.23)  | -0.10<br>(-1.34) | -0.06<br>(-1.05) | 0.01<br>(.07)    | -0.13<br>(-1.77) |  |
|       | SIZE     | -0.03<br>(-.34)                 | 0.03<br>(.31)    | 0.11<br>(1.31)   | 0.04<br>(.49)    | -0.03<br>(-.32)  | -0.09<br>(-1.05) | 0.10<br>(1.47)   | -0.06<br>(-.73)  | 0.02<br>(.19)    |  |
|       | ROUT     | -0.07<br>(-.78)                 | 0.03<br>(.33)    | -0.05<br>(-.60)  | 0.14<br>(1.78)   | -0.03<br>(-.39)  | -0.07<br>(-.87)  | -0.03<br>(-.42)  | 0.01<br>(.11)    | 0.01<br>(.19)    |  |
|       | ID       | -0.04<br>(-.48)                 | 0.10<br>(1.24)   | 0.04<br>(.46)    | 0.20<br>(2.56)   | 0.06<br>(.82)    | -0.11<br>(-1.47) | 0.25<br>(4.22)   | 0.30<br>(4.10)   | 0.30<br>(4.06)   |  |
|       | INTERPOC | -0.04<br>(-.48)                 | -0.17<br>(-2.23) | -0.08<br>(-1.09) | -0.15<br>(-1.98) | -0.10<br>(-1.46) | -0.01<br>(-.13)  | 0.13<br>(2.26)   | 0.04<br>(.54)    | 0.04<br>(.54)    |  |
|       | TIMEOC   | -0.05<br>(-.57)                 | -0.05<br>(-.55)  | -0.10<br>(-1.06) | 0.01<br>(.09)    | -0.03<br>(-.39)  | -0.06<br>(-.68)  | -0.07<br>(-.97)  | -0.16<br>(-1.88) | -0.10<br>(-1.14) |  |
|       | TASKMFG  | 0.19<br>(2.35)                  | 0.01<br>(.09)    | -0.01<br>(-.08)  | -0.01<br>(-.10)  | 0.11<br>(1.56)   | 0.13<br>(1.72)   | -0.03<br>(-.51)  | -0.07<br>(-.98)  | 0.02<br>(.30)    |  |
|       | TASKRD   | 0.06<br>(.78)                   | 0.07<br>(.95)    | 0.16<br>(2.01)   | -0.06<br>(-.80)  | 0.00<br>(.02)    | -0.06<br>(-.73)  | -0.02<br>(-.28)  | 0.12<br>(1.72)   | -0.11<br>(-1.49) |  |
|       | TASKMKTG | 0.01<br>(.15)                   | 0.11<br>(1.27)   | 0.08<br>(.97)    | 0.02<br>(.21)    | 0.06<br>(.75)    | 0.04<br>(.49)    | 0.10<br>(1.60)   | 0.03<br>(.38)    | 0.07<br>(.87)    |  |
|       | TASKGEN  | -0.02<br>(-.26)                 | 0.03<br>(.36)    | -0.01<br>(-.11)  | -0.02<br>(-.27)  | 0.06<br>(.70)    | 0.04<br>(.49)    | 0.03<br>(.46)    | 0.12<br>(1.49)   | 0.09<br>(1.05)   |  |
|       | GOALS    | 0.02<br>(.25)                   | 0.03<br>(.36)    | 0.12<br>(1.51)   | 0.05<br>(.60)    | 0.37<br>(5.11)   | 0.00<br>(.01)    | 0.10<br>(1.63)   | -0.04<br>(-.48)  | 0.23<br>(3.11)   |  |
|       | PRODPROC | 0.09<br>(1.09)                  | 0.21<br>(2.66)   | 0.08<br>(1.08)   | 0.12<br>(1.56)   | 0.04<br>(.61)    | -0.21<br>(-2.73) | 0.08<br>(1.32)   | 0.17<br>(2.33)   | -0.02<br>(-.22)  |  |
|       | PRODLINS | -0.05<br>(-.59)                 | -0.01<br>(-.07)  | 0.03<br>(.40)    | -0.03<br>(-.35)  | 0.13<br>(1.89)   | -0.04<br>(-.49)  | 0.05<br>(.84)    | 0.09<br>(1.23)   | 0.03<br>(.35)    |  |

**Table 4.7 - continued**

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR R&D MANAGERS WITH MARKETING**

|                                 | TO:              |                  |                  |                  |                  |                  |                 |                 |                |  |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|----------------|--|
|                                 | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET            | INFO            | COLLAB         |  |
| CONFLICT                        | 0.15<br>(1.88)   | 0.10<br>(1.27)   | 0.27<br>(3.54)   | 0.13<br>(1.80)   | 0.14<br>(1.96)   | -0.16<br>(-2.20) | -0.00<br>(-.02) | 0.12<br>(1.77)  | 0.17<br>(2.50) |  |
| COMPUTER                        | -0.03<br>(-.36)  | -0.18<br>(-2.09) | -0.02<br>(-.23)  | 0.00<br>(.04)    | -0.11<br>(-1.41) | 0.10<br>(1.14)   | -0.05<br>(-.74) | 0.06<br>(.75)   | 0.02<br>(.22)  |  |
| TELECOMM                        | -0.07<br>(-.75)  | 0.04<br>(.46)    | -0.12<br>(-1.28) | -0.15<br>(-1.62) | -0.01<br>(-.15)  | -0.04<br>(-.42)  | 0.51<br>(7.20)  | 0.12<br>(1.33)  | 0.01<br>(.16)  |  |
| INFOCERT                        | 0.12<br>(1.56)   | 0.22<br>(2.83)   | 0.24<br>(3.19)   | 0.39<br>(5.19)   | 0.31<br>(4.38)   | -0.09<br>(-1.24) | -0.01<br>(-.14) | 0.05<br>(.69)   | 0.16<br>(2.29) |  |
| TURB                            | -0.09<br>(-1.03) | -0.08<br>(-.94)  | -0.02<br>(-.20)  | -0.03<br>(-.36)  | -0.09<br>(-1.14) | 0.12<br>(1.40)   | 0.07<br>(1.04)  | 0.04<br>(.46)   | 0.05<br>(.63)  |  |
| STATUS                          | 0.02<br>(.29)    | -0.00<br>(-.01)  | 0.03<br>(.46)    | -0.04<br>(-.49)  | 0.02<br>(.31)    | 0.02<br>(.29)    | 0.04<br>(.78)   | 0.16<br>(2.28)  | 0.01<br>(.09)  |  |
| PRXDIST                         | -0.10<br>(-1.35) | 0.07<br>(.99)    | -0.05<br>(-.66)  | 0.05<br>(.70)    | -0.10<br>(-1.48) | -0.01<br>(-.14)  | -0.00<br>(-.02) | -0.04<br>(-.57) | 0.00<br>(.05)  |  |
| COEFFICIENT<br>OF DETERMINATION | 0.17             | 0.18             | 0.21             | 0.24             | 0.33             | 0.23             | 0.55            | 0.31            | 0.32           |  |

- KEY:**
- |                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

T-VALUES ARE GIVEN IN THE PARENTHESES

same finding for marketing's documented information exchange with R&D, a formalized R&D department may wish to receive documentation to maintain a historical record of R&D's dealings with marketing.

Among findings not hypothesized, it appears that an R&D department with an R&D orientation - i.e., a greater interest in scientific knowledge, patents, and publication, will increase its documented information exchange with marketing. It is speculated that documentation is necessary for these activities, however, since R&D did not reflect this relationship with manufacturing, the relationship may be spurious. A second finding not hypothesized was the positive relationship between production process type and R&D's documented information exchange with marketing. This relationship suggests that R&D departments in continuous manufacturers will exchange more documented information with marketing than compared to R&D departments in job shops. As previously discussed in the case of marketing's documented information exchange with R&D, continuous manufacturers will fix the production process (manufacturing's job) and direct marketing and R&D to exchange documented information to determine market and technology possibilities suitable for the fixed production process. The third unhypothesized finding concerned status. This finding suggested that as R&D's status increased over marketing, R&D would have

greater documented information exchange with marketing. While it possible that a R&D department with higher status may exchange documented information to substantiate, highlight, and/or dictate its position of importance, the relationship may be spurious since it was the only significant relationship between status and any integration variable. However, the strength of this status relationship is strong enough ( $\beta=.16$ ,  $t=2.28$ ) to warrant future study.

Along with the common findings of interdependence and cooperative goals, which have been already discussed, effective conflict resolution mechanisms and certainty of information reflected significant, positive influences on R&D's collaboration with marketing - such influences were not hypothesized. Also not hypothesized, specialization was found to have a negative influence on R&D's collaboration with marketing.

Conflict resolution may promote collaboration since such a mechanism may be able to resolve disputes that emerge between R&D and marketing in an jointly agreeable, effective manner. Since this finding is the same for marketing's collaboration with R&D, it appears that companies wishing to improve collaboration between marketing and R&D might focus on establishing effective conflict resolution mechanisms. As for certainty of information, the R&D department may feel more assured in working with marketing. Certain information

also may reduce marketing complaints regarding market acceptance of new products/technologies. As for the negative finding of specialization, it is suggested that the less specialized R&D becomes, the less collaboration with marketing. One possibility may be that as R&D becomes less specialized, R&D may perform certain marketing functions, thus diminishing the need for close contact with the marketing department. As previously mentioned, with marketing managers reflecting an opposite relationship, there is a possible duality between R&D and marketing. Again, however, it must be noted that the limited reliability of specialization measure precludes any generalizations concerning specialization.

#### **R&D's Integration With Manufacturing**

Table 4.8 displays results of the regression analysis addressing R&D's integration with manufacturing. Five factors were found to significantly influence R&D's meetings with manufacturing. Four of these five factors had positive relationships: interdependence (supporting H6a), a general orientation (partially supporting H9a), production process type (no hypothesis), and effective telecommunication systems (H13a). The fifth factor of length of time orientation was a negative relationship (supporting H8a). In partially supporting H9a, the finding concerning a



Table 4.8

Regression of Structural Variables onto  
Performance, Interaction, and Collaboration:  
R&D Managers With Manufacturing

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR R&D MANAGERS WITH MANUFACTURING

| TO:   |          | PERFORMANCE VARIABLES . . . . . |                  |                  |                  |                  | INTEGRATION . .  |                  |                  |                  |
|-------|----------|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| FROM: |          | DEPT                            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
|       | CENT     | -0.09<br>(-1.07)                | 0.03<br>(.34)    | -0.09<br>(-1.03) | 0.10<br>(1.26)   | -0.01<br>(-.07)  | 0.23<br>(2.79)   | 0.01<br>(.12)    | 0.10<br>(1.40)   | -0.02<br>(-.30)  |
|       | FORM     | 0.16<br>(1.87)                  | -0.02<br>(-.29)  | 0.02<br>(.29)    | -0.12<br>(-1.50) | -0.01<br>(-.14)  | 0.16<br>(2.00)   | 0.01<br>(.11)    | 0.08<br>(1.11)   | 0.11<br>(1.48)   |
|       | SPEC     | 0.09<br>(1.11)                  | 0.05<br>(.60)    | -0.02<br>(-.22)  | -0.07<br>(-.92)  | 0.04<br>(.60)    | -0.12<br>(-1.53) | 0.03<br>(.55)    | 0.04<br>(.58)    | -0.09<br>(-1.20) |
|       | SIZE     | -0.06<br>(-.68)                 | 0.04<br>(.41)    | 0.08<br>(.88)    | 0.07<br>(.78)    | -0.03<br>(-.38)  | -0.09<br>(-1.11) | -0.01<br>(-.15)  | -0.16<br>(-2.11) | -0.02<br>(-.26)  |
|       | ROUT     | -0.05<br>(-.65)                 | 0.01<br>(.17)    | -0.05<br>(-.56)  | 0.11<br>(1.34)   | 0.02<br>(.28)    | -0.06<br>(-.73)  | -0.00<br>(-.05)  | -0.04<br>(-.54)  | -0.07<br>(-.97)  |
|       | ID       | -0.08<br>(-1.01)                | 0.04<br>(.57)    | -0.07<br>(-.95)  | 0.09<br>(1.22)   | 0.07<br>(.95)    | -0.14<br>(-1.83) | 0.32<br>(5.09)   | 0.27<br>(3.88)   | 0.29<br>(4.09)   |
|       | INTERPOC | -0.02<br>(-.26)                 | -0.15<br>(-1.97) | -0.04<br>(-.52)  | -0.12<br>(-1.60) | -0.15<br>(-2.24) | -0.04<br>(-.51)  | 0.05<br>(.80)    | -0.04<br>(-.62)  | -0.03<br>(-.48)  |
|       | TIMEOC   | -0.02<br>(-.20)                 | -0.04<br>(-.46)  | -0.04<br>(-.44)  | 0.01<br>(.09)    | -0.18<br>(-2.20) | -0.06<br>(-.62)  | -0.13<br>(-1.66) | -0.25<br>(-2.95) | -0.04<br>(-.51)  |
|       | TASKMFG  | 0.20<br>(2.54)                  | 0.01<br>(.16)    | 0.01<br>(.08)    | 0.00<br>(.04)    | -0.05<br>(-.69)  | 0.15<br>(1.98)   | 0.02<br>(.35)    | -0.02<br>(-.31)  | 0.11<br>(1.48)   |
|       | TASKRD   | 0.03<br>(.42)                   | 0.05<br>(.68)    | 0.11<br>(1.35)   | -0.10<br>(-1.27) | 0.05<br>(.72)    | -0.03<br>(-.45)  | 0.04<br>(.63)    | 0.11<br>(1.55)   | -0.00<br>(-.02)  |
|       | TASKMKTG | 0.02<br>(.20)                   | 0.13<br>(1.46)   | 0.10<br>(1.19)   | 0.04<br>(.48)    | 0.00<br>(.02)    | 0.02<br>(.29)    | 0.09<br>(1.30)   | -0.06<br>(-.81)  | -0.01<br>(-.16)  |
|       | TASKGEN  | -0.04<br>(-.48)                 | 0.02<br>(.21)    | -0.05<br>(-.59)  | -0.04<br>(-.47)  | 0.13<br>(1.60)   | 0.07<br>(.79)    | 0.18<br>(2.54)   | 0.34<br>(4.20)   | 0.08<br>(.93)    |
|       | GOALS    | -0.03<br>(-.37)                 | -0.03<br>(.43)   | 0.02<br>(.21)    | -0.05<br>(-.70)  | 0.45<br>(6.42)   | 0.01<br>(.11)    | -0.02<br>(-.31)  | -0.09<br>(-1.29) | 0.29<br>(3.99)   |
|       | PRODPROC | 0.10<br>(1.24)                  | 0.21<br>(2.60)   | 0.08<br>(1.04)   | 0.11<br>(1.45)   | -0.09<br>(-1.23) | -0.19<br>(-2.50) | 0.17<br>(2.63)   | 0.18<br>(2.59)   | 0.01<br>(.16)    |
|       | PRODLINS | -0.05<br>(-.68)                 | -0.02<br>(-.19)  | 0.02<br>(.20)    | -0.03<br>(-.44)  | 0.11<br>(1.67)   | -0.03<br>(-.34)  | -0.03<br>(-.51)  | 0.09<br>(1.25)   | -0.00<br>(.03)   |

Table 4.8 - continued

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR R&D MANAGERS WITH MANUFACTURING

|                                 | TO:              |                  |                  |                  |                  |                 |                  |                 |                 |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|-----------------|-----------------|
|                                 | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS          | MEET             | INFO            | COLLAB          |
| CONFLICT                        | 0.02<br>(.21)    | 0.07<br>(.94)    | 0.05<br>(.71)    | 0.16<br>(2.09)   | 0.04<br>(.62)    | -0.06<br>(-.86) | -0.03<br>(-.55)  | -0.01<br>(-.20) | 0.08<br>(1.17)  |
| COMPUTER                        | -0.03<br>(-.30)  | -0.16<br>(-1.87) | 0.03<br>(.29)    | 0.03<br>(.37)    | -0.09<br>(-1.16) | 0.07<br>(.85)   | 0.06<br>(.84)    | 0.07<br>(.91)   | 0.06<br>(.78)   |
| TELECOMM                        | -0.09<br>(-.96)  | 0.04<br>(.41)    | -0.13<br>(-1.30) | -0.16<br>(-1.67) | 0.12<br>(1.39)   | -0.05<br>(-.56) | 0.48<br>(6.19)   | 0.26<br>(2.97)  | -0.03<br>(-.31) |
| INFOCERT                        | 0.14<br>(1.78)   | 0.21<br>(2.59)   | 0.26<br>(3.17)   | 0.37<br>(4.66)   | 0.15<br>(2.15)   | -0.08<br>(-.96) | -0.01<br>(-.10)  | 0.04<br>(.53)   | 0.11<br>(1.50)  |
| TURB                            | -0.06<br>(-.65)  | -0.07<br>(-.80)  | 0.02<br>(.28)    | -0.01<br>(-.11)  | -0.06<br>(-.79)  | 0.11<br>(1.35)  | -0.08<br>(-1.17) | -0.05<br>(-.61) | -0.02<br>(-.21) |
| STATUS                          | 0.19<br>(2.48)   | 0.10<br>(1.29)   | 0.20<br>(2.64)   | 0.13<br>(1.76)   | 0.13<br>(1.88)   | 0.03<br>(.45)   | 0.00<br>(.00)    | 0.02<br>(.23)   | 0.04<br>(.56)   |
| PRXDIST                         | -0.10<br>(-1.31) | 0.06<br>(.77)    | -0.03<br>(-.44)  | 0.05<br>(.62)    | -0.04<br>(-.63)  | -0.01<br>(-.13) | -0.02<br>(-.25)  | -0.05<br>(-.70) | -0.01<br>(.11)  |
| COEFFICIENT<br>OF DETERMINATION | 0.19             | 0.18             | 0.17             | 0.22             | 0.37             | 0.22            | 0.47             | 0.33            | 0.31            |

- KEY:
- |                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

T-VALUES ARE GIVEN IN THE PARENTHESES

general orientation indicates that general orientation (e.g. product quality, profit, return on investment) may provide greater breadth in R&D goals. Thus, as hypothesized, R&D will require greater information needs. The finding concerning production process type suggests that R&D departments in continuous manufacturers are more likely to meet than R&D departments in job shops. As previously discussed, this may be due to the process-orientation of R&D departments in continuous manufacturers. In this case, R&D and manufacturing will have similar objectives, and thus, will hold more meetings to properly design and implement process-improving technologies.

R&D's documented information exchange with manufacturing appeared to be positively influenced by interdependence (supporting H6a), a general task orientation (partially supporting H9a), production process type (no hypothesis), and effective telecommunication systems (H13a). R&D's documented information exchange with manufacturing appears negatively influenced by department size (refuting H4a) and length of time orientation (supporting H8a).

As in the case of R&D's meetings with manufacturing, a general goal orientation promoted greater documented information exchange. It is possible that R&D will need more information to achieve broader goals - documented information exchange will provide such information. As for

the finding concerning production process type, it appears that R&D departments will increase documented information with manufacturing as previously discussed with R&D's documented information exchange with marketing. Since this factor is significant in both R&D scenarios, production process may have an unique influence on R&D departments. Another finding significant across both R&D scenarios was the negative relationship between length of time orientation and documented information exchange. This suggests that R&D managers that have a shorter time orientation will have a greater likelihood to exchange documented information. Since this factor is significant for both R&D scenarios, the factor of time orientation may have an unique influence on R&D departments.

The negative relationship between department size and documented information exchange suggests that larger R&D departments will diminish their documented information exchange with manufacturing. It may be possible that larger R&D departments have ample information resources to diminish the need for documented information from manufacturing. As previously suggested with several other findings, this relationship may be spurious since it is only significant for this case. The strength of this relationship ( $t=-2.11$ ), though, does warrant further study.

R&D's collaboration with manufacturing was influenced by the two common, unhypothesized factors of interdependence and cooperative goals. The strong significance of these factors ( $t=4.09$  for interdependence and  $t=3.99$  for cooperative goals) strongly supports the importance of interdependence and cooperative goals for collaboration.

#### **DIRECT EFFECTS OF INTERACTION AND COLLABORATION**

Path analysis was used to assess integration's (i.e., interaction's and collaboration's) effect on performance. The use of path analysis is deemed appropriate since it is "a technique to assess the direct causal contributions of one variable to another in a non-experimental condition" (Joreskog and Sorbom 1989, p. 119).

Based on the given hypotheses, the path model was constructed as presented in Figure 4.1: collaboration leads to meetings, documented information exchange, and performance (i.e., department performance, company performance, product development performance, product management performance, satisfaction, and market position); meetings lead to documented information exchange and performance; and lastly, documented information exchange leads to performance. Note that meetings are hypothesized to influence documented information exchange. It is presumed that more meetings will increase information

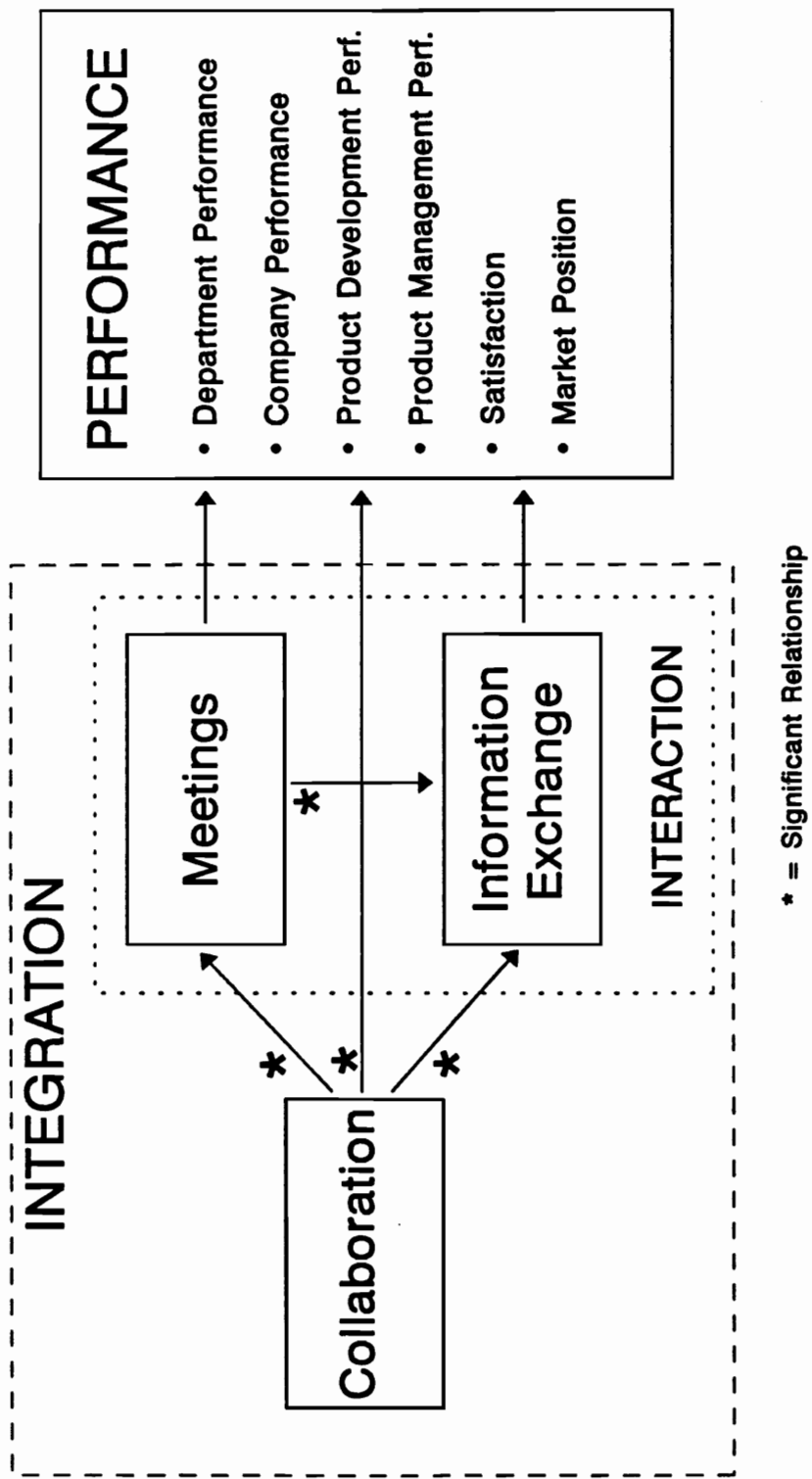


Figure 4.1: Path Analysis Model

exchange, thereby leading to a greater demand for documentation to support such meetings.

As shown in Tables 4.9, 4.10, and 4.11, path analysis supported this presumption by showing a significant relationship from meetings to documented information exchange across all manager sets. As also shown in these tables, analysis supported collaboration's influence on interaction, thereby supporting H17. A reciprocal model was applied to determine if interaction simultaneously affected collaboration. This model could not be specified, suggesting that only a unidimensional relationship should be considered. This supports H18.

A dramatic finding was the strong effect of collaboration on performance. As presented in Tables 4.9, 4.10, and 4.11, as well as summarized in Table 4.12, collaboration had significant positive relationships with almost all performance variables across almost every interdepartmental relationship. The only performance variable not strongly related to collaboration was market position. It is strongly suggested that collaboration increases product management performance and satisfaction since these findings were significant across all manager sets. Overall, the results of this analysis strongly support H19b, which hypothesizes that collaboration increases performance, and strongly support H19c, which

**Table 4.9**

**Path Analysis of Integration's Effects on Performance:  
Marketing Managers**

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MARKETING MANAGERS WITH MANUFACTURING**

|       |                                 | TO:            |                |                |                  |                  |                 |                  |                  |
|-------|---------------------------------|----------------|----------------|----------------|------------------|------------------|-----------------|------------------|------------------|
|       |                                 | MEET           | INFO           | DEPT           | COMP             | PD               | PM              | SATIS            | MKTPOS           |
| FROM: | COLLAB                          | 0.48<br>(7.30) | 0.24<br>(3.39) | 0.26<br>(3.02) | 0.17<br>(1.93)   | 0.18<br>(2.03)   | 0.33<br>(3.92)  | 0.61<br>(8.40)   | 0.02<br>(.20)    |
|       | MEET                            |                | 0.42<br>(6.01) | 0.01<br>(.06)  | -0.12<br>(-1.28) | 0.04<br>(.38)    | -0.00<br>(-.05) | 0.02<br>(.22)    | -0.15<br>(-1.59) |
|       | INFO                            |                |                | 0.08<br>(.93)  | 0.06<br>(.63)    | -0.11<br>(-1.17) | 0.02<br>(.18)   | -0.15<br>(-1.98) | 0.18<br>(1.92)   |
|       | COEFFICIENT<br>OF DETERMINATION |                |                | 0.32           | 0.30             | 0.30             | 0.34            | 0.49             | 0.28             |

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MARKETING MANAGERS WITH R&D**

|       |                                 | TO:            |                |                  |                  |                  |                 |                  |                  |
|-------|---------------------------------|----------------|----------------|------------------|------------------|------------------|-----------------|------------------|------------------|
|       |                                 | MEET           | INFO           | DEPT             | COMP             | PD               | PM              | SATIS            | MKTPOS           |
| FROM: | COLLAB                          | 0.46<br>(6.85) | 0.21<br>(2.88) | 0.19<br>(2.25)   | 0.21<br>(2.55)   | 0.42<br>(5.13)   | 0.36<br>(4.35)  | 0.60<br>(8.21)   | -0.16<br>(-1.81) |
|       | MEET                            |                | 0.42<br>(5.89) | -0.13<br>(-1.44) | -0.19<br>(-2.10) | -0.05<br>(-.61)  | -0.07<br>(-.80) | -0.10<br>(-1.29) | -0.04<br>(-.39)  |
|       | INFO                            |                |                | 0.12<br>(1.33)   | 0.15<br>(1.73)   | -0.15<br>(-1.83) | -0.02<br>(-.24) | -0.08<br>(-.99)  | 0.13<br>(1.43)   |
|       | COEFFICIENT<br>OF DETERMINATION |                |                | 0.27             | 0.27             | 0.35             | 0.32            | 0.46             | 0.26             |

**KEY:** COLLAB = COLLABORATION  
 MEET = MEETINGS  
 INFO = DOCUMENTED INFORMATION EXCHANGE  
 DEPT = DEPARTMENT PERFORMANCE  
 COMP = COMPANY PERFORMANCE  
 PD = PRODUCT DEVELOPMENT PERFORMANCE  
 PM = PRODUCT MANAGEMENT PERFORMANCE  
 SATIS = SATISFACTION  
 MKTPOS = MARKET POSITION

T-VALUES ARE GIVEN IN THE PARENTHESES



Table 4.10

Path Analysis of Integration's Effects on Performance:  
Manufacturing Managers

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MANUFACTURING MANAGERS WITH MARKETING

|                              |        | TO:            |                |                  |                 |                 |                  |                  |                  |
|------------------------------|--------|----------------|----------------|------------------|-----------------|-----------------|------------------|------------------|------------------|
|                              |        | MEET           | INFO           | DEPT             | COMP            | PD              | PM               | SATIS            | MKTPOS           |
| FROM:                        | COLLAB | 0.31<br>(4.00) | 0.23<br>(3.25) | 0.04<br>(.40)    | -0.08<br>(-.88) | 0.01<br>(.10)   | 0.21<br>(2.45)   | 0.43<br>(5.31)   | -0.17<br>(-2.02) |
|                              | MEET   |                | 0.41<br>(5.70) | 0.07<br>(.73)    | 0.12<br>(1.28)  | -0.07<br>(-.71) | -0.14<br>(-1.52) | -0.01<br>(-.07)  | -0.07<br>(-.80)  |
|                              | INFO   |                |                | -0.00<br>(-0.02) | 0.01<br>(.14)   | 0.10<br>(1.10)  | 0.07<br>(.75)    | -0.17<br>(-1.92) | 0.00<br>(.02)    |
| COEFFICIENT OF DETERMINATION |        |                |                | 0.15             | 0.16            | 0.15            | 0.18             | 0.28             | 0.17             |

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR MANUFACTURING MANAGERS WITH R&D

|                              |        | TO:            |                |                 |                  |                 |                  |                  |                  |
|------------------------------|--------|----------------|----------------|-----------------|------------------|-----------------|------------------|------------------|------------------|
|                              |        | MEET           | INFO           | DEPT            | COMP             | PD              | PM               | SATIS            | MKTPOS           |
| FROM:                        | COLLAB | 0.43<br>(5.87) | 0.23<br>(3.06) | 0.10<br>(1.05)  | 0.10<br>(1.07)   | 0.31<br>(3.52)  | 0.24<br>(2.69)   | 0.44<br>(5.20)   | -0.14<br>(-1.59) |
|                              | MEET   |                | 0.43<br>(5.79) | 0.08<br>(.81)   | 0.10<br>(1.08)   | -0.02<br>(-.21) | -0.14<br>(-1.41) | -0.17<br>(-1.85) | -0.01<br>(-.10)  |
|                              | INFO   |                |                | -0.09<br>(-.94) | -0.14<br>(-1.44) | 0.02<br>(.19)   | 0.04<br>(.44)    | 0.03<br>(-.37)   | 0.02<br>(.24)    |
| COEFFICIENT OF DETERMINATION |        |                |                | 0.24            | 0.24             | 0.29            | 0.26             | 0.35             | 0.24             |

KEY: COLLAB = COLLABORATION  
 MEET = MEETINGS  
 INFO = DOCUMENTED INFORMATION EXCHANGE  
 DEPT = DEPARTMENT PERFORMANCE  
 COMP = COMPANY PERFORMANCE  
 PD = PRODUCT DEVELOPMENT PERFORMANCE  
 PM = PRODUCT MANAGEMENT PERFORMANCE  
 SATIS = SATISFACTION  
 MKTPOS = MARKET POSITION

T-VALUES ARE GIVEN IN THE PARENTHESES

**Table 4.11**

**Path Analysis of Integration's Effects on Performance:  
R&D Managers**

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR R&D MANAGERS WITH MARKETING**

|       |                                 | TO:            |                |                  |                  |                 |                  |                  |                  |
|-------|---------------------------------|----------------|----------------|------------------|------------------|-----------------|------------------|------------------|------------------|
|       |                                 | MEET           | INFO           | DEPT             | COMP             | PD              | PM               | SATIS            | MKTPOS           |
| FROM: | COLLAB                          | 0.48<br>(7.29) | 0.23<br>(3.34) | 0.31<br>(3.60)   | 0.24<br>(2.75)   | 0.35<br>(4.25)  | 0.42<br>(5.11)   | 0.49<br>(6.23)   | -0.13<br>(-1.51) |
|       | MEET                            |                | 0.44<br>(6.41) | -0.12<br>(-1.29) | -0.06<br>(-.67)  | -0.01<br>(-.13) | -0.14<br>(-1.63) | -0.20<br>(-2.39) | -0.09<br>(-.97)  |
|       | INFO                            |                |                | -0.05<br>(-0.60) | -0.10<br>(-1.08) | -0.04<br>(-.44) | 0.02<br>(.23)    | -0.01<br>(-.10)  | 0.05<br>(.59)    |
|       | COEFFICIENT<br>OF DETERMINATION |                |                | 0.33             | 0.31             | 0.34            | 0.37             | 0.41             | 0.29             |

**STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR R&D MANAGERS WITH MANUFACTURING**

|       |                                 | TO:            |                |                  |                 |                 |                  |                  |                  |
|-------|---------------------------------|----------------|----------------|------------------|-----------------|-----------------|------------------|------------------|------------------|
|       |                                 | MEET           | INFO           | DEPT             | COMP            | PD              | PM               | SATIS            | MKTPOS           |
| FROM: | COLLAB                          | 0.41<br>(5.99) | 0.11<br>(1.71) | 0.25<br>(3.13)   | 0.14<br>(1.71)  | 0.19<br>(2.34)  | 0.21<br>(2.53)   | 0.45<br>(6.00)   | 0.04<br>(.52)    |
|       | MEET                            |                | 0.57<br>(8.84) | -0.11<br>(-1.20) | -0.02<br>(-.21) | -0.06<br>(-.58) | -0.10<br>(-1.05) | -0.12<br>(-1.38) | -0.20<br>(-2.08) |
|       | INFO                            |                |                | -0.03<br>(-.36)  | -0.08<br>(-.80) | -0.01<br>(-.10) | 0.04<br>(.44)    | -0.03<br>(-.35)  | 0.09<br>(.99)    |
|       | COEFFICIENT<br>OF DETERMINATION |                |                | 0.22             | 0.19            | 0.21            | 0.21             | 0.32             | 0.18             |

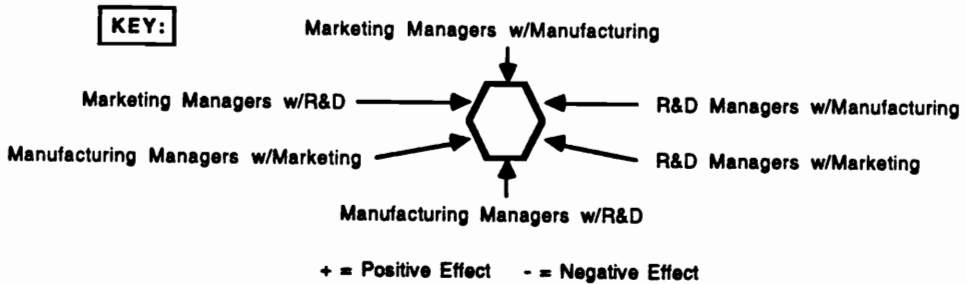
**KEY:** COLLAB = COLLABORATION  
 MEET = MEETINGS  
 INFO = DOCUMENTED INFORMATION EXCHANGE  
 DEPT = DEPARTMENT PERFORMANCE  
 COMP = COMPANY PERFORMANCE  
 PD = PRODUCT DEVELOPMENT PERFORMANCE  
 PM = PRODUCT MANAGEMENT PERFORMANCE  
 SATIS = SATISFACTION  
 MKTPOS = MARKET POSITION

T-VALUES ARE GIVEN IN THE PARENTHESES

Table 4.12

Path Analysis of Integration's Effects on Performance:  
Summary of Manager Sets

|             |        | PERFORMANCE |      |    |    |       |        |
|-------------|--------|-------------|------|----|----|-------|--------|
|             |        | DEPT        | COMP | PD | PM | SATIS | MKTPOS |
| INTEGRATION | MEET   |             | /    |    |    | ↘     | ↘      |
|             | INFO   |             | /    | /  |    | ↘     | +      |
|             | COLLAB | ⊕           | ⊕    | ⊕  | ⊕  | ⊕     | ⊖      |



**INTEGRATION**

MEET = Meetings  
INFO = Documented Information Exchange  
COLLAB = Collaboration

**PERFORMANCE**

DEPT = Department Performance  
COMP = Company Performance  
PD = Product Development Performance  
PM = Product Management Performance  
SATIS = Satisfaction with the Interrelationship  
MKTPOS = Market Position

hypothesizes that collaboration has a stronger effect on performance than interaction.

Meetings and documented information exchange were positively related to performance in two separate cases, which provides little evidence to support H19a. In the remaining significant cases, meetings and documented information exchange appear to have negative effects on performance, which refutes H19a. The latter findings indicate that more meetings and greater documented information exchange will not improve performance; in fact, increasing meeting and documented information exchange may hurt performance.

In sum, collaboration appears to be a key factor to performance. The ramification of this finding is important: departments need to work together instead of simply holding many meetings and exchanging paperwork.

#### **THE EFFECTS OF ATTRIBUTE DIFFERENCES**

The second analysis investigated the proposition and hypotheses that differences in department attributes would influence collaboration and that such differences would not affect interaction or performance variables. To undertake this analysis, managers in the same company were matched (to form a dyad); absolute values of their differences across measures were then calculated. This analysis thus attempted

to provide an intra-firm perspective, whereas the previous analysis was inter-firm.

The proposed analysis of structural equation modelling could not be applied due to the small number of dyads collected. As previously mentioned, the recommendation is there be at least five observations for every free parameter. The small number of dyads responding - 51 marketing-manufacturing dyads, 56 for marketing-R&D managers, and 50 manufacturing-R&D dyads, failed to provide enough free parameters to properly analyze difference effects.

Since structural equation modelling could not be applied to the difference effects as it was applied in the first analysis, a correlational analysis was performed to suggest possible effects. Analysis calculated correlations between attribute differences of the respective departments' and a particular department's interaction and collaboration with the other respective department. For example, analysis of marketing managers in the marketing-manufacturing dyad consisted of correlations between attribute differences and the marketing department's interaction and collaboration with the manufacturing department. Managers' responses for performance variables were consistent across analysis, i.e., marketing managers' perceptions of performance were the same for the marketing-manufacturing dyad as well as the

marketing-R&D dyad. However, correlations changed as a result of varying difference scores across dyads.

The limitations of a correlational analysis are noted. Correlations can mask direct, indirect, and spurious effects. While correlations at  $\alpha \leq .10$  are identified as significant possible effects on interaction, collaboration, and performance variables, these significant effects will require further investigation in future research. Such research should encompass case studies, and, if feasible, surveys with more dyads. As will be discussed below, such research also might consider concentrating on a particular dyad (interdepartmental relationship) versus multiple dyads collectively since attribute differences appear to have relationship-specific effects.

#### **Summary of Findings Across All Dyads**

Support for the general proposition and individual hypotheses, which suggest that attribute differences influence collaboration, received mixed support. Findings suggest that certain attribute differences may have negative effects on collaboration, while other attribute differences may have positive effects.

As shown in Table 4.13, common findings across the three dyads are lacking. This suggests that efforts to reduce attribute differences may be ineffectual across all

Table 4.13

Correlations Between Attribute Differences  
and Interaction, Collaboration, and Performance:  
Summary of Manager Dyads

|                       |           | PERFORMANCE |      |    |     |       |        |
|-----------------------|-----------|-------------|------|----|-----|-------|--------|
|                       |           | DEPT        | COMP | PD | PM  | SATIS | MKTPOS |
| ATTRIBUTE DIFFERENCES | DCENT     |             |      |    |     |       |        |
|                       | DFORM     | ↗<br>—      |      |    | ↗   | ↘     | ↘      |
|                       | DSPEC     | ↘           |      |    |     |       |        |
|                       | DSIZE     |             |      |    |     |       | —      |
|                       | DROUT     |             |      |    | ↘   |       |        |
|                       | DID       | —           |      | ↗  |     | ↗     | ↗      |
|                       | DINTERPOC |             | ↘    | ↘  | ↘ ↗ |       | ↗      |
|                       | DTIMEOC   |             |      |    |     |       |        |

Table 4.13 - continued

|                       |            | PERFORMANCE |             |           |           |              |               |
|-----------------------|------------|-------------|-------------|-----------|-----------|--------------|---------------|
|                       |            | <u>DEPT</u> | <u>COMP</u> | <u>PD</u> | <u>PM</u> | <u>SATIS</u> | <u>MKTPOS</u> |
| ATTRIBUTE DIFFERENCES | DTASKMFG   | /           |             |           |           | /            | /             |
|                       | DTASKRD    |             |             | \         | \         |              |               |
|                       | DTASK-MKTG |             |             |           |           | -            | \ /           |
|                       | DTASKGEN   |             | -           |           |           | /            | /             |
|                       | DGOAL      | -           | \           | \         |           | < /          |               |
|                       | DPROD-PROC |             | -           |           | -         | -            | \             |
|                       | DPROD-LINS |             |             |           |           |              |               |
|                       | DCONFLICT  |             | /           |           | -         | < /          |               |



Table 4.13 - continued

|                       |                | PERFORMANCE |      |    |    |       |        |
|-----------------------|----------------|-------------|------|----|----|-------|--------|
|                       |                | DEPT        | COMP | PD | PM | SATIS | MKTPOS |
| ATTRIBUTE DIFFERENCES | DCOM-<br>PUTER |             |      | ∩  |    |       | ✓      |
|                       | DTELE-<br>COMM |             | ∩    | ∩  | ∩  | ∩     |        |
|                       | DINFOCERT      |             |      | ∩  | ∩  | ∩     |        |
|                       | DTURB          |             | ✓    | ✓  | ∩  | ∩     | ∩      |
|                       | DSTATUS        | ∩           |      | ∩  | ∩  | ∩     | ∩      |
|                       | DPRXDIST       | ∩           |      |    | ∩  |       | ∩      |

Table 4.13 - continued

|                       |           | INTEGRATION |             |               |
|-----------------------|-----------|-------------|-------------|---------------|
|                       |           | <u>MEET</u> | <u>INFO</u> | <u>COLLAB</u> |
| ATTRIBUTE DIFFERENCES | DCEM      | —           |             |               |
|                       | DFORM     |             |             |               |
|                       | DSPEC     | /           | /           | / \<br>—      |
|                       | DSIZE     | ⌋<br>⌋<br>⌋ |             | ⌋<br>⌋        |
|                       | DROUT     | —<br>/      |             | —             |
|                       | DID       | \           | / \         | /             |
|                       | DINTERPOC | /           |             | /<br>—        |
|                       | DTIMEOC   |             |             |               |

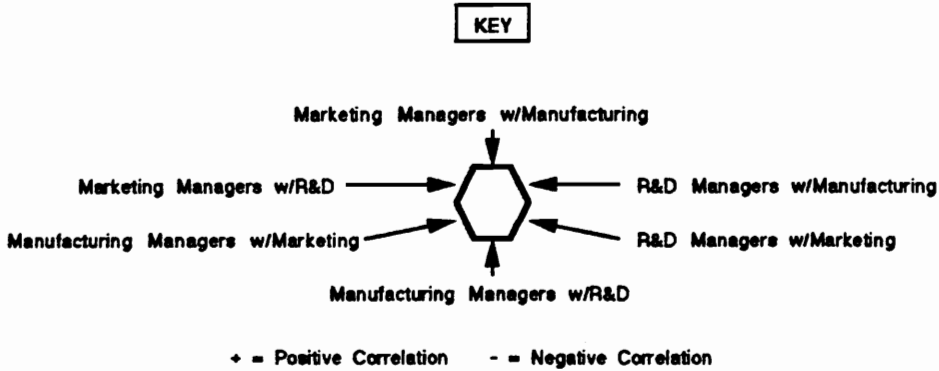
Table 4.13 - continued

|                       |            | INTEGRATION |             |               |
|-----------------------|------------|-------------|-------------|---------------|
|                       |            | <u>MEET</u> | <u>INFO</u> | <u>COLLAB</u> |
| ATTRIBUTE DIFFERENCES | DTASKMFG   | /           |             | /             |
|                       | DTASKRD    |             | \           |               |
|                       | DTASK-MKTG | /           | /           | -             |
|                       | DTASKGEN   |             |             |               |
|                       | DGOAL      |             |             | /             |
|                       | DPROD-PROC | \           | \           | /             |
|                       | DPROD-LINS | /           |             |               |
|                       | DCONFLICT  | -           |             | -             |

Table 4.13 - continued

|                       |                | INTEGRATION |             |               |
|-----------------------|----------------|-------------|-------------|---------------|
|                       |                | <u>MEET</u> | <u>INEQ</u> | <u>COLLAB</u> |
| ATTRIBUTE DIFFERENCES | DCOM-<br>PUTER |             |             |               |
|                       | DTELE-<br>COMM | /           |             | /             |
|                       | DINFOCERT      | -           |             |               |
|                       | DTURB          |             |             | -             |
|                       | DSTATUS        |             |             | -             |
|                       | DPRXDIST       | -           | /           | -             |

Table 4.13 - continued



**ATTRIBUTE DIFFERENCES**

DCENT = Centralization Differences  
 DFORM = Formalization Differences  
 DSPEC = Specialization Differences  
 DSIZE = Size (Employment) Differences  
 DROUT = Routinization Differences  
 DID = Interdependence Differences  
 DINTERPOC = Interpersonal Orientation Differences  
 DTIMEOC = Time Orientation Differences  
 DTASKMFG = Manufacturing Task Orientation Diff.  
 DTASKRD = R&D Task Orientation Differences  
 DTASKMKTG = Marketing Task Orientation Diff.  
 DTASKGEN = General Business Task Orientation Diff.  
 DGOAL = Cooperative Goals Differences  
 DPRODPROC = Production Process Type Differences  
 DPRODLINS = # of Product Lines Manufactured Diff.  
 DCONFLICT = Conflict Resolution Mechanisms Diff.  
 COMPUTER = Computer Systems Differences  
 DTELECOMM = Telecommunication Systems Diff.  
 DINFOCERT = Certainty of Information Differences  
 DTURB = Turbulence Differences  
 DSTATUS = Status Differences  
 DPRXDIST = Proximal Distance Differences

**PERFORMANCE**

DEPT = Department Performance  
 COMP = Company Performance  
 PD = Product Development Performance  
 PM = Product Management Performance  
 SATIS = Satisfaction with the Interrelationship  
 MKTPOS = Market Position

**INTEGRATION**

MEET = Meetings  
 INFO = Documented Information Exchange  
 COLLAB = Collaboration

departments since each dyad would appear to be influenced by varying attribute differences. It is also possible that the measures used in this study were not strong enough to detect "true" attribute differences, thereby resulting in inconclusive findings. Future research should study how to best measure attribute differences between departments.

The discussion below addresses the significant findings from each of the individual dyads, i.e., marketing-manufacturing, marketing-R&D, and manufacturing-R&D. By this discussion, this study attempts to identify possible influential attribute differences that may be inherent to each of these dyads.

#### **The Marketing-Manufacturing Dyad**

As shown in Table 4.14, the only common attribute difference that influenced collaboration between marketing and manufacturing was differences over marketing task orientation. The negative relationship of this finding across marketing and manufacturing indicates that greater differences over marketing task orientation reduce collaboration between the two departments. The negative relationship exhibited by this finding supports P2 and partially supports H9b.

The negative relationship between differences over turbulence and marketing managers' collaboration with

Table 4.14

Correlations Between Attribute Differences  
and Interaction, Collaboration, and Performance:  
Marketing-Manufacturing Dyad

CORRELATIONS AND SIGNIFICANCE FOR MARKETING MANAGERS WITH MANUFACTURING

|       |           | TO:                             |                  |                  |                  |                  |                  |                  |                  |                  |  |
|-------|-----------|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|
|       |           | PERFORMANCE VARIABLES . . . . . |                  |                  |                  |                  | INTEGRATION . .  |                  |                  |                  |  |
| FROM: |           | DEPT                            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |  |
|       | DCENT     | -0.008<br>(.957)                | -0.164<br>(.249) | -0.104<br>(.466) | -0.216<br>(.129) | -0.221<br>(.120) | 0.051<br>(.722)  | -0.250<br>(.077) | -0.041<br>(.775) | -0.158<br>(.268) |  |
|       | DFORM     | -0.260<br>(.065)                | -0.225<br>(.113) | -0.189<br>(.183) | -0.259<br>(.067) | -0.174<br>(.222) | 0.179<br>(.208)  | -0.187<br>(.200) | -0.020<br>(.890) | -0.072<br>(.617) |  |
|       | DSPEC     | 0.029<br>(.842)                 | -0.109<br>(.446) | -0.089<br>(.537) | -0.165<br>(.246) | 0.085<br>(.552)  | -0.183<br>(.199) | 0.099<br>(.490)  | -0.098<br>(.492) | 0.073<br>(.613)  |  |
|       | DSIZE     | 0.143<br>(.318)                 | 0.083<br>(.563)  | -0.006<br>(.966) | -0.004<br>(.976) | -0.221<br>(.118) | -0.301<br>(.032) | 0.056<br>(.695)  | 0.003<br>(.984)  | -0.150<br>(.293) |  |
|       | DROUT     | -0.077<br>(.593)                | -0.033<br>(.817) | -0.004<br>(.977) | 0.155<br>(.278)  | 0.123<br>(.390)  | 0.123<br>(.388)  | -0.282<br>(.045) | -0.173<br>(.225) | -0.111<br>(.439) |  |
|       | DID       | 0.078<br>(.587)                 | 0.208<br>(.143)  | 0.024<br>(.868)  | 0.155<br>(.277)  | 0.069<br>(.630)  | -0.064<br>(.658) | 0.162<br>(.256)  | 0.198<br>(.164)  | 0.141<br>(.325)  |  |
|       | DINTERPOC | 0.119<br>(.407)                 | 0.114<br>(.426)  | 0.088<br>(.541)  | 0.165<br>(.246)  | -0.169<br>(.237) | -0.175<br>(.220) | -0.006<br>(.968) | -0.059<br>(.684) | 0.003<br>(.984)  |  |
|       | DTINEOC   | -0.086<br>(.549)                | 0.046<br>(.747)  | 0.169<br>(.236)  | 0.106<br>(.459)  | 0.168<br>(.239)  | -0.315<br>(.025) | 0.096<br>(.504)  | -0.020<br>(.891) | 0.147<br>(.305)  |  |
|       | DTASKMFG  | -0.010<br>(.942)                | -0.039<br>(.784) | 0.114<br>(.425)  | 0.085<br>(.555)  | -0.021<br>(.883) | -0.124<br>(.385) | -0.132<br>(.355) | -0.104<br>(.467) | -0.075<br>(.601) |  |
|       | DTASKRD   | 0.061<br>(.668)                 | 0.110<br>(.442)  | 0.209<br>(.142)  | 0.036<br>(.801)  | 0.094<br>(.514)  | 0.053<br>(.713)  | -0.108<br>(.450) | -0.021<br>(.884) | 0.017<br>(.905)  |  |
|       | DTASKMKTG | 0.001<br>(.996)                 | 0.048<br>(.740)  | 0.158<br>(.268)  | 0.021<br>(.883)  | -0.258<br>(.068) | -0.075<br>(.601) | -0.043<br>(.767) | -0.272<br>(.054) | -0.426<br>(.002) |  |
|       | DTASKGEN  | -0.003<br>(.985)                | 0.050<br>(.725)  | -0.044<br>(.760) | -0.099<br>(.489) | -0.173<br>(.224) | 0.107<br>(.456)  | 0.088<br>(.539)  | 0.150<br>(.295)  | 0.193<br>(.176)  |  |
|       | DGOALS    | -0.242<br>(.087)                | -0.204<br>(.151) | -0.068<br>(.635) | -0.142<br>(.322) | -0.052<br>(.718) | 0.028<br>(.848)  | -0.034<br>(.816) | 0.068<br>(.636)  | 0.137<br>(.337)  |  |
|       | DPROCPROC | -0.184<br>(.196)                | 0.007<br>(.959)  | 0.064<br>(.657)  | 0.074<br>(.608)  | 0.044<br>(.760)  | 0.025<br>(.863)  | 0.098<br>(.494)  | 0.051<br>(.722)  | 0.211<br>(.138)  |  |
|       | DPRODLINS | 0.186<br>(.190)                 | 0.104<br>(.467)  | 0.135<br>(.345)  | 0.091<br>(.524)  | 0.045<br>(.754)  | -0.034<br>(.813) | 0.008<br>(.955)  | -0.198<br>(.168) | -0.073<br>(.612) |  |

Table 4.14 - continued

CORRELATIONS AND SIGNIFICANCE FOR MARKETING MANAGERS WITH MANUFACTURING

|       |           | TO:              |                  |                  |                  |                  |                  |                  |                  |                  |
|-------|-----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |           | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| FROM: | DCONFLICT | -0.178<br>(.213) | -0.061<br>(.672) | -0.203<br>(.152) | -0.315<br>(.024) | -0.071<br>(.621) | 0.045<br>(.756)  | -0.381<br>(.006) | -0.255<br>(.071) | -0.195<br>(.171) |
|       | DCOMPUTER | 0.025<br>(.861)  | 0.038<br>(.791)  | -0.102<br>(.478) | 0.078<br>(.588)  | -0.020<br>(.889) | -0.095<br>(.505) | 0.054<br>(.705)  | -0.009<br>(.951) | 0.194<br>(.173)  |
|       | DTELECOMM | -0.098<br>(.493) | -0.068<br>(.638) | -0.091<br>(.524) | -0.019<br>(.897) | 0.014<br>(.925)  | -0.019<br>(.895) | -0.015<br>(.916) | 0.101<br>(.481)  | 0.043<br>(.767)  |
|       | DINFOCERT | -0.075<br>(.599) | -0.196<br>(.168) | -0.289<br>(.040) | -0.112<br>(.432) | -0.137<br>(.339) | 0.142<br>(.322)  | -0.286<br>(.042) | -0.178<br>(.211) | -0.209<br>(.142) |
|       | DTURB     | -0.112<br>(.432) | -0.063<br>(.661) | 0.048<br>(.736)  | -0.119<br>(.404) | -0.168<br>(.238) | -0.162<br>(.257) | -0.037<br>(.797) | -0.179<br>(.209) | -0.272<br>(.054) |
|       | DSTATUS   | 0.065<br>(.650)  | -0.040<br>(.781) | -0.050<br>(.727) | 0.064<br>(.656)  | 0.250<br>(.077)  | -0.094<br>(.502) | -0.001<br>(.994) | 0.157<br>(.271)  | 0.127<br>(.376)  |
|       | DPRXDIST  | 0.277<br>(.049)  | 0.218<br>(.125)  | 0.146<br>(.306)  | 0.266<br>(.059)  | -0.054<br>(.705) | -0.066<br>(.645) | 0.326<br>(.020)  | 0.187<br>(.188)  | 0.090<br>(.529)  |

KEY:

D BEFORE VARIABLE MEANS DIFFERENCE

|                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

SIGNIFICANCE LEVELS ARE GIVEN IN THE PARENTHESES



Table 4.14 - continued

CORRELATIONS AND SIGNIFICANCE FOR MANUFACTURING MANAGERS WITH MARKETING

| TO:   |           | PERFORMANCE VARIABLES . . . . . |                  |                  |                  |                  | INTEGRATION . .  |                  |                  |                  |
|-------|-----------|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| FROM: | DEPT      | COMP                            | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |                  |
|       | DCENT     | -0.144<br>(.315)                | -0.168<br>(.238) | 0.180<br>(.206)  | -0.052<br>(.715) | -0.080<br>(.575) | -0.072<br>(.614) | -0.196<br>(.167) | 0.107<br>(.455)  | -0.081<br>(.572) |
|       | DFORM     | 0.069<br>(.631)                 | -0.099<br>(.489) | -0.024<br>(.867) | -0.061<br>(.671) | 0.096<br>(.501)  | 0.098<br>(.492)  | 0.082<br>(.569)  | 0.090<br>(.529)  | 0.197<br>(.166)  |
|       | DSPEC     | 0.084<br>(.559)                 | 0.035<br>(.809)  | -0.047<br>(.744) | -0.195<br>(.171) | -0.055<br>(.701) | -0.017<br>(.905) | 0.116<br>(.417)  | -0.018<br>(.901) | 0.097<br>(.499)  |
|       | DSIZE     | -0.073<br>(.610)                | 0.141<br>(.324)  | 0.162<br>(.257)  | 0.205<br>(.148)  | -0.022<br>(.877) | -0.226<br>(.111) | 0.379<br>(.006)  | 0.188<br>(.186)  | 0.035<br>(.810)  |
|       | DROUT     | 0.118<br>(.410)                 | -0.064<br>(.657) | 0.126<br>(.379)  | -0.046<br>(.751) | -0.231<br>(.103) | 0.188<br>(.187)  | -0.096<br>(.503) | 0.037<br>(.795)  | -0.141<br>(.324) |
|       | DID       | 0.080<br>(.575)                 | 0.175<br>(.220)  | 0.031<br>(.828)  | -0.009<br>(.950) | 0.004<br>(.980)  | 0.075<br>(.601)  | -0.090<br>(.529) | -0.118<br>(.410) | -0.158<br>(.270) |
|       | DINTERPOC | -0.138<br>(.334)                | 0.060<br>(.676)  | 0.238<br>(.093)  | 0.335<br>(.016)  | 0.031<br>(.827)  | -0.127<br>(.376) | -0.074<br>(.605) | -0.032<br>(.825) | -0.063<br>(.662) |
|       | DTIMEOC   | 0.063<br>(.661)                 | 0.017<br>(.907)  | 0.062<br>(.663)  | 0.038<br>(.792)  | -0.028<br>(.847) | -0.136<br>(.343) | 0.184<br>(.197)  | 0.001<br>(.995)  | 0.042<br>(.770)  |
|       | DTASKMFG  | -0.153<br>(.283)                | 0.090<br>(.530)  | 0.063<br>(.661)  | 0.077<br>(.592)  | -0.112<br>(.432) | -0.124<br>(.387) | -0.115<br>(.420) | -0.120<br>(.403) | 0.005<br>(.974)  |
|       | DTASKRD   | 0.128<br>(.371)                 | -0.179<br>(.208) | -0.166<br>(.246) | -0.247<br>(.081) | 0.185<br>(.193)  | 0.198<br>(.163)  | 0.029<br>(.842)  | -0.010<br>(.943) | 0.014<br>(.923)  |
|       | DTASKMKTG | 0.020<br>(.887)                 | 0.099<br>(.491)  | 0.157<br>(.271)  | 0.049<br>(.733)  | -0.134<br>(.350) | 0.253<br>(.073)  | 0.070<br>(.624)  | -0.043<br>(.763) | -0.257<br>(.068) |
|       | DTASKGEN  | -0.010<br>(.948)                | 0.105<br>(.464)  | 0.109<br>(.447)  | 0.049<br>(.731)  | -0.122<br>(.392) | 0.168<br>(.239)  | -0.075<br>(.599) | 0.199<br>(.162)  | -0.042<br>(.772) |
|       | DGOALS    | -0.310<br>(.027)                | -0.262<br>(.063) | -0.158<br>(.268) | -0.180<br>(.207) | -0.311<br>(.026) | 0.034<br>(.814)  | -0.174<br>(.222) | -0.015<br>(.916) | 0.070<br>(.627)  |
|       | DPRODPROC | -0.089<br>(.535)                | -0.049<br>(.732) | -0.014<br>(.922) | 0.072<br>(.618)  | -0.009<br>(.948) | -0.234<br>(.098) | 0.093<br>(.515)  | 0.053<br>(.710)  | 0.077<br>(.593)  |
|       | DPRODLINS | 0.244<br>(.085)                 | 0.210<br>(.140)  | 0.156<br>(.275)  | 0.213<br>(.134)  | 0.034<br>(.813)  | 0.079<br>(.580)  | -0.062<br>(.665) | -0.111<br>(.440) | -0.045<br>(.755) |

Table 4.14 - continued

CORRELATIONS AND SIGNIFICANCE FOR MANUFACTURING MANAGERS WITH MARKETING

|       |           | TO:              |                  |                  |                  |                  |                  |                  |                  |                  |
|-------|-----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |           | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| FROM: | DCONFLICT | 0.045<br>(.756)  | -0.022<br>(.878) | 0.130<br>(.363)  | -0.018<br>(.899) | -0.381<br>(.006) | 0.148<br>(.301)  | -0.331<br>(.018) | -0.028<br>(.844) | -0.208<br>(.142) |
|       | DCOMPUTER | -0.182<br>(.201) | -0.013<br>(.927) | -0.283<br>(.044) | -0.191<br>(.180) | 0.010<br>(.946)  | -0.060<br>(.674) | -0.109<br>(.448) | -0.055<br>(.701) | 0.087<br>(.544)  |
|       | DTELECOMM | -0.136<br>(.341) | -0.321<br>(.022) | -0.248<br>(.079) | -0.367<br>(.008) | -0.095<br>(.509) | 0.136<br>(.340)  | -0.108<br>(.452) | -0.203<br>(.154) | -0.167<br>(.243) |
|       | DINFCERT  | 0.178<br>(.212)  | 0.160<br>(.262)  | 0.116<br>(.418)  | 0.033<br>(.818)  | -0.135<br>(.346) | 0.057<br>(.691)  | -0.211<br>(.137) | -0.151<br>(.290) | -0.176<br>(.216) |
|       | DTURB     | -0.011<br>(.941) | -0.187<br>(.190) | -0.052<br>(.718) | -0.327<br>(.019) | -0.241<br>(.089) | 0.246<br>(.082)  | 0.093<br>(.516)  | -0.021<br>(.882) | -0.193<br>(.176) |
|       | DSTATUS   | 0.139<br>(.332)  | 0.211<br>(.138)  | 0.310<br>(.027)  | 0.198<br>(.164)  | -0.054<br>(.708) | -0.304<br>(.030) | 0.078<br>(.587)  | 0.101<br>(.482)  | -0.048<br>(.737) |
|       | DPRXDIST  | 0.135<br>(.345)  | 0.138<br>(.336)  | 0.136<br>(.341)  | 0.246<br>(.082)  | 0.002<br>(.991)  | -0.042<br>(.770) | 0.089<br>(.534)  | -0.024<br>(.866) | -0.205<br>(.149) |

KEY:

D BEFORE VARIABLE MEANS DIFFERENCE

|                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFCERT = CERTAINTY OF INFORMATION              |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

SIGNIFICANCE LEVELS ARE GIVEN IN THE PARENTHESES

manufacturing provides some evidence to support H15b. Since this latter relationship was not found in other cases, this relationship may be spurious or unique to marketing departments.

Contrary to propositions of this study, there are various significant relationships between attribute differences and certain interaction and performance variables. Common across marketing and manufacturing managers, there was a negative relationship between differences over goal cooperativeness and department performance; a positive relationship between differences over distance and product management performance; and a negative relationship between differences over conflict resolution mechanisms and meetings.

Differences over goal cooperativeness may prevent marketing and manufacturing from achieving full department performance due to potential conflict over goals. Such conflict would divert the attention needed to achieve expected performance towards resolution of conflict. In cases of equal perceptions of goal cooperativeness, the two departments may have better impressions of their working relationship, and thus, are less likely to have conflicts which would divert attention away from maintaining performance.

The common, positive relationship of distance between marketing and manufacturing with product management performance is interesting. This finding supports today's use of a central manufacturing facility with a dispersed marketing force and suggests that greater distances between marketing and manufacturing may lead to better product management performance. It is possible that both marketing and manufacturing managers prefer to be separated from the other department in order to focus on their respective activities; when they are separated, managers may feel that they can concentrate better on product management activities. Another rival explanation is that the successful, global companies in this study's response sample contributed bias, and thus, skewed results to reflect this finding.

Meetings appear influenced by differences over conflict resolution mechanisms. The direction of correlations across marketing and manufacturing managers suggests that greater differences lead to less meetings. While this finding was not proposed, it is plausible since departments would prefer not to engage in active discussions/meetings without some agreeable, effective way to resolve conflicts that might emerge.

### **The Marketing-R&D Dyad**

As shown in Table 4.15, attribute differences between marketing and R&D do not appear to influence either department's collaboration with the other department. As for common findings in this dyad, there were only two effects of attribute differences that were significant across marketing and R&D manager sets. These two findings included a negative relationship between differences over goal cooperativeness and satisfaction, and a negative relationship between conflict resolution mechanisms and satisfaction.

It appears that marketing and R&D differences over goal cooperativeness will promote less satisfaction within the marketing-R&D interrelationship. This is reasonable since disagreement over goals might promote conflictual relations, which are undesirable over time. It is also conceivable that when goals are cooperative, each department will be able to successfully attain its goals, which in turn, will generate greater satisfaction.

Satisfaction with the marketing-R&D interrelationship also appears affected by differences in conflict resolution mechanisms. In particular, the negative correlations across marketing and R&D departments suggests that greater differences over conflict resolution mechanisms will diminish satisfaction. When conflict can be successfully

Table 4.15

Correlations Between Attribute Differences  
and Interaction, Collaboration, and Performance:  
Marketing-R&D Dyad

CORRELATIONS AND SIGNIFICANCE FOR MARKETING MANAGERS WITH R&D

|       |           | TO:                             |                  |                  |                  |                  |                  |                  |                  |                  |  |
|-------|-----------|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|
|       |           | PERFORMANCE VARIABLES . . . . . |                  |                  |                  |                  | INTEGRATION . .  |                  |                  |                  |  |
|       |           | DEPT                            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |  |
| FROM: | DCEINT    | -0.118<br>(.387)                | -0.050<br>(.712) | 0.078<br>(.570)  | -0.053<br>(.701) | -0.032<br>(.813) | -0.122<br>(.371) | 0.011<br>(.939)  | -0.103<br>(.451) | -0.068<br>(.616) |  |
|       | DFORM     | -0.235<br>(.082)                | -0.008<br>(.954) | -0.040<br>(.771) | -0.261<br>(.052) | -0.121<br>(.374) | -0.013<br>(.927) | -0.187<br>(.167) | -0.059<br>(.666) | -0.157<br>(.249) |  |
|       | DSPEC     | -0.046<br>(.738)                | 0.012<br>(.929)  | -0.070<br>(.609) | -0.028<br>(.838) | -0.186<br>(.170) | 0.211<br>(.119)  | -0.291<br>(.029) | -0.438<br>(.001) | -0.403<br>(.002) |  |
|       | DSIZE     | 0.012<br>(.932)                 | 0.038<br>(.782)  | 0.117<br>(.391)  | 0.099<br>(.470)  | -0.006<br>(.963) | -0.047<br>(.733) | -0.010<br>(.941) | -0.052<br>(.701) | -0.134<br>(.325) |  |
|       | DROUT     | -0.091<br>(.503)                | 0.133<br>(.330)  | -0.067<br>(.626) | -0.063<br>(.647) | -0.024<br>(.864) | -0.066<br>(.629) | -0.086<br>(.528) | 0.126<br>(.353)  | 0.016<br>(.907)  |  |
|       | DID       | -0.012<br>(.933)                | 0.023<br>(.867)  | 0.043<br>(.754)  | -0.037<br>(.786) | 0.113<br>(.406)  | 0.121<br>(.376)  | 0.136<br>(.319)  | 0.240<br>(.075)  | 0.049<br>(.720)  |  |
|       | DINTERPOC | -0.078<br>(.570)                | 0.062<br>(.648)  | 0.136<br>(.317)  | 0.148<br>(.277)  | 0.106<br>(.435)  | -0.241<br>(.074) | 0.353<br>(.008)  | 0.075<br>(.583)  | 0.272<br>(.042)  |  |
|       | DTIMEOC   | 0.117<br>(.390)                 | 0.097<br>(.475)  | 0.037<br>(.787)  | -0.013<br>(.924) | -0.019<br>(.887) | 0.111<br>(.415)  | 0.017<br>(.904)  | 0.032<br>(.818)  | -0.149<br>(.275) |  |
|       | DTASKMFG  | 0.242<br>(.072)                 | 0.111<br>(.417)  | 0.199<br>(.141)  | 0.098<br>(.473)  | 0.199<br>(.142)  | -0.229<br>(.089) | -0.002<br>(.989) | 0.057<br>(.676)  | 0.246<br>(.068)  |  |
|       | DTASKRD   | -0.046<br>(.736)                | 0.051<br>(.707)  | 0.057<br>(.677)  | -0.081<br>(.554) | 0.010<br>(.941)  | 0.117<br>(.390)  | -0.203<br>(.133) | -0.111<br>(.417) | -0.166<br>(.220) |  |
|       | DTASKMKTG | 0.066<br>(.627)                 | 0.040<br>(.772)  | 0.194<br>(.152)  | 0.101<br>(.459)  | 0.017<br>(.902)  | -0.137<br>(.312) | -0.307<br>(.021) | -0.270<br>(.044) | -0.164<br>(.228) |  |
|       | DTASKGEN  | -0.046<br>(.738)                | -0.002<br>(.987) | 0.047<br>(.732)  | -0.002<br>(.991) | 0.035<br>(.800)  | 0.045<br>(.743)  | 0.078<br>(.569)  | 0.040<br>(.767)  | 0.034<br>(.805)  |  |
|       | DGOALS    | -0.096<br>(.483)                | -0.093<br>(.495) | 0.000<br>(.999)  | -0.035<br>(.799) | -0.372<br>(.005) | 0.180<br>(.185)  | -0.114<br>(.402) | -0.130<br>(.339) | -0.298<br>(.026) |  |
|       | DPROOPROC | -0.144<br>(.289)                | -0.180<br>(.184) | -0.172<br>(.204) | -0.084<br>(.537) | -0.060<br>(.663) | 0.080<br>(.558)  | 0.055<br>(.686)  | -0.059<br>(.666) | -0.224<br>(.097) |  |
|       | DPRODLINS | -0.072<br>(.599)                | 0.037<br>(.787)  | -0.011<br>(.938) | 0.083<br>(.545)  | 0.091<br>(.507)  | -0.212<br>(.117) | 0.307<br>(.022)  | 0.105<br>(.441)  | 0.130<br>(.341)  |  |

Table 4.15 - continued

CORRELATIONS AND SIGNIFICANCE FOR MARKETING MANAGERS WITH R&D

| FROM: |          | TO:              |                  |                  |                  |                  |                  |                  |                  |                  |
|-------|----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |          | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| D     | CONFLICT | -0.206<br>(.128) | -0.234<br>(.083) | -0.101<br>(.457) | -0.093<br>(.496) | -0.239<br>(.076) | 0.367<br>(.005)  | 0.070<br>(.606)  | 0.138<br>(.310)  | -0.021<br>(.881) |
| D     | COMPUTER | -0.026<br>(.849) | -0.013<br>(.924) | 0.001<br>(.996)  | -0.018<br>(.894) | 0.075<br>(.581)  | 0.056<br>(.681)  | -0.139<br>(.306) | 0.006<br>(.966)  | 0.021<br>(.880)  |
| D     | TELECOMM | 0.028<br>(.837)  | 0.132<br>(.332)  | 0.014<br>(.920)  | -0.137<br>(.312) | 0.027<br>(.844)  | -0.076<br>(.576) | 0.042<br>(.758)  | 0.168<br>(.215)  | 0.009<br>(.948)  |
| D     | INFOCERT | -0.062<br>(.651) | -0.033<br>(.811) | -0.007<br>(.962) | 0.104<br>(.444)  | -0.018<br>(.897) | 0.054<br>(.692)  | -0.055<br>(.687) | -0.210<br>(.120) | -0.088<br>(.520) |
| D     | TURB     | -0.162<br>(.233) | -0.246<br>(.067) | -0.235<br>(.082) | -0.198<br>(.144) | -0.056<br>(.683) | 0.032<br>(.813)  | 0.217<br>(.109)  | -0.089<br>(.515) | -0.069<br>(.616) |
| D     | STATUS   | -0.072<br>(.599) | -0.041<br>(.765) | -0.187<br>(.167) | -0.031<br>(.820) | -0.082<br>(.551) | 0.013<br>(.923)  | -0.086<br>(.530) | -0.115<br>(.397) | -0.102<br>(.455) |
| D     | PRXDIST  | 0.134<br>(.326)  | 0.115<br>(.398)  | 0.148<br>(.278)  | 0.143<br>(.293)  | 0.015<br>(.916)  | 0.003<br>(.982)  | -0.073<br>(.595) | 0.120<br>(.379)  | 0.088<br>(.521)  |

KEY:

D BEFORE VARIABLE MEANS DIFFERENCE

- |                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

SIGNIFICANCE LEVELS ARE GIVEN IN THE PARENTHESES

Table 4.15 - continued

CORRELATIONS AND SIGNIFICANCE FOR R&D MANAGERS WITH MARKETING

|       |           | TO:   |                  |                  |                  |                  |                           |                  |                  |                  |  |
|-------|-----------|---|------------------|------------------|------------------|------------------|---------------------------|------------------|------------------|------------------|--|
|       |           | P E R F O R M A N C E   V A R I A B L E S . . . . . |                  |                  |                  |                  | I N T E G R A T I O N . . |                  |                  |                  |  |
| FROM: |           | DEPT  | COMP             | PD               | PM               | SATIS            | MKTPOS                    | MEET             | INFO             | COLLAB           |  |
|       | DCENT     | 0.162<br>(.232)                                     | 0.111<br>(.417)  | 0.051<br>(.710)  | 0.043<br>(.753)  | -0.039<br>(.774) | -0.181<br>(.183)          | -0.065<br>(.634) | -0.112<br>(.413) | 0.020<br>(.882)  |  |
|       | DFORM     | 0.044<br>(.747)                                     | 0.027<br>(.843)  | 0.113<br>(.408)  | 0.136<br>(.317)  | -0.118<br>(.386) | -0.105<br>(.441)          | -0.054<br>(.690) | 0.003<br>(.983)  | 0.116<br>(.394)  |  |
|       | DSPEC     | 0.243<br>(.071)                                     | 0.199<br>(.143)  | 0.106<br>(.439)  | 0.085<br>(.532)  | -0.008<br>(.954) | -0.017<br>(.903)          | 0.083<br>(.544)  | 0.113<br>(.409)  | 0.150<br>(.271)  |  |
|       | DSIZE     | -0.145<br>(.285)                                    | 0.044<br>(.746)  | 0.085<br>(.533)  | 0.096<br>(.483)  | -0.014<br>(.917) | -0.190<br>(.162)          | 0.285<br>(.034)  | 0.265<br>(.048)  | -0.003<br>(.983) |  |
|       | DROUT     | 0.238<br>(.078)                                     | 0.170<br>(.210)  | 0.091<br>(.503)  | 0.210<br>(.121)  | -0.089<br>(.516) | 0.013<br>(.923)           | -0.281<br>(.036) | -0.101<br>(.460) | 0.012<br>(.930)  |  |
|       | DID       | -0.070<br>(.609)                                    | 0.059<br>(.664)  | -0.248<br>(.066) | -0.161<br>(.236) | -0.263<br>(.050) | 0.232<br>(.086)           | -0.002<br>(.989) | -0.046<br>(.734) | -0.310<br>(.020) |  |
|       | DINTERPOC | 0.075<br>(.583)                                     | 0.023<br>(.867)  | 0.056<br>(.680)  | 0.231<br>(.087)  | 0.154<br>(.258)  | 0.135<br>(.321)           | 0.116<br>(.394)  | -0.065<br>(.635) | 0.142<br>(.297)  |  |
|       | DTIMEOC   | -0.138<br>(.309)                                    | 0.054<br>(.692)  | -0.184<br>(.176) | 0.153<br>(.260)  | 0.053<br>(.697)  | -0.123<br>(.366)          | -0.028<br>(.838) | 0.221<br>(.102)  | -0.070<br>(.611) |  |
|       | DTASKMFG  | 0.105<br>(.441)                                     | -0.022<br>(.873) | -0.161<br>(.235) | -0.134<br>(.323) | 0.259<br>(.054)  | 0.143<br>(.294)           | -0.267<br>(.046) | -0.061<br>(.655) | -0.144<br>(.289) |  |
|       | DTASKRD   | -0.009<br>(.950)                                    | 0.173<br>(.203)  | 0.215<br>(.112)  | 0.084<br>(.537)  | -0.065<br>(.634) | 0.006<br>(.966)           | -0.032<br>(.815) | 0.160<br>(.238)  | -0.099<br>(.470) |  |
|       | DTASKMKTG | -0.037<br>(.789)                                    | -0.079<br>(.563) | 0.028<br>(.840)  | -0.055<br>(.688) | 0.100<br>(.466)  | -0.247<br>(.067)          | -0.166<br>(.223) | 0.049<br>(.721)  | -0.001<br>(.996) |  |
|       | DTASKGEN  | 0.177<br>(.193)                                     | 0.174<br>(.199)  | 0.120<br>(.378)  | 0.251<br>(.062)  | -0.037<br>(.789) | -0.232<br>(.086)          | -0.002<br>(.990) | 0.040<br>(.772)  | 0.105<br>(.441)  |  |
|       | DGOALS    | -0.036<br>(.791)                                    | 0.036<br>(.793)  | -0.072<br>(.599) | -0.121<br>(.375) | -0.225<br>(.095) | 0.022<br>(.870)           | 0.052<br>(.701)  | 0.187<br>(.168)  | 0.008<br>(.956)  |  |
|       | DPRODPROC | 0.031<br>(.820)                                     | -0.079<br>(.561) | -0.016<br>(.910) | 0.009<br>(.947)  | -0.135<br>(.321) | 0.072<br>(.600)           | 0.169<br>(.213)  | 0.071<br>(.603)  | 0.013<br>(.927)  |  |
|       | DPRODLINS | 0.056<br>(.681)                                     | 0.041<br>(.762)  | 0.031<br>(.820)  | 0.007<br>(.962)  | 0.024<br>(.859)  | -0.050<br>(.714)          | 0.109<br>(.423)  | -0.132<br>(.332) | -0.055<br>(.689) |  |



Table 4.15 - continued

CORRELATIONS AND SIGNIFICANCE FOR R&D MANAGERS WITH MARKETING

|       |           | TO:              |                  |                  |                  |                  |                  |                  |                  |                  |
|-------|-----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |           | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| FROM: | DCONFLICT | -0.111<br>(.415) | -0.083<br>(.544) | 0.007<br>(.957)  | 0.022<br>(.874)  | -0.330<br>(.013) | 0.171<br>(.207)  | 0.027<br>(.846)  | 0.159<br>(.241)  | -0.086<br>(.528) |
|       | DCOMPUTER | -0.202<br>(.135) | -0.109<br>(.426) | -0.269<br>(.045) | -0.065<br>(.635) | 0.032<br>(.812)  | 0.006<br>(.964)  | -0.074<br>(.588) | -0.128<br>(.348) | -0.111<br>(.414) |
|       | DTELECOMM | -0.111<br>(.416) | 0.013<br>(.924)  | -0.150<br>(.269) | -0.083<br>(.541) | -0.175<br>(.198) | -0.071<br>(.606) | -0.199<br>(.141) | 0.045<br>(.741)  | -0.176<br>(.194) |
|       | DINFOCERT | 0.049<br>(.718)  | 0.131<br>(.336)  | 0.018<br>(.894)  | -0.052<br>(.705) | -0.102<br>(.454) | -0.000<br>(.998) | -0.107<br>(.433) | 0.007<br>(.961)  | -0.077<br>(.574) |
|       | DTURB     | 0.011<br>(.935)  | 0.083<br>(.545)  | -0.084<br>(.538) | -0.262<br>(.052) | -0.237<br>(.079) | -0.055<br>(.685) | 0.058<br>(.669)  | -0.015<br>(.914) | -0.152<br>(.263) |
|       | DSTATUS   | -0.085<br>(.532) | -0.105<br>(.443) | -0.081<br>(.551) | -0.180<br>(.185) | -0.161<br>(.237) | -0.052<br>(.701) | -0.065<br>(.636) | 0.004<br>(.974)  | -0.215<br>(.111) |
|       | DPRXDIST  | -0.024<br>(.863) | -0.026<br>(.852) | 0.190<br>(.161)  | -0.002<br>(.986) | -0.024<br>(.860) | -0.323<br>(.015) | -0.084<br>(.536) | 0.247<br>(.067)  | -0.175<br>(.198) |

KEY:

D BEFORE VARIABLE MEANS DIFFERENCE

|                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

SIGNIFICANCE LEVELS ARE GIVEN IN THE PARENTHESES

resolved in a jointly agreeable manner, each department will be more likely to be satisfied with its working relationship with the other respective department.

### **The Manufacturing-R&D Dyad**

Table 4.16 presents the findings concerning the manufacturing-R&D dyad. These findings provide marginal support for the proposition that attribute differences influence collaboration. It appears that differences in specialization diminish collaboration between manufacturing and R&D, which supports H10; however, the reliability shortcomings of the specialization measure make this finding suspect.

Unlike the previous two dyads, the manufacturing-R&D dyad has two significant attribute differences where the influence is opposite on each of the departments. Differences over telecommunication systems effectiveness diminishes the manufacturing department's collaboration with R&D, while these differences appear to increase the R&D department's collaboration with manufacturing. This inverse effect might be problematic when establishing manufacturing-R&D collaboration. Another inverse effect concerns certainty of information. Manufacturing managers perceive better product management performance as differences over the certainty of information increases; R&D managers

Table 4.16

Correlations Between Attribute Differences  
and Interaction, Collaboration, and Performance:  
Manufacturing-R&D Dyad

CORRELATIONS AND SIGNIFICANCE FOR MANUFACTURING MANAGERS WITH R&D

|       |           | TO:                             |                  |                  |                  |                  |                  |                  |                  |                  |  |
|-------|-----------|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|
|       |           | PERFORMANCE VARIABLES . . . . . |                  |                  |                  |                  | INTEGRATION . .  |                  |                  |                  |  |
|       |           | DEPT                            | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |  |
| FROM: |           |                                 |                  |                  |                  |                  |                  |                  |                  |                  |  |
|       | DCENT     | -0.101<br>(.487)                | -0.055<br>(.704) | 0.219<br>(.127)  | 0.233<br>(.104)  | 0.079<br>(.585)  | -0.167<br>(.246) | -0.157<br>(.277) | 0.070<br>(.628)  | 0.163<br>(.259)  |  |
|       | DFORM     | -0.220<br>(.125)                | -0.292<br>(.039) | -0.065<br>(.652) | 0.089<br>(.538)  | 0.163<br>(.258)  | 0.117<br>(.421)  | -0.182<br>(.206) | -0.145<br>(.317) | -0.052<br>(.720) |  |
|       | DSPEC     | -0.125<br>(.388)                | -0.031<br>(.833) | -0.020<br>(.890) | -0.053<br>(.714) | -0.231<br>(.106) | 0.005<br>(.974)  | -0.203<br>(.159) | 0.099<br>(.495)  | -0.285<br>(.045) |  |
|       | DSIZE     | -0.056<br>(.698)                | 0.069<br>(.634)  | 0.004<br>(.978)  | 0.059<br>(.683)  | 0.151<br>(.295)  | -0.051<br>(.723) | 0.300<br>(.034)  | 0.149<br>(.300)  | 0.354<br>(.012)  |  |
|       | DROUT     | -0.167<br>(.245)                | 0.044<br>(.760)  | 0.175<br>(.224)  | 0.141<br>(.328)  | -0.028<br>(.846) | -0.057<br>(.694) | -0.224<br>(.118) | -0.098<br>(.498) | -0.203<br>(.158) |  |
|       | DID       | -0.278<br>(.051)                | -0.161<br>(.264) | -0.099<br>(.496) | -0.106<br>(.465) | -0.076<br>(.598) | -0.192<br>(.182) | -0.093<br>(.521) | 0.028<br>(.846)  | -0.258<br>(.071) |  |
|       | DINTERPOC | 0.096<br>(.507)                 | 0.096<br>(.509)  | 0.082<br>(.571)  | 0.172<br>(.233)  | -0.004<br>(.976) | 0.099<br>(.493)  | 0.012<br>(.936)  | -0.034<br>(.815) | 0.239<br>(.094)  |  |
|       | DTIMEOC   | -0.223<br>(.120)                | -0.143<br>(.323) | 0.060<br>(.680)  | 0.148<br>(.305)  | 0.233<br>(.103)  | -0.022<br>(.880) | -0.020<br>(.893) | -0.087<br>(.549) | -0.096<br>(.508) |  |
|       | DTASKMFG  | 0.183<br>(.203)                 | 0.106<br>(.464)  | 0.157<br>(.275)  | 0.197<br>(.171)  | 0.062<br>(.671)  | 0.005<br>(.975)  | -0.040<br>(.783) | -0.036<br>(.803) | 0.203<br>(.157)  |  |
|       | DTASKRD   | 0.010<br>(.947)                 | 0.108<br>(.455)  | -0.106<br>(.464) | 0.033<br>(.821)  | 0.035<br>(.807)  | 0.133<br>(.357)  | 0.126<br>(.383)  | -0.189<br>(.190) | -0.066<br>(.649) |  |
|       | DTASKMKTG | -0.028<br>(.849)                | -0.055<br>(.705) | 0.056<br>(.701)  | 0.052<br>(.719)  | 0.120<br>(.408)  | -0.100<br>(.488) | 0.097<br>(.504)  | 0.079<br>(.586)  | -0.019<br>(.895) |  |
|       | DTASKGEN  | -0.038<br>(.794)                | -0.267<br>(.061) | -0.037<br>(.797) | -0.069<br>(.633) | 0.114<br>(.430)  | 0.164<br>(.257)  | -0.147<br>(.307) | 0.105<br>(.468)  | -0.149<br>(.303) |  |
|       | DGOALS    | 0.126<br>(.384)                 | 0.086<br>(.554)  | -0.006<br>(.965) | -0.040<br>(.781) | -0.104<br>(.472) | 0.086<br>(.553)  | 0.046<br>(.752)  | 0.042<br>(.771)  | -0.006<br>(.966) |  |
|       | DPRODPROC | -0.227<br>(.113)                | -0.240<br>(.094) | -0.185<br>(.199) | -0.184<br>(.201) | -0.248<br>(.082) | 0.126<br>(.383)  | 0.352<br>(.012)  | -0.022<br>(.879) | -0.058<br>(.691) |  |
|       | DPRODLINS | 0.145<br>(.316)                 | 0.180<br>(.210)  | 0.105<br>(.469)  | 0.213<br>(.137)  | 0.224<br>(.119)  | 0.008<br>(.958)  | -0.222<br>(.122) | -0.193<br>(.179) | 0.200<br>(.163)  |  |

Table 4.16 - continued

CORRELATIONS AND SIGNIFICANCE FOR MANUFACTURING MANAGERS WITH R&D

| FROM:     |  | TO:              |                  |                  |                  |                  |                  |                  |                  |                  |
|-----------|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|           |  | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
| DCONFLICT |  | -0.054<br>(.712) | 0.085<br>(.556)  | -0.138<br>(.339) | -0.135<br>(.350) | -0.069<br>(.636) | -0.015<br>(.919) | 0.105<br>(.467)  | 0.028<br>(.848)  | -0.023<br>(.875) |
| DCOMPUTER |  | -0.234<br>(.103) | -0.030<br>(.839) | -0.287<br>(.044) | -0.132<br>(.361) | -0.079<br>(.586) | -0.190<br>(.187) | -0.084<br>(.563) | -0.100<br>(.492) | -0.224<br>(.118) |
| DTELECOMM |  | 0.107<br>(.458)  | 0.179<br>(.214)  | -0.002<br>(.991) | -0.305<br>(.031) | -0.123<br>(.394) | -0.086<br>(.552) | -0.067<br>(.645) | -0.045<br>(.756) | -0.280<br>(.049) |
| DINFOCERT |  | 0.072<br>(.620)  | 0.062<br>(.667)  | 0.269<br>(.059)  | 0.311<br>(.028)  | 0.100<br>(.492)  | 0.100<br>(.490)  | 0.004<br>(.981)  | -0.152<br>(.293) | 0.112<br>(.438)  |
| DTURB     |  | 0.028<br>(.846)  | -0.115<br>(.425) | -0.007<br>(.960) | 0.001<br>(.996)  | 0.026<br>(.861)  | 0.090<br>(.535)  | 0.030<br>(.837)  | 0.116<br>(.424)  | 0.062<br>(.670)  |
| DSTATUS   |  | -0.259<br>(.070) | -0.175<br>(.223) | -0.196<br>(.172) | -0.237<br>(.098) | -0.325<br>(.021) | 0.103<br>(.478)  | 0.066<br>(.651)  | -0.063<br>(.662) | -0.279<br>(.050) |
| DPRXDIST  |  | -0.260<br>(.068) | 0.005<br>(.974)  | 0.091<br>(.531)  | 0.084<br>(.560)  | 0.157<br>(.277)  | -0.283<br>(.046) | 0.109<br>(.453)  | -0.023<br>(.875) | 0.264<br>(.064)  |

KEY:

D BEFORE VARIABLE MEANS DIFFERENCE

|                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

SIGNIFICANCE LEVELS ARE GIVEN IN THE PARENTHESES

Table 4.16 - continued

CORRELATIONS AND SIGNIFICANCE FOR R&D MANAGERS WITH MANUFACTURING

| TO:   |           | PERFORMANCE VARIABLES . . . . . INTEGRATION . . |                  |                  |                  |                  |                  |                  |                  |                  |  |
|-------|-----------|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|
| FROM: | DCENT     | DEPT  | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |  |
|       |           | 0.119<br>(.413)                                 | 0.194<br>(.177)  | 0.037<br>(.801)  | 0.059<br>(.683)  | 0.040<br>(.783)  | -0.129<br>(.371) | -0.108<br>(.456) | -0.114<br>(.429) | 0.064<br>(.657)  |  |
|       | DFORM     | -0.121<br>(.403)                                | -0.230<br>(.108) | -0.029<br>(.840) | -0.059<br>(.686) | -0.269<br>(.059) | 0.265<br>(.063)  | -0.075<br>(.607) | 0.101<br>(.487)  | -0.150<br>(.299) |  |
|       | DSPEC     | 0.039<br>(.786)                                 | 0.007<br>(.962)  | 0.081<br>(.576)  | -0.089<br>(.538) | -0.149<br>(.301) | 0.053<br>(.713)  | -0.190<br>(.187) | -0.137<br>(.342) | -0.248<br>(.083) |  |
|       | DSIZE     | 0.006<br>(.965)                                 | 0.222<br>(.121)  | 0.078<br>(.590)  | -0.074<br>(.609) | -0.122<br>(.398) | -0.080<br>(.580) | 0.316<br>(.026)  | 0.115<br>(.428)  | 0.125<br>(.387)  |  |
|       | DROUT     | 0.083<br>(.566)                                 | 0.182<br>(.205)  | 0.032<br>(.826)  | -0.434<br>(.002) | -0.109<br>(.451) | 0.142<br>(.326)  | -0.195<br>(.174) | -0.180<br>(.210) | -0.133<br>(.357) |  |
|       | DID       | 0.020<br>(.892)                                 | 0.042<br>(.772)  | 0.063<br>(.665)  | -0.053<br>(.715) | 0.137<br>(.343)  | 0.164<br>(.256)  | -0.240<br>(.093) | -0.337<br>(.017) | -0.054<br>(.712) |  |
|       | DINTERPOC | 0.161<br>(.266)                                 | 0.290<br>(.041)  | 0.154<br>(.285)  | 0.237<br>(.098)  | 0.040<br>(.784)  | -0.019<br>(.897) | -0.058<br>(.689) | -0.227<br>(.113) | -0.033<br>(.822) |  |
|       | DTIMEOC   | -0.083<br>(.568)                                | 0.022<br>(.881)  | -0.051<br>(.726) | -0.076<br>(.601) | 0.035<br>(.811)  | 0.167<br>(.246)  | 0.182<br>(.207)  | 0.015<br>(.918)  | 0.097<br>(.503)  |  |
|       | DTASKMFG  | 0.065<br>(.652)                                 | 0.041<br>(.777)  | -0.158<br>(.272) | 0.036<br>(.805)  | 0.108<br>(.457)  | -0.165<br>(.253) | 0.226<br>(.115)  | -0.009<br>(.948) | 0.120<br>(.407)  |  |
|       | DTASKRD   | -0.132<br>(.362)                                | -0.211<br>(.142) | 0.055<br>(.702)  | -0.259<br>(.070) | -0.106<br>(.464) | -0.031<br>(.833) | 0.219<br>(.126)  | 0.364<br>(.009)  | 0.168<br>(.243)  |  |
|       | DTASKMKTG | -0.128<br>(.375)                                | -0.048<br>(.742) | -0.059<br>(.685) | 0.096<br>(.507)  | -0.093<br>(.521) | 0.115<br>(.426)  | 0.026<br>(.859)  | 0.057<br>(.697)  | 0.105<br>(.469)  |  |
|       | DTASKGEN  | 0.007<br>(.961)                                 | -0.180<br>(.211) | 0.006<br>(.965)  | 0.231<br>(.106)  | 0.110<br>(.448)  | 0.045<br>(.755)  | 0.100<br>(.489)  | 0.023<br>(.873)  | 0.060<br>(.678)  |  |
|       | DGOALS    | 0.227<br>(.114)                                 | -0.016<br>(.913) | 0.264<br>(.064)  | -0.128<br>(.376) | -0.009<br>(.952) | 0.056<br>(.700)  | -0.019<br>(.897) | -0.044<br>(.762) | 0.101<br>(.486)  |  |
|       | DPRODPROC | 0.013<br>(.928)                                 | 0.090<br>(.532)  | 0.210<br>(.144)  | -0.028<br>(.847) | -0.066<br>(.647) | 0.048<br>(.740)  | 0.302<br>(.033)  | 0.246<br>(.085)  | 0.003<br>(.983)  |  |
|       | DPRODLINS | 0.137<br>(.341)                                 | 0.209<br>(.146)  | 0.142<br>(.324)  | 0.104<br>(.474)  | -0.009<br>(.951) | -0.017<br>(.908) | 0.134<br>(.355)  | 0.020<br>(.891)  | 0.052<br>(.721)  |  |

Table 4.16 - continued

CORRELATIONS AND SIGNIFICANCE FOR R&D MANAGERS WITH MANUFACTURING

| TO:             |  | DEPT             | COMP             | PD               | PM               | SATIS            | MKTPOS           | MEET             | INFO             | COLLAB           |
|-----------------|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| FROM: DCONFLICT |  | 0.045<br>(.758)  | -0.124<br>(.392) | -0.001<br>(.993) | 0.043<br>(.767)  | -0.088<br>(.542) | 0.077<br>(.594)  | -0.173<br>(.230) | 0.141<br>(.329)  | -0.048<br>(.739) |
| DCOMPUTER       |  | -0.189<br>(.188) | -0.035<br>(.808) | -0.062<br>(.669) | 0.111<br>(.444)  | -0.161<br>(.263) | 0.136<br>(.347)  | 0.059<br>(.684)  | -0.038<br>(.795) | -0.234<br>(.101) |
| DTELECOMM       |  | 0.122<br>(.400)  | 0.152<br>(.293)  | -0.080<br>(.582) | -0.016<br>(.914) | 0.343<br>(.015)  | -0.090<br>(.535) | 0.256<br>(.072)  | 0.218<br>(.128)  | 0.385<br>(.006)  |
| DINFOCERT       |  | -0.209<br>(.146) | -0.021<br>(.883) | -0.268<br>(.060) | -0.251<br>(.079) | -0.159<br>(.271) | 0.024<br>(.871)  | 0.149<br>(.301)  | 0.017<br>(.905)  | -0.097<br>(.505) |
| DTURB           |  | 0.067<br>(.642)  | 0.081<br>(.579)  | 0.103<br>(.479)  | 0.127<br>(.381)  | 0.012<br>(.937)  | 0.000<br>(.999)  | -0.014<br>(.923) | -0.090<br>(.536) | 0.025<br>(.864)  |
| DSTATUS         |  | -0.183<br>(.202) | -0.145<br>(.316) | 0.039<br>(.790)  | -0.243<br>(.090) | -0.140<br>(.332) | 0.101<br>(.487)  | -0.107<br>(.462) | -0.196<br>(.172) | -0.202<br>(.160) |
| DPRXDIST        |  | 0.104<br>(.471)  | 0.128<br>(.376)  | 0.114<br>(.429)  | 0.062<br>(.667)  | -0.058<br>(.692) | -0.052<br>(.720) | 0.180<br>(.211)  | 0.118<br>(.414)  | -0.097<br>(.501) |

KEY:

D BEFORE VARIABLE MEANS DIFFERENCE

|                                     |   |
|-------------------------------------|---|
| DEPT = DEPARTMENT PERFORMANCE       | INTERPOC = INTERPERSONAL ORIENTATION            |
| COMP = COMPANY PERFORMANCE          | TIMEOC = TIME ORIENTATION                       |
| PD = PRODUCT DEVELOPMENT PERFORM    | TASKMFG = MANUFACTURING TASK ORIENTATION        |
| PM = PRODUCT MANAGEMENT PERFORMANCE | TASKRD = R&D TASK ORIENTATION                   |
| SATIS = SATISFACTION                | TASKMKTG = MARKETING TASK ORIENTATION           |
| MKTPOS = MARKET POSITION            | TASKGEN = GENERAL BUSINESS TASK ORIENTATION     |
| COLLAB = COLLABORATION              | GOALS = COOPERATIVE GOALS                       |
| MEET = MEETINGS                     | PRODPROC = PRODUCTION PROCESS TYPE              |
| INFO = DOCUMENTED INFORMATION EXCH  | PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED |
| CENT = CENTRALIZATION               | CONFLICT = CONFLICT RESOLUTION MECHANISMS       |
| FORM = FORMALIZATION                | COMPUTER = COMPUTER SYSTEMS                     |
| SPEC = SPECIALIZATION               | TELECOMM = TELECOMMUNICATION SYSTEMS            |
| SIZE = SIZE (EMPLOYMENT)            | INFOCERT = CERTAINTY OF INFORMATION             |
| ROUT = ROUTINENESS                  | TURB = TURBULENCE                               |
| ID = INTERDEPENDENCE                | STAT = STATUS                                   |
|                                     | PRXDIST = PROXIMAL DISTANCE                     |

SIGNIFICANCE LEVELS ARE GIVEN IN THE PARENTHESES

perceive worse product management performance as such differences increase. This discrepancy also might be problematic for evaluating product management performance success across the two departments.

Three other findings were commonly held across manufacturing and R&D departments. Status differences were shown to diminish perceptions of product management performance. This may be a result of lower status managers believing that since their department has less power, management of the product will be less successful. The second common finding concerned department size and meetings. This finding indicated that greater size differences led to more meetings. One possibility is that larger departments will require more information to operate. Since smaller departments do not have the manpower or time resources to document large amounts of information, there will be preference for more meetings, which are generally quicker than documentation activities. In other words, smaller departments might find meetings more efficient for information exchange. It is also possible that larger departments may have the ability to mandate more meetings for updates and information clarification with smaller departments. The third common difference was a positive effect by production process type differences on the degree of meetings. While explanation of this effect is difficult,

it may be that greater differences over the production process lead to more meetings to explain and/or establish the configuration of the firm's production process.

#### **SUMMARY OF THE TESTING OF HYPOTHESES**

Based on the analyses performed in this study, each of the given hypotheses was tested. Findings have strongly supported some hypotheses, partially supported other hypotheses, and refuted a larger number of hypotheses. Table 4.17 summarizes these findings.

Overall, it appears that collaboration is the most important of the integration variables. It was revealed that collaboration had significant positive relationships with all performance variables, except market position. The interaction variables of meetings and documented information exchange were significant in only a few cases, with some of these cases suggesting that more interaction led to worse performance.

Because of the important role of collaboration, there is interest in identifying its antecedents. The antecedents as proposed by Proposition P2 were not supported by the second analysis; that is, attribute differences do not have major influences on collaboration. Instead, it appears that the structural variables of interdependence and cooperative goals are key antecedents to collaboration since



Table 4.17

Summary of Hypotheses Testing Results

PROPOSED HYPOTHESES:

| <u>Factor</u>          | <u>Direct Effect<br/>on Interaction</u> | <u>Attribute Difference<br/>on Collaboration</u> |
|------------------------|---|--|
| Centralization         | - (H1a)                                 | - (H1b)  |
| Formalization          | - (H2a)                                 | - (H2b)  |
| Specialization         | - (H3a)                                 | - (H3b)  |
| Department Size        | + (H4a)                                 | - (H4b)  |
| Routineness            | - (H5a)                                 | - (H5b)  |
| Interdependence        | + (H6a)                                 | - (H6b)  |
| Interpersonal Orient.  | + (H7a)                                 | - (H7b)  |
| Time Length Orient.    | - (H8a)                                 | - (H8b)  |
| Task Breadth Orient.   | + (H9a)                                 | - (H9b)  |
| Cooperative Goals      | + (H10a)                                | - (H10b)   |
| Production Process     | + (H11a)                                | - (H11b)   |
| Conflict Resolution    | + (H12a)                                | - (H12b)   |
| Computers/Telecomm.    | + (H13a)                                | - (H13b)   |
| Uncertainty of Info    | + (H14a)                                | - (H14b)   |
| Environment Turbulence | + (H15a)                                | - (H15b)   |
| Status                 | 0 (H16a)                                | - (H16b)   |

- 
- H17: A department's collaboration with another department will positively influence its interaction with that department.
- H18: A department's interaction with another department will not influence its collaboration with that department.
- H19a: Interaction will increase performance.
- H19b: Collaboration will increase performance.
- H19c: Collaboration will have a stronger effect on performance than interaction.

Table 4.17 - continued

EMPIRICAL RESULTS:

IS SUPPORT GIVEN FOR THE RESPECTIVE HYPOTHESIS?

| Hypothesis | Marketing..... |         | Manufacturing.. |       | R&D..... |       |
|------------|----------------|---------|-----------------|-------|----------|-------|
|            | w/MFG          | w/R&D   | w/MKTG          | w/R&D | w/MKTG   | w/MFG |
| H1a        | no             | no      | no              | no    | no       | no    |
| H1b        | no             | no      | no              | no    | no       | no    |
| H2a        | no             | no      | no              | no    | no       | no    |
| H2b        | no             | no      | no              | no    | no       | no    |
| H3a        | no             | yes     | no              | no    | no       | no    |
| H3b        | no             | yes     | no              | yes   | no       | yes   |
| H4a        | no             | no      | yes             | no    | no       | no    |
| H4b        | no             | no      | no              | no    | no       | no    |
| H5a        | no             | no      | yes             | no    | no       | no    |
| H5b        | no             | no      | no              | yes   | no       | no    |
| H6a        | yes            | yes     | no              | yes   | yes      | yes   |
| H6b        | no             | no      | no              | no    | yes      | no    |
| H7a        | no             | no      | no              | no    | yes      | no    |
| H7b        | no             | no      | no              | no    | no       | no    |
| H8a        | no             | no      | no              | no    | yes      | yes   |
| H8b        | no             | no      | no              | no    | no       | no    |
| H9a        | limited        | no      | no              | no    | no       | yes   |
| H9b        | limited        | no      | limited         | no    | no       | no    |
| H10a       | yes            | yes     | no              | no    | no       | no    |
| H10b       | no             | yes     | no              | no    | no       | no    |
| H11a       | no             | no      | no              | no    | no       | no    |
| H11b       | no             | limited | no              | no    | no       | no    |
| H12a       | no             | no      | no              | no    | yes      | no    |
| H12b       | no             | no      | no              | no    | no       | no    |
| H13a       | yes            | yes     | yes             | yes   | yes      | yes   |
| H13b       | no             | no      | no              | yes   | no       | no    |
| H14a       | yes            | no      | no              | no    | no       | no    |
| H14b       | no             | no      | no              | no    | no       | no    |
| H15a       | yes            | yes     | no              | no    | no       | no    |
| H15b       | yes            | no      | no              | no    | no       | no    |
| H16a       | yes            | yes     | yes             | yes   | no       | yes   |
| H16b       | no             | no      | no              | yes   | no       | no    |
| H17        | yes            | yes     | yes             | yes   | yes      | yes   |
| H18        | yes            | yes     | yes             | yes   | yes      | yes   |
| H19a       | no             | limited | no              | no    | no       | no    |
| H19b       | yes            | yes     | yes             | yes   | yes      | yes   |
| H19c       | yes            | yes     | yes             | yes   | yes      | yes   |

they were found to have significant positive relationships with collaboration. It is again noted, however, that the cooperative goals measure may be considered an attribute differences measure.

#### **POST-HOC ANALYSIS OF INTERDEPENDENCE AND COOPERATIVE GOALS**

Since interdependence and cooperative goals were strong antecedents to collaboration, a post-hoc analysis was undertaken to determine if certain structural variables might promote interdependence and/or cooperative goals. A regression analysis was performed, including the twenty-one remaining variables.

Overall, common antecedents for interdependence and cooperative goals across all manager sets are lacking. As shown in Table 4.18, the only two antecedents in a majority of manager cases were interdependence and cooperative goals. It therefore appears that these two variables may not be only important for collaboration, but that they may be important for establishing each other.

The lack of common findings suggests that each department's relationship with another department may be influenced by factors inherent to the specific interrelationship and/or the individual department. The implication of this is that companies may have difficulty

Table 4.18

Post-Hoc Analysis: Possible Antecedents of Interdependence and Cooperative Goals

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR ANTECEDENTS OF INTERDEPENDENCE

TO: INTERDEPENDENCE in the following cases:

|       |          | MARKETING.....   |                  | MANUFACTURING... |                  | R&D.....         |                  |
|-------|----------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |          | w/MFG            | w/R&D            | w/MKTG           | w/R&D            | w/MKTG           | w/MFG            |
| FROM: | CENT     | -0.03<br>(-.37)  | -0.01<br>(-.07)  | -0.08<br>(-.84)  | -0.10<br>(-1.05) | 0.14<br>(1.74)   | -0.08<br>(-1.01) |
|       | FORM     | 0.00<br>(-.01)   | 0.04<br>(.49)    | 0.08<br>(.82)    | 0.12<br>(1.37)   | -0.01<br>(-.16)  | -0.01<br>(-.10)  |
|       | SPEC     | 0.01<br>(.18)    | -0.02<br>(-.19)  | 0.06<br>(.69)    | -0.18<br>(-2.09) | 0.01<br>(.15)    | -0.02<br>(-.26)  |
|       | SIZE     | -0.03<br>(-.36)  | -0.12<br>(-1.56) | 0.15<br>(1.77)   | 0.14<br>(1.80)   | 0.18<br>(2.13)   | 0.02<br>(.28)    |
|       | ROUT     | -0.02<br>(-.27)  | -0.27<br>(-3.27) | -0.08<br>(-.80)  | -0.09<br>(-.96)  | -0.18<br>(-2.23) | 0.03<br>(.33)    |
|       | INTERPOC | -0.10<br>(-1.25) | -0.04<br>(-.48)  | 0.05<br>(.60)    | 0.12<br>(1.48)   | 0.05<br>(.69)    | 0.01<br>(.11)    |
|       | TIMEOC   | -0.12<br>(-1.47) | -0.07<br>(-.82)  | -0.04<br>(-.38)  | -0.09<br>(-1.08) | -0.09<br>(-.95)  | 0.02<br>(.25)    |
|       | TASKMFG  | 0.13<br>(1.13)   | 0.02<br>(.15)    | -0.05<br>(-.57)  | 0.04<br>(.47)    | 0.09<br>(1.10)   | 0.17<br>(2.08)   |
|       | TASKRD   | -0.02<br>(-.23)  | -0.06<br>(-.77)  | na               | na               | -0.04<br>(-.57)  | -0.06<br>(-.78)  |
|       | TASKMKTG | -0.04<br>(-.34)  | -0.04<br>(-.30)  | 0.15<br>(1.52)   | -0.06<br>(-.65)  | 0.14<br>(1.58)   | -0.02<br>(-.21)  |
|       | TASKGEN  | 0.09<br>(.89)    | 0.08<br>(.81)    | -0.05<br>(-.52)  | -0.08<br>(-.78)  | 0.00<br>(.05)    | 0.09<br>(.93)    |
|       | GOALS    | 0.17<br>(2.15)   | 0.03<br>(.37)    | 0.16<br>(1.75)   | 0.25<br>(2.95)   | 0.15<br>(1.90)   | -0.03<br>(-.31)  |
|       | PRODPROC | 0.07<br>(.83)    | -0.01<br>(-.14)  | 0.09<br>(1.09)   | 0.03<br>(.39)    | -0.05<br>(-.61)  | 0.06<br>(.71)    |
|       | PRODLINS | -0.08<br>(-1.03) | -0.10<br>(-1.27) | -0.05<br>(-.55)  | -0.15<br>(-1.84) | 0.13<br>(1.67)   | 0.11<br>(1.39)   |

Table 4.18 - continued

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR ANTECEDENTS OF INTERDEPENDENCE (CONTINUED)

TO: INTERDEPENDENCE in the following cases:

|                                 | MARKETING.....   |                  | MANUFACTURING... |                  | R&D.....        |                  |
|---------------------------------|------------------|------------------|------------------|------------------|-----------------|------------------|
|                                 | w/MFG            | w/R&D            | w/MKTG           | w/R&D            | w/MKTG          | w/MFG            |
| CONFLICT                        | -0.17<br>(-1.97) | -0.01<br>(-.15)  | 0.13<br>(1.46)   | 0.03<br>(.35)    | 0.02<br>(.28)   | 0.00<br>(.00)    |
| COMPUTER                        | 0.00<br>(.01)    | 0.08<br>(.91)    | -0.01<br>(-.14)  | -0.21<br>(-2.26) | 0.14<br>(1.67)  | 0.08<br>(.85)    |
| TELECOMM                        | 0.16<br>(1.91)   | 0.17<br>(1.99)   | -0.05<br>(-.51)  | 0.12<br>(1.32)   | 0.13<br>(1.34)  | 0.07<br>(.67)    |
| INFOCERT                        | 0.04<br>(.42)    | -0.11<br>(-1.20) | -0.00<br>(-.02)  | 0.04<br>(.45)    | -0.04<br>(-.52) | 0.20<br>(2.45)   |
| TURB                            | 0.03<br>(.39)    | -0.01<br>(-.11)  | 0.04<br>(.40)    | 0.17<br>(2.00)   | 0.06<br>(.68)   | 0.05<br>(.59)    |
| STATUS                          | -0.20<br>(-2.43) | -0.05<br>(-.60)  | -0.04<br>(-.47)  | -0.06<br>(-.78)  | 0.10<br>(1.35)  | -0.11<br>(-1.38) |
| PRXDIST                         | 0.12<br>(1.39)   | 0.04<br>(.45)    | 0.00<br>(.01)    | 0.05<br>(.58)    | 0.02<br>(.30)   | 0.07<br>(.85)    |
| COEFFICIENT<br>OF DETERMINATION | 0.16             | 0.15             | 0.12             | 0.24             | 0.20            | 0.15             |

KEY: CENT = CENTRALIZATION  
 FORM = FORMALIZATION  
 SPEC = SPECIALIZATION  
 SIZE = SIZE (EMPLOYMENT)  
 ROUT = ROUTINENESS  
 INTERPOC = INTERPERSONAL ORIENTATION  
 TIMEOC = TIME ORIENTATION  
 TASKMFG = MANUFACTURING TASK ORIENTATION  
 TASKRD = R&D TASK ORIENTATION  
 TASKMKTG = MARKETING TASK ORIENTATION  
 TASKGEN = GENERAL BUSINESS TASK ORIENTATION  
 GOAL = COOPERATIVE GOALS  
 PRODPROC = PRODUCTION PROCESS TYPE  
 PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED  
 CONFLICT = CONFLICT RESOLUTION MECHANISMS  
 COMPUTER = COMPUTER SYSTEMS  
 TELECOMM = TELECOMMUNICATION SYSTEMS  
 INFOCERT = CERTAINTY OF INFORMATION  
 TURB = TURBULENCE  
 STAT = STATUS  
 PRXDIST = PROXIMAL DISTANCE

T-VALUES ARE GIVEN IN THE PARENTHESES

Table 4.18 - continued

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR ANTECEDENTS OF COOPERATIVE GOALS

TO: COOPERATIVE GOALS in the following cases:

| FROM: |          | MARKETING.....   |                  | MANUFACTURING... |                  | R&D.....         |                  |
|-------|----------|------------------|------------------|------------------|------------------|------------------|------------------|
|       |          | w/MFG            | w/R&D            | w/MKTG           | w/R&D            | w/MKTG           | w/MFG            |
|       | CENT     | -0.16<br>(-1.94) | -0.14<br>(-1.74) | 0.23<br>(2.40)   | 0.12<br>(1.31)   | 0.05<br>(.66)    | 0.05<br>(.56)    |
|       | FORM     | 0.03<br>(.37)    | -0.07<br>(-.87)  | -0.10<br>(-1.06) | 0.06<br>(.67)    | 0.05<br>(.59)    | -0.02<br>(-.29)  |
|       | SPEC     | -0.02<br>(-.20)  | 0.13<br>(1.53)   | -0.01<br>(-.09)  | 0.11<br>(1.32)   | -0.17<br>(-2.25) | 0.09<br>(1.18)   |
|       | SIZE     | 0.10<br>(1.27)   | 0.09<br>(1.14)   | -0.01<br>(-.13)  | -0.01<br>(-.17)  | -0.13<br>(-1.45) | 0.08<br>(.95)    |
|       | ROUT     | 0.06<br>(.78)    | 0.08<br>(.99)    | 0.08<br>(.91)    | -0.04<br>(-.48)  | 0.03<br>(.40)    | 0.11<br>(1.32)   |
|       | ID       | 0.17<br>(2.15)   | 0.03<br>(.37)    | 0.14<br>(1.75)   | 0.24<br>(2.95)   | 0.15<br>(1.90)   | -0.02<br>(-.31)  |
|       | INTERPOC | 0.07<br>(1.11)   | 0.07<br>(.91)    | -0.02<br>(-.29)  | -0.09<br>(-1.10) | 0.10<br>(1.25)   | 0.09<br>(1.23)   |
|       | TIMEOC   | 0.09<br>(.89)    | -0.01<br>(-.06)  | 0.01<br>(.13)    | 0.11<br>(1.36)   | 0.11<br>(1.18)   | -0.11<br>(-1.19) |
|       | TASKMFG  | -0.13<br>(-1.15) | -0.22<br>(-2.03) | 0.00<br>(.01)    | 0.01<br>(.15)    | 0.00<br>(.01)    | 0.06<br>(.79)    |
|       | TASKRD   | 0.04<br>(.52)    | 0.10<br>(1.37)   | na               | na               | -0.03<br>(-.33)  | -0.07<br>(-.95)  |
|       | TASKMKTG | -0.20<br>(-1.77) | -0.30<br>(-2.67) | -0.07<br>(-.73)  | -0.04<br>(-.43)  | 0.01<br>(.17)    | 0.01<br>(.11)    |
|       | TASKGEN  | -0.11<br>(-1.12) | -0.02<br>(-.15)  | -0.08<br>(-.78)  | -0.06<br>(-.59)  | -0.05<br>(-.60)  | 0.11<br>(1.22)   |
|       | PRODPROC | -0.18<br>(-2.20) | -0.08<br>(-.98)  | -0.03<br>(-.39)  | 0.02<br>(.27)    | -0.00<br>(-.06)  | 0.10<br>(1.31)   |
|       | PRODLINS | 0.04<br>(.49)    | 0.04<br>(.54)    | -0.00<br>(-.05)  | 0.02<br>(.24)    | -0.24<br>(-3.22) | -0.22<br>(-2.87) |

Table 4.18 - continued

STANDARDIZED REGRESSION COEFFICIENTS AND T-VALUES FOR ANTECEDENTS OF COOPERATIVE GOALS (CONTINUED)

TO: COOPERATIVE GOALS in the following cases:

|                                 | MARKETING.....   |                  | MANUFACTURING... |                 | R&D.....         |                 |
|---------------------------------|------------------|------------------|------------------|-----------------|------------------|-----------------|
|                                 | w/MFG            | w/R&D            | w/MKTG           | w/R&D           | w/MKTG           | w/MFG           |
| CONFLICT                        | 0.14<br>(1.65)   | 0.06<br>(.85)    | -0.14<br>(-1.63) | 0.23<br>(2.99)  | 0.05<br>(.65)    | 0.08<br>(1.04)  |
| COMPUTER                        | 0.05<br>(.61)    | -0.16<br>(-2.03) | 0.05<br>(.49)    | 0.15<br>(1.64)  | 0.17<br>(1.96)   | 0.10<br>(1.16)  |
| TELECOMM                        | -0.12<br>(-1.40) | 0.06<br>(.66)    | 0.23<br>(2.43)   | -0.08<br>(-.96) | 0.08<br>(.89)    | 0.02<br>(.26)   |
| INFOCERT                        | 0.06<br>(.66)    | 0.09<br>(1.03)   | 0.29<br>(2.92)   | 0.19<br>(2.11)  | -0.01<br>(-.16)  | 0.19<br>(2.41)  |
| TURB                            | 0.05<br>(.68)    | -0.14<br>(-1.77) | -0.05<br>(-.57)  | 0.01<br>(.13)   | -0.12<br>(-1.39) | -0.07<br>(-.84) |
| STATUS                          | 0.11<br>(1.40)   | 0.14<br>(1.82)   | 0.21<br>(2.51)   | 0.18<br>(2.24)  | -0.08<br>(-1.09) | 0.09<br>(1.20)  |
| PRXDIST                         | -0.03<br>(-.31)  | 0.12<br>(1.54)   | 0.00<br>(.01)    | -0.07<br>(-.91) | -0.05<br>(-.72)  | -0.03<br>(-.46) |
| COEFFICIENT<br>OF DETERMINATION | 0.19             | 0.22             | 0.19             | 0.28            | 0.20             | 0.18            |

KEY: CENT = CENTRALIZATION  
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 TASKMFG = MANUFACTURING TASK ORIENTATION  
 TASKRD = R&D TASK ORIENTATION  
 TASKMKTG = MARKETING TASK ORIENTATION  
 TASKGEN = GENERAL BUSINESS TASK ORIENTATION  
 GOAL = COOPERATIVE GOALS  
 PRODPROC = PRODUCTION PROCESS TYPE  
 PRODLINS = NUMBER OF PRODUCT LINES MANUFACTURED  
 CONFLICT = CONFLICT RESOLUTION MECHANISMS  
 COMPUTER = COMPUTER SYSTEMS  
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T-VALUES ARE GIVEN IN THE PARENTHESES

establishing a company-wide program designed to instill collaboration across all departments simultaneously.

A second post-hoc analysis considered the interdependence construct. As measured, the construct was composed of a department's dependence on another department and that other department's dependence on the respective department. It is conceivable that interdependence differences across departments might not influence collaboration, but rather, the individual department's perception of unequal interdependence might influence its collaboration with another department. While the two dependence scales reflected lower internal consistency, as previously discussed in the reliability analysis section, a tentative post-hoc analysis was performed.

The hypothesis that a department's perceived inequity of interdependence would affect its collaboration was not supported. As shown in Table 4.19, differences in dependence do not affect collaboration. Rather, a department's perception of being dependent or being depended upon has a positive influence on its collaboration with another department. This implies that departments collaborate when there is a strong degree of resource dependence in either and/or both directions. These findings support literature concerning resource dependence, which



Table 4.19

Post-Hoc Analysis: Investigation  
of the Interdependence Construct

CORRELATION COEFFICIENTS BETWEEN INTERDEPENDENCE COMPONENTS AND COLLABORATION

=> MARKETING MANAGERS

|                     | The Other<br>Department's<br>Dependence<br>On Marketing | Marketing's<br>Dependence<br>on the Other<br>Department | Dependence<br>Score<br>Difference | Absolute<br>Difference<br>of Dependence<br>Score |
|---------------------|---|---|-----------------------------------|--|
| Collaboration with: |   |   |                                   |  |
| Manufacturing       | .18 (p=.015)  | .16 (p=.039)  | .02 (p=.760)                      | -.01 (p=.912)                                    |
| R&D                 | .20 (p=.008)  | .12 (p=.116)  | .07 (p=.390)                      | -.12 (p=.104)                                    |

=> MANUFACTURING MANAGERS

|                     | The Other<br>Department's<br>Dependence<br>On Mfg. | Mfg's<br>Dependence<br>on the Other<br>Department | Dependence<br>Score<br>Difference | Absolute<br>Difference<br>of Dependence<br>Score |
|---------------------|--|---|-----------------------------------|--|
| Collaboration with: |  |   |                                   |  |
| Marketing           | .13 (p=.107)                                       | .16 (p=.043)                                      | -.06 (p=.469)                     | .03 (p=.691)                                     |
| R&D                 | .19 (p=.019)                                       | .23 (p=.005)                                      | -.06 (p=.450)                     | .09 (p=.287)                                     |

=> R&D MANAGERS

|                     | The Other<br>Department's<br>Dependence<br>On Mfg. | Mfg's<br>Dependence<br>on the Other<br>Department | Dependence<br>Score<br>Difference | Absolute<br>Difference<br>of Dependence<br>Score |
|---------------------|--|---|-----------------------------------|--|
| Collaboration with: |  |   |                                   |  |
| Marketing           | .40 (p=.000)                                       | .20 (p=.008)                                      | .14 (p=.059)                      | .11 (p=.141)                                     |
| Manufacturing       | .37 (p=.000)                                       | .22 (p=.003)                                      | .09 (p=.214)                      | -.12 (p=.122)                                    |

suggests that greater resource dependence leads to greater coalition-formation (cf. Pfeffer and Salancik 1978, Anderson 1982, Ruekert and Walker 1987).

## CHAPTER 5

### CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

Throughout the previous chapters, this dissertation has proposed, theoretically developed, and empirically investigated a model of interdepartmental integration. As proposed, this model characterized integration as a composite process of interaction and collaboration. Interaction was defined as a structural element, consisting of coordinated actions, e.g. meetings, information exchange, resource exchange. Collaboration was defined as an affective element, encompassing the sharing of resources, common vision, and collective goals.

A theoretical foundation for the proposed model was provided by the works of Lorsch (1965), Woodward (1965), Lawrence and Lorsch (1967; 1986), Thompson (1967) and Perrow (1970). Specifically, sociotechnical theory, as discussed by Woodward, Perrow, and Thompson, indicated that departmental structure, task structure, goals, status, technology, and environmental conditions would influence interaction. Contingency theory, as discussed by Lawrence and Lorsch, included the attribute of occupational orientation and indicated that differences between

departments (differentiation) would influence collaborative efforts. A set of hypotheses was proposed to assess each of these theoretical approaches.

A survey methodology was employed to empirically investigate each of the proposed hypotheses. Department managers from marketing, manufacturing, and R&D from electronics firms served as survey recipients. Two survey waves, which reflected no differences, provided an overall response rate of 20%.

Following reliability analysis on the employed measures, two types of data analyses were performed. The first analysis assessed the direct effects of each structural variable on interaction, collaboration, and performance variables. The analysis also assessed collaboration's effect on interaction (and vice versa) and the direct effects of interaction and collaboration on performance. The second analysis assessed the effects of attribute differences on interaction, collaboration, and performance. Attribute differences comprised difference scores between departments within the same company.

### **GENERAL CONCLUSIONS**

Overall, the two guiding propositions concerning interaction and collaboration received marginal support. The first proposition stated that individual attributes

(structural variables) of a department would influence that department's interaction with other departments. While it appears that structural factors directly influence interaction, it also appears that structural factors can directly influence collaboration. The lack of support for the first proposition is also shown by the lack of common effects across all manager sets. Since most direct influences appear to be department-specific and/or interrelationship specific, it would appear the structural effects do not have a strong, universal effect.

Hence, structural variables may have a lesser influence than originally believed, and other factors may be more important. Evidence for this speculation is not only illustrated by the lack of common findings, but also by the small coefficients of determination reflected in the first analysis. Research should therefore continue to investigate the antecedents for integration. In particular, future study should investigate the direct effects of psycho-social variables like conflict, cooperation, culture, and personality.

The second proposition stated that attribute differences between two departments would influence each department's collaboration with the other department. Akin to the findings associated with interaction, attribute differences influence both collaboration and interaction.

Lack of support for the second proposition is again illustrated by the lack of common effects across all manager sets. Since the effects of attribute differences appear to be department-specific and/or interrelationship specific, it appears that attribute differences do not have strong, universal effects on collaboration or interaction. Future research should continue to examine the effects of attribute differences. It is possible that attribute differences between structural factors are not the focal points for interdepartmental integration. Rather, other types of factors, such as psycho-social variables, may be more pertinent. It is also possible that the measures used in this study were not strong enough to discern "true" attribute differences. Only future research can effectively address these issues.

Underlying the propositions of this dissertation was the assumption that structural variables would affect integration variables, which in turn, would affect performance. In other words, integration variables would mediate the effects of structural variables onto performance. This assumption was not validated since both analyses revealed some structural variables and their differences to have significant relationships with performance. This finding is not very surprising since performance would be based on factors beyond integration.

It is especially not surprising to see that environment greatly influences performance, which supports the findings of Lawrence and Lorsch (1967, 1986). Hence, the environment and the other significant structural variable effects on performance, which were reflected in this research, should be taken as tentative guidelines for future research efforts.

In regards to the specific hypotheses proposed in this research, many were unsupported across all manager sets. Nonetheless, a variety of findings were revealed that have important ramifications for marketing's integration with other departments. Each of these findings are highlighted below along with a discussion of their managerial and research implications.

### **Collaboration Increases Performance**

Findings strongly support a positive relationship between collaboration and performance. In particular, collaboration improves department performance, company performance, product development performance, product management performance, and satisfaction. The only performance factor not influenced by collaboration was market position, which is conceivable since market position would be expected to be predicated on more upper-level, long-term, company-wide factors.

A managerial implication of this finding is that companies need to stress collaboration between departments. Top management should develop programs that encourage departments to achieve goals collectively; have mutual understanding; informally work together; share ideas, information, and/or resources; share the same vision for the company; and work together as a team. Since much of these activities are strategic, any program that is developed should include modification of the company's strategic planning process and the company's strategic planning implementation process.

Research should continue to investigate the collaboration construct. In particular, research should seek to confirm collaboration's positive relationship with performance. Such research should investigate whether this relationship holds only for electronics firms or if it also holds across other industrial and organizational contexts (i.e., nonprofit organizations). Additional research should attempt to identify other variables that may have antecedent relationships to collaboration in addition to interdependence and cooperative goals. Through such research, a model of interdepartmental collaboration may be developed.



### **Interaction Does Not Improve Performance**

In contrast to the finding concerning collaboration, interaction (i.e., frequency of meeting and documented information exchange) does not improve performance. It therefore appears that increasing the number of meetings between departments and/or increasing the document exchange between departments will not lead to better performance. In fact, interaction decreased performance in certain manager cases.

This finding is important. Many companies (and other organizations) have typically associated integration with communication/interaction. In this way, these companies have held more meetings and exchanged more information between departments to become better integrated, and thus, become more successful. The results of this study indicate that more meetings and increased information flows do not necessarily improve performance, and in fact, can inhibit performance. Consequently, companies should not assume that simply holding meetings and/or exchanging documents will generate successful performance through communication. Collaboration is the key.

Research is needed to confirm this dissertation's finding that interaction has a minimal relationship, and in certain cases, a negative relationship with successful performance. Such research should determine if results are

unique to the electronics industry or if they apply across industries. Research should also examine perceptions from managers of other departments and other types of organizations like colleges and universities.

As found, collaboration increases both meetings and documented information exchange. Some may contend that the opposite relationship will be true: meetings and information exchange will improve collaboration. However, as previously discussed, interaction will not promote collaboration since a higher order of involvement as well as a different approach to sharing and creating information, is necessary. Thus, it is posited that collaboration will increase interaction to facilitate such activities as sharing resources and establishing collective goals. It is further posited that once two departments begin to collaborate, they should be allowed to set their own interaction agenda to facilitate collaboration.

Research should consider this issue by investigating in more detail the relationship between collaboration and interaction. Such research should include case studies and in-depth interviews with managers and department employees.

## **Interdependence Increases Collaboration, Meeting Frequency, and Documented Information Exchange**

Interdependence appears to be an important antecedent to interdepartmental integration. The relationship between interdependence and collaboration is especially highlighted since it has been shown that collaboration leads to better performance. Those departments that depend on other departments and/or are depended upon by other departments for resources, support, and/or outputs appear to be more likely to collaborate. The implication of this finding is that companies need to assess the resource dependencies within the company. It may be necessary to instill resource interdependence across departments, possibly through the redistribution of resources. Interdependence may also be instilled by redefining work activities to build dependencies between such key departments as marketing, manufacturing, and R&D.

Only through future research will the antecedent relationship of interdependence to collaboration, meeting frequency, and documented information exchanged be confirmed. Because of collaboration's importance to performance, attention should be focused on the existence and strength of the relationship between interdependence and collaboration. Further research should be undertaken to better define the types of interdependencies that exist

between various departments. Based on the departments studied in this dissertation, there is need to define and describe the types of interdependencies that exist between marketing and manufacturing, marketing and R&D, and manufacturing and R&D.

### **Cooperative Goals Increase Collaboration and a Department's Satisfaction With Its Interrelationship With Other Departments**

The second antecedent to collaboration is cooperative goals, which also appears to promote a department's satisfaction with interrelationships with other departments. This finding strongly indicates that strategic planning plays a crucial role in integration. In order to establish collaboration between departments, it appears that a group/team approach to strategic planning will be necessary. In this manner, cooperative goals could be assured since all parties would be represented when determining goals. Not only will cooperative goals increase collaboration, but findings suggest that departments will be satisfied in working across departments when cooperative goals exist. Thus, strategic planning should not be taken lightly or developed from the perspective of a single department (unless all departments agree with the goals being set). Otherwise, collaboration and departments' satisfaction will be hindered.

As with the interdependence construct, future research is needed to confirm the antecedent relationship of cooperative goals to collaboration. Research should also confirm the antecedent relationship of cooperative goals to a department's satisfaction with interrelationships with other departments. Research also should explore what characterizes cooperative goals. Through case studies and in-depth surveys (both interviews and mail questionnaires), research might suggest how goals should be specified so that they are cooperative with other departments' goals. Based on the departments studied in this dissertation, research might begin with the nature of cooperative goals between marketing and manufacturing, marketing and R&D, and manufacturing and R&D.

### **Interdependence and Cooperative Goals Are Interrelated**

While interdependence and cooperative goals were found to be promoters of collaboration, they also were found to be interrelated. At the present time, it is not known whether this relationship is reciprocal or unidirectional. It is possible that interdependent departments will set cooperative goals that are predicated on and insure the continuance of existing interdependencies. It is also possible that after setting cooperative goals, departments will develop interdependencies to insure achievement of

these goals. It is further possible that both are true. Additionally, it is possible that the cooperation between departments to establish cooperative goals will lead to interdependence. Only through future research will the nature of the relationship between interdependence and cooperative goals become better understood. Such research should specifically address each of these four possible scenarios. In regards to managerial implications, as it currently stands, companies should promote both interdependence and cooperative goals as two ways to develop collaboration across key departments.

**Effective Conflict Resolution Mechanisms Increase a Department's Satisfaction With Its Interrelationships With Other Departments**

Across a majority of manager sets, effective conflict resolution mechanisms influence a department's satisfaction with its interrelationships with other departments. While this supports the attention paid to conflict resolution in normative literature, it is interesting that conflict resolution mechanisms do not facilitate integration across a majority of manager sets. Rather, it appears that the value of having conflict resolution mechanisms is to manifest satisfaction throughout the organization. As previously discussed, such satisfaction may derive from conflict being resolved in a jointly agreeable manner.

The implication of this finding is that companies should continue to develop effective conflict resolution mechanisms. Such mechanisms, however, are not going to promote an increase in interdepartmental efforts. Rather, these mechanisms will serve to sustain existing relationships.

Research should continue to investigate conflict resolution mechanisms. Such research should confirm the finding that effective conflict resolutions have a positive effect on a department's satisfaction with its interrelationships with other departments. Moreover, such research should examine the role of conflict resolution mechanisms in organizations, thereby determining if the role is only to sustain existing relationships as suggested above. Other research should characterize the types of conflict resolution mechanisms available, possibly develop new types of conflict resolution mechanisms, and identify a set of mechanisms that are more effective in resolving conflict. After this identification process, research could then be undertaken to highlight those systems which are actually more effective.

## **Effective Telecommunication Systems Increase the Frequency of Meetings**

Effective telecommunication systems were found to increase the frequency of meetings. Such a finding suggests that effective telecommunications may be ineffectual since meetings do not have a strong relationship to performance. However, meetings may be beneficial if a strong degree of collaboration already exists between departments. In this latter situation, effective telecommunications systems may be useful for solidifying collaborative efforts.

An implication for managers is that effective telecommunication systems should not be viewed as a remedy for establishing collaborative efforts. Such systems primarily serve a communication function, which as shown, has little effect on performance.

Research should seek to confirm the finding concerning effective telecommunication systems. In doing so, future research will better define the role of telecommunication systems in organizations, and in particular, better define the role of telecommunication systems in interdepartmental relationships. Other research should identify the types of telecommunications systems available, suggest new types of telecommunication systems, and identify those systems, which might be more effective in promoting "good" interdepartmental relations. After this identification



process, research could then be undertaken to highlight those systems which are actually more effective.

### **Certainty of Information Leads to Better Performance**

Certainty of information leads to better department performance, better product development performance, and greater satisfaction with those relationships with other departments. Naturally, departments that receive more certain information will be able to plan more appropriately, and thus, perform more successfully. It is also revealed that certainty of information can affect the internal functioning of companies in terms of interrelationship satisfaction. It is speculated that certain information might diminish discrepancies between departments and allow departments to have more confidence, both of which would promote such satisfaction. Research is needed to pursue confirmation of this speculation as well as seek to confirm this dissertation's findings concerning certainty of information.

As a managerial implication, it is rather obvious that companies should strive for better data collection and forecasting practices to obtain more certain information, and thereby improve performance. However, it may not be so obvious that striving for greater certainty of information

might improve the satisfaction derived from dealing with other departments.

**Programs May Need to Address Certain Characteristics Inherent to Individual Departments and/or Individual Interrelationships**

While certain structural attributes may have effects that apply across all manager sets, other attributes appear to be department-specific and/or relationship-specific. Consequently, a global program designed to integrate the company may not be entirely successful if certain department attributes are overlooked. Research should continue to investigate interdepartmental relationships to discover which variables appear to be department-specific and which variables appear to be relationship-specific.

Based on the findings of this dissertations, two such variables include the impacts of time orientation and environmental turbulence on marketing and manufacturing managers' perceptions of performance. Thus, it appears that time orientation and environmental turbulence have a specific effect on the marketing-manufacturing relationship.

Findings suggest that when marketing and manufacturing managers have a longer time orientation, they experience greater company success and greater product development success. These findings support various prescriptions from product development literature that too short a time

orientation will prevent product development projects from reaching full potential. Companies should therefore train and encourage marketing and manufacturing managers to manifest longer-term perspectives. Of course, research should continue to validate these findings concerning the effects of time orientation on marketing and manufacturing managers in other industries.

Marketing and manufacturing managers also perceive less company success and a weaker market position when environmental turbulence is higher. While it is impractical to prescribe eliminating environmental turbulence, efforts towards reducing such turbulence (e.g. better forecasting) may improve perceptions of performance, and possibly, equalize perceptions of performance across departments. Again, research should validate these findings concerning the effects of environmental turbulence on marketing and manufacturing managers in other industries.

Other structural attributes also were found to have specialized relationships, and thus, may have implications for specific departments and interrelationships. However, these characteristics (e.g., specialization, conflict resolution mechanisms, status) reflected lower reliability, were single items, and/or had questionable explanations for their significance. Prior to any provision of managerial prescriptions for these other structural variables, future

research needs to be pursued. Specifically, there is an immediate research need to develop reliable, multi-item measures of specialization, effective conflict resolution mechanisms, and status. After such measures are constructed, research should then re-examine these variables' relationships with integration and performance variables.

#### **STUDY LIMITATIONS AND OTHER FUTURE RESEARCH OPPORTUNITIES**

Since this dissertation employed a mail survey methodology, several limitations inherent to a mail survey methodology must be acknowledged. The first of these is nonresponse bias. It is possible that the 20% of managers responding to this survey did not represent the overall sample. However, analysis did not indicate significant differences between wave respondents. Additionally, the 20% response rate achieved by this study is appropriate in light of the difficulty to achieve higher response rates in industrial studies. Use of industrial samples in future research, which addresses integration, will support or refute the representativeness of the sample.

A second limitation is the possibility that respondents biased their responses to put themselves in a better light. While it can only be assumed that survey responses were accurately reported, the range of responses would suggest

that respondents were truthful. Several respondents also specifically requested that their responses remain confidential, suggesting that they were responding truthfully.

A third limitation associated with the survey methodology is respondents may not have understood or taken care in completing the survey. While it can be only assumed that respondents understood the questions and the corresponding scales, the modifications arising out of pretesting should have improved comprehensibility. Further, since pretest participants found the final survey format acceptable, it is reasonable to assume respondents understood the survey and found it acceptable.

Coupled with the limitations of mail survey research, this study has four other methodological limitations. One is the use of only managers to measure constructs. It is possible that other events may be occurring, of which the manager may not be aware. It is assumed that most managers will try to stay on top of what is going on in and around his/her function. Managers also must often serve as liaisons between functions, and therefore should be aware of interdepartmental activities. Future research may consider expanding the survey sample to include managers and department personnel. In a related issue, the manager's tenure with the company and tenure with the respective

department may have biased their responses. Since data concerning tenure were not collected, it is unknown whether this occurred. Future studies should include questions about manager's tenure to properly investigate such bias.

Another limitation is the survey's use of perceptual measures. It is possible that there may be discrepancies between perceived and observed/behavioral measures. However, this study adopts the philosophy that perceptions often predicate observed behavior (Weick 1979). Through future research in the form of case studies, experiments, and surveys, a better understanding of perceptions and observed behavior within the context of interdepartmental integration may be gained.

The low reliability of certain constructs serves as an additional limitation. Future research needs to improve the measures of specialization, routineness, and effective conflict resolution mechanisms, which were adapted from previous research. Still, the exploratory nature of this dissertation has attempted to identify which structural variables may influence integration and performance and which integration variables may influence performance. Moreover, this study has offered three excellent scales for measuring meeting frequency, documented information exchange, and collaboration. These scales should be especially incorporated into future research efforts.

A fourth and considerably overriding limitation concerns the issue of correlation versus causation. Implicit throughout this dissertation has been the assumption that study findings would support causal relationships. In actuality, the performed analyses only can indicate correlational relationships, and thus, it may be possible that the proposed relationships could be reversed, e.g. performance influences collaboration and/or interaction, or that the proposed relationships could be two-way. As it currently stands, the reviewed literature and empirical findings suggest that the significant relationships specified in this study might be causal. Alternative methodologies like cases studies and experiments need to be pursued to establish causality. In particular, it is recommended that longitudinal studies be pursued as a way to best investigate causal relationships.

Even with limitations, the research has shown that various structural variables have an impact on integration and performance and that integration variables, specifically collaboration, have an impact on performance. Because this study is a first step in the investigation process, research needs to continue to examine these relationships. It is hoped that this dissertation can inspire a long, fruitful stream of research in the research area of interdepartmental relations.

## ADDITIONAL FUTURE RESEARCH OPPORTUNITIES

This dissertation serves as an initial step toward developing a theory base on interdepartmental integration. Most literature addressing this research area has been normative, thereby demanding continued empirical work. Such research also is needed to explain the relationships between structural variables (and other possible variables) and integration and explain integration's relationship with performance. By doing so, greater insight may be achieved concerning marketing's integration with other departments and what sustains such integration. While this dissertation has highlighted marketing, manufacturing, and R&D, future research should consider marketing's relationships with other departments, including purchasing, accounting, finance, and distribution/logistics. Research also might consider taking a triadic approach to interdepartmental integration. Such analysis will offer better insight into simultaneous management of several departments, thereby contributing to the development of programs that facilitate interdepartmental relationships throughout companies, not just across two departments.

Research should also closely examine the issue of environment and its effect on interdepartmental collaboration. In particular, future research should examine two types of internal environment: the



organizational culture of the company and the mandates of upper management. While both of these are similar, organizational culture concerns the norms of behavior that characterize the organization (Schwartz and Davis 1981) -- for example, an "innovative" company culture would encourage departments (personnel) to be risk-taking, and thus, have a favorable impact on interdepartmental integration. Upper management mandates concern orders from management that direct the organization to perform activities that may or may not align with the organization culture -- upper management mandates that require departments to work together, irrespective of how departments currently get along and irrespective of the existing organizational culture, would have an effect on interdepartmental integration. Future research is needed to examine the nature of the effects from organizational culture and upper management mandates.

Another issue to consider is the possible effects of market orientation. It is observed that marketing managers supported a greater number of hypotheses than manufacturing and R&D managers. It is possible that this result was random or that this dissertation was biased towards marketing managers because it was founded in the marketing discipline. However, a third and very interesting explanation may be that marketing managers in pursuing a

market orientation will be more interdepartmental than other departments. As suggested by Narver and Slater (1990), interdepartmental coordination is a critical component of a market orientation. In this study, marketing managers reflected the highest value for marketing goals, which should correspond to a market orientation. Future research should investigate this issue of why marketing managers in this study reflected a greater number of significant relationships. If due to market orientation, such future research will provide valuable implications for manifesting a market orientation across departments.

Because interaction and collaboration are complex processes subsumed within integration, it is also expected that moderating effects and interaction effects will be present among the antecedents of interaction and collaboration. Such effects among the constructs studied in this dissertation should be included in future research endeavors.

#### **FINAL NOTE**

Overall, there is a pressing need to gain insight into the variables that influence these integration processes in light of the current focus on horizontal management and the use of team-oriented approaches to product development and product management, (cf. Business Week, December 20, 1993).

If problems persist during today's cross-departmental activities, future efforts forcing departments to work more closely together will only serve to generate more frustration for all departments involved. It is therefore imperative that the marketing discipline understand interdepartmental relations to meet the challenges of working across departments.

The most important finding of this dissertation is the importance of collaboration to performance. As revealed, collaboration has a significant, direct, positive effect on performance success. If marketing is to become truly integrated with other departments, collaboration therefore is the key - not forced communication through frequent meetings or documented information exchange. Consequently, companies need to pursue ways of instilling collaboration across departments. Two possibilities are joint strategic planning to develop cooperative goals and work analysis to comprehend existing interdependencies.

This study emphasizes that those companies which can facilitate collaboration will experience greater performance success. Not only will this improve attitudes, but it will improve performance and increase the bottom line. In sum, integration via collaboration is how companies can survive.

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## APPENDIX I

### SURVEY MEASURES

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Three versions of questionnaires were used: one for marketing managers, one for manufacturing managers, and one for R&D managers. The only difference between the three versions was the interchanging of the words "marketing," "manufacturing," and "R&D" where appropriate.  
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## DEPARTMENT STRUCTURE

### **Centralization**

Circle the appropriate response that identifies the degree to which the following is true about your department  
[1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

- Little action is taken until a manager approves a decision.
- Individuals are discouraged from making their own decisions.
- All matters have to be referred to managers for a final answer.
- Any decision has to have a manager's approval.

### **Formalization**

Circle the appropriate response that identifies the degree to which the following is true about your department  
[1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

- Following policies, rules, and regulations is stressed in my department.
- There are specific procedures to deal with most situations that arise in my department.
- Going through the proper channels is constantly stressed.
- There is a historical record of everyone's job performance.
- Everyone knows specifically what they should be doing.
- Problems are resolved in a specific, systematic manner.

### **Specialization**

Circle the appropriate response that identifies the degree to which the following is true about your department  
[1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

- Everyone in my department is responsible for a wide range of tasks.
- Employees are assigned to unique activities in my department.
- Everyone here is considered an expert in their own area.

### **Size**

- Number of full-time employees in your department

## TASK STRUCTURE

### **Routineness**

Circle the appropriate response that identify the degree to which the following is true about your department  
[1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

- Everyone here does the same job in the same way every day.
- One thing people like around here is the variety of work.  
[Reversed]
- Most jobs have something new happening everyday.  
[Reversed]
- Much of the activity in my department can be considered routine.

### **Interdependence**

For the other two departments to accomplish their goals and responsibilities, how much do they need your department's  
[5 point scale ranging from "1-small extent" to "5-great extent"]

- Resources (e.g. \$, personnel, equipment, info) .
- Support (e.g. advice or technical assistance)
- Outputs (e.g. customer data, new technologies, manufactured product)

For your department to accomplish its goals and responsibilities, how much do it needs the other two departments' [5 point scale ranging from "1-small extent" to "5-great extent"]

- Resources (e.g. \$, personnel, equipment, info)
- Support (e.g. advice or technical assistance)
- Outputs (e.g. customer data, new technologies, manufactured product)

NOTE: Each questionnaire asked two questions about the respective department's interdependence with the other two departments.

OCCUPATIONAL ORIENTATION

**Interpersonal Orientation**

Below are pairs of words which are opposite in meaning. You are asked to describe the person in your department with whom you can work least well. He or she does not have to be the person you like least, but should be the person with whom you've had the most difficulty in getting a job done. Look at the words at both ends of each line before you circle your response. Do not omit any items. Mark each item only once.

|               |   |   |   |   |   |               |
|---------------|---|---|---|---|---|---------------|
| pleasant      | 1 | 2 | 3 | 4 | 5 | unpleasant    |
| friendly      | 1 | 2 | 3 | 4 | 5 | unfriendly    |
| rejecting     | 1 | 2 | 3 | 4 | 5 | accepting     |
| tense         | 1 | 2 | 3 | 4 | 5 | relaxed       |
| distant       | 1 | 2 | 3 | 4 | 5 | close         |
| cold          | 1 | 2 | 3 | 4 | 5 | warm          |
| supportive    | 1 | 2 | 3 | 4 | 5 | hostile       |
| boring        | 1 | 2 | 3 | 4 | 5 | interesting   |
| quarrelsome   | 1 | 2 | 3 | 4 | 5 | harmonious    |
| gloomy        | 1 | 2 | 3 | 4 | 5 | cheerful      |
| open          | 1 | 2 | 3 | 4 | 5 | guarded       |
| backbiting    | 1 | 2 | 3 | 4 | 5 | loyal         |
| untrustworthy | 1 | 2 | 3 | 4 | 5 | trustworthy   |
| considerate   | 1 | 2 | 3 | 4 | 5 | inconsiderate |
| nasty         | 1 | 2 | 3 | 4 | 5 | nice          |
| agreeable     | 1 | 2 | 3 | 4 | 5 | disagreeable  |
| insincere     | 1 | 2 | 3 | 4 | 5 | sincere       |
| kind          | 1 | 2 | 3 | 4 | 5 | unkind        |

**Time Orientation**

What percent of your department's time is spent working on matters which will directly impact your company within each of the indicated. Your answers should total 100%.

- a) less than 1 week \_\_\_\_\_
  - b) 1 week to 1 month \_\_\_\_\_
  - c) 1 month to 1 quarter \_\_\_\_\_
  - d) 1 quarter to 1 year \_\_\_\_\_
  - e) 1 year to 5 years \_\_\_\_\_
  - f) over 5 years \_\_\_\_\_
- 100%

## Task Orientation

In evaluating and considering the potential of a new product, there are many considerations that will concern different departments. While all of those below are new product concerns, which are most important to your department? Place a "1" by the three criteria that are the biggest concerns to your department. Place a "2" by the next three criteria that are the second biggest concerns to your department.

- \_\_\_\_\_ Manufacturing costs
- \_\_\_\_\_ Technical processing problems
- \_\_\_\_\_ Contribution to scientific knowledge
- \_\_\_\_\_ Equipment requirements
- \_\_\_\_\_ Impact on other product lines
- \_\_\_\_\_ Product/service quality
- \_\_\_\_\_ Maintenance schedules
- \_\_\_\_\_ Profit
- \_\_\_\_\_ Potential for patent and/or scientific publication
- \_\_\_\_\_ Competitors' responses
- \_\_\_\_\_ Customer Satisfaction
- \_\_\_\_\_ Sales potential
- \_\_\_\_\_ Personnel requirements
- \_\_\_\_\_ Procurement of raw materials
- \_\_\_\_\_ Distribution through existing channels
- \_\_\_\_\_ Market Share
- \_\_\_\_\_ Return on investment
- \_\_\_\_\_ Other (Please specify \_\_\_\_\_)

**GOALS**

**Cooperative Goals**

Circle the appropriate response that best describes the relationships between the goals of your department and those goals of the other two departments. Use the following definitions:

Competitive Goals - a department's goal attainment interferes with/makes less likely goal attainment of another department

Independent Goals - a department's goal attainment neither helps or interferes with goal attainment of another department.

Cooperative Goals - a department's goal attainment helps another department reach its goals

The goals of your department and...                      are...

|              |   |  |
|--------------|---|--|
| Department A | Very Competitive<br>Independent<br>Very Cooperative | Somewhat Competitive<br>Somewhat Cooperative |
| Department B | Very Competitive<br>Independent<br>Very Cooperative | Somewhat Competitive<br>Somewhat Cooperative |

**TECHNOLOGY**

**Production Process Technology**

Circle the response that identifies the type of production process that your company/division primarily uses:

1-Job Shop, 2-Small Batch Flow, 3-Large Batch Flow,  
4-Assembly Line, 5-Continuous Flow,  
6-Other (Please specify \_\_\_\_\_)

Approximately how many product lines can your primary production process readily produce? \_\_\_\_\_

## **Conflict Resolution Mechanisms**

During the past three months when disagreements or disputes arose between your department and the other department (specified one of the other two departments), circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. [Usage: N-Never, S-Seldom, OCC-Occasionally, O-Often, A-Almost Always; Effectiveness: NE-Not Effective at All, SE-Somewhat Effective, VE-Very Effective]  
(Final Scale = Usage X Effectiveness)

- Ignoring or avoiding the issue
- Smoothing over the issues
- Bringing the issues out in the open and working them out among the parties involved
- Having upper management resolve the issue between the parties involved

NOTE: Each questionnaire asked two questions about the respective department's conflict resolution with the other two departments.

## **Computer and Telecommunication Systems**

Circle the appropriate response to describe your departments usage and the effectiveness of the following information technologies. [Usage: N-Never, S-Seldom, OCC-Occasionally, O-Often, QF-Quite Frequently; Effectiveness: NE-Not Effective at All, SE-Somewhat Effective, VE-Very Effective]  
(Final Scale = Usage X Effectiveness)

- Computers in general
- Computer-Aided-Design
- Computer databases
- Computer Spreadsheets
- Word Processing
- Electronic Mail
- Phone Mail
- Conference Calling
- Teleconferencing

ENVIRONMENTAL CONDITIONS

**Certainty of Information**

Circle the appropriate response that identify the degree to which the following are true about your department [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

- My department can get the information it needs to make decisions.
- My department can get reliable information to help with decision-making.
- My department has easy access to credible information.
- The information my department obtains allows for confident decisions.

**Turbulence**

Circle the appropriate response that identifies the degree to which the following are true about your company's primary markets [1-definitely false, 2-more false, 3-sometimes false /sometimes true, 4-more true, 5-definitely true]

- The overall customer base is stable. [Reversed]
- The majority of markets are turbulent.
- My company does not have much competition.
- Market demand can be forecasted accurately.
- My company contends with a high rate of technological change.

STATUS

**Status**

Circle the appropriate response that identifies the degree of status that your department has in relation to the other two departments.

| <u>Compared to...</u> | <u>Your department has...</u> |                      |
|-----------------------|-------------------------------|----------------------|
| Department A          | Much Less Status              | Somewhat Less Status |
|                       | Equal Status                  | Somewhat More Status |
|                       | Much More Status              |                      |
| Department B          | Much Less Status              | Somewhat Less Status |
|                       | Equal Status                  | Somewhat More Status |
|                       | Much More Status              |                      |

## INTERACTION

### **Interaction**

During the past 3 months, to what degree did your department interact with the other two departments in regards to the below activities. [N-Never, S-Seldom, OCC-Occasionally, O-Often, QF-Quite Frequently]

- Meetings
- Committees/Task Forces
- Teleconferencing
- Phone Conversations
- Phone Mail
- Conference Calls
- Electronic Mail
- Exchange of forms
- Exchange of reports
- Exchange of memorandums
- Exchange of FAX materials

NOTE: Each questionnaire asked two questions about the respective department's collaboration with the other two departments.

## COLLABORATION

### **Collaboration**

During the past 3 months, to what degree did your department pursue the following activities with the other two departments. [N-Never, S-Seldom, OCC-Occasionally, O-Often, QF-Quite Frequently]

- Achieve goals collectively
- Have a mutual understanding
- Informally work together
- Share ideas, information, and/or resources
- Share the same vision for the company
- Work together as a team

NOTE: Each questionnaire asked two questions about the respective department's collaboration with the other two departments.



PERFORMANCE

- Department Performance
- Company Performance
- Product Development Performance
- Product Management Performance

Considering your company's (division's) overall business activity in the past year, please grade the following on a scale of 0% to 100%, with 100% meaning perfect performance.

- Your department's overall performance \_\_\_\_\_
- Your company's/division's overall performance \_\_\_\_\_
- Your company's/division's performance in product development \_\_\_\_\_
- Your company's/division's performance in product management \_\_\_\_\_

**Sales Per Employee**

Approximately what is the Annual Sales in US Dollars of your company/division? \_\_\_\_\_

Approximately what is the number of employees for your company/division? \_\_\_\_\_

**Satisfaction**

Circle the appropriate response that identifies the degree of your satisfaction with your department's relationship with the other two departments.

- |              |                                    |
|--------------|------------------------------------|
| Department A | Very Dissatisfied                  |
|              | Dissatisfied                       |
|              | Neither Dissatisfied Nor Satisfied |
|              | Satisfied                          |
|              | Very Satisfied                     |
| Department B | Very Dissatisfied                  |
|              | Dissatisfied                       |
|              | Neither Dissatisfied Nor Satisfied |
|              | Satisfied                          |
|              | Very Satisfied                     |

## Market Position

Check the appropriate response that describes your company's/division's current market position.

- Leader for the market, i.e., dominant position
- Definite edge over competitors, but not dominant
- Unique position due to a market niche
- Slight difficulty in gaining/retaining market share
- Unstable/Weak position

APPENDIX II

COVER LETTERS AND QUESTIONNAIRES USED IN THE STUDY

COVER LETTERS AND QUESTIONNAIRES SENT TO  
MARKETING MANAGERS

703-231-6949  
703-552-1741 (FAX)

August 6, 1993

Dear Marketing/Sales Executive:

The enclosed questionnaire is part of my doctoral dissertation research on how to facilitate and manage interdepartmental relationships, specifically those relationships between marketing, manufacturing, and research and development (R&D). I would appreciate your filling out this questionnaire, giving honest opinions about your marketing department and the relationships your marketing department maintains with the manufacturing and/or R&D sectors of your company.

The questionnaire is designed to be completed in less than 20 minutes, with most questions requiring you only to circle the appropriate response. When you have completed the questionnaire, please place it in the enclosed self-addressed, stamped envelope and return it to me.

Your responses will be confidential. Neither your company nor you will be identified; only aggregate data will be analyzed and reported. If you would like a copy of the findings of this study, please include your business card with the questionnaire. I will separate business cards from questionnaires as they are returned so that all responses remain confidential. When all returns are in and the data have been analyzed, I will send copies of my findings to those respondents who have requested them.

It is vital to my research that I receive your response. Please take a few minutes to complete and return the enclosed questionnaire. I greatly appreciate your help.

Sincerely yours,

Kenneth B. Kahn  
Virginia Tech Ph.D. Candidate

enclosures

September 17, 1993

Dear Marketing/Sales Executive:

In August, I sent you a questionnaire as part of my doctoral dissertation research on how to facilitate and manage the relationships between marketing, manufacturing, and research and development (R&D). Due to the type of analysis that I am doing, a large response rate is required. Thus, it is vital to my research that I receive your input. If you have already completed a copy of the questionnaire, please disregard this letter and thank you for your help.

If you have not yet completed the questionnaire, please take several minutes to complete it today. For your convenience, an extra copy of the questionnaire is enclosed along with a self-addressed, stamped envelope for returning the completed questionnaire to me.

Let me remind you that your response will be confidential. Neither your company nor you will be identified. Only aggregate data will be analyzed and reported.

If you would like to receive a copy of my findings, please include your business card with the completed questionnaire. I will separate them when the envelope is opened so that your response will remain confidential.

Once again, thank you for your help.

Sincerely yours,

Kenneth B. Kahn  
Ph.D. Candidate

enclosures

## MARKETING/SALES DEPARTMENT SURVEY

**Instructions:** The following questionnaire concerns the marketing (marketing/sales) department/function and its interrelationships with manufacturing (manufacturing/operations) and R&D (R&D/engineering). Please provide your honest opinion when answering each question. Thank you for your time filling out this survey.

1. ***For manufacturing and R&D to accomplish their goals and responsibilities***, how much do they need your marketing department's:

|  | <u>MANUFACTURING NEEDS...</u> |   |   |   |                     | <u>R&amp;D NEEDS...</u> |   |   |   |                     |
|--|-------------------------------|---|---|---|---------------------|-------------------------|---|---|---|---------------------|
|  | <u>Small Extent</u>           |   |   |   | <u>Great Extent</u> | <u>Small Extent</u>     |   |   |   | <u>Great Extent</u> |
| <i>Resources (e.g. \$, personnel, equipment, info)</i> | 1                             | 2 | 3 | 4 | 5                   | 1                       | 2 | 3 | 4 | 5                   |
| <i>Support (e.g. advice or technical assistance)</i>   | 1                             | 2 | 3 | 4 | 5                   | 1                       | 2 | 3 | 4 | 5                   |
| <i>Outputs (e.g. customer data)</i>                    | 1                             | 2 | 3 | 4 | 5                   | 1                       | 2 | 3 | 4 | 5                   |

2. ***For your marketing department to accomplish its goals and responsibilities***, how much does it need manufacturing's and R&D's:

|  | <u>DEPEND ON MANUFACTURING FOR...</u> |   |   |   |                     | <u>DEPEND ON R&amp;D FOR...</u> |   |   |   |                     |
|--|---------------------------------------|---|---|---|---------------------|---------------------------------|---|---|---|---------------------|
|  | <u>Small Extent</u>                   |   |   |   | <u>Great Extent</u> | <u>Small Extent</u>             |   |   |   | <u>Great Extent</u> |
| <i>Resources (e.g. \$, personnel, equipment, info)</i> | 1                                     | 2 | 3 | 4 | 5                   | 1                               | 2 | 3 | 4 | 5                   |
| <i>Support (e.g. advice or technical assistance)</i>   | 1                                     | 2 | 3 | 4 | 5                   | 1                               | 2 | 3 | 4 | 5                   |
| <i>Outputs (e.g. product, technology)</i>              | 1                                     | 2 | 3 | 4 | 5                   | 1                               | 2 | 3 | 4 | 5                   |

3. Circle the appropriate response that identifies the degree of status that your marketing department has in relation to manufacturing and R&D departments.

| <u>Compared to...</u> | <u>Marketing has....</u> |                         |                 |                         |                     |
|-----------------------|--------------------------|-------------------------|-----------------|-------------------------|---------------------|
| <i>Manufacturing</i>  | MUCH LESS<br>STATUS      | SOMEWHAT<br>LESS STATUS | EQUAL<br>STATUS | SOMEWHAT<br>MORE STATUS | MUCH MORE<br>STATUS |
| <i>R&amp;D</i>        | MUCH LESS<br>STATUS      | SOMEWHAT<br>LESS STATUS | EQUAL<br>STATUS | SOMEWHAT<br>MORE STATUS | MUCH MORE<br>STATUS |

4. Circle the appropriate response that best describes the relationships between the goals of your marketing department and those goals of manufacturing and R&D departments. Use the following definitions:

**COMPETITIVE GOALS:** a department's goal attainment interferes with/makes less likely goal attainment of another department.

**INDEPENDENT GOALS:** a department's goal attainment neither helps or interferes with goal attainment of another department.

**COOPERATIVE GOALS:** a department's goal attainment helps another department reach its goals.

| <u>The goals of marketing and...</u> | <u>are...</u>       |                         |             |                         |                     |
|--------------------------------------|---------------------|-------------------------|-------------|-------------------------|---------------------|
| <i>Manufacturing</i>                 | VERY<br>COMPETITIVE | SOMEWHAT<br>COMPETITIVE | INDEPENDENT | SOMEWHAT<br>COOPERATIVE | VERY<br>COOPERATIVE |
| <i>R&amp;D</i>                       | VERY<br>COMPETITIVE | SOMEWHAT<br>COMPETITIVE | INDEPENDENT | SOMEWHAT<br>COOPERATIVE | VERY<br>COOPERATIVE |

5. Circle the appropriate response that identifies the degree of your satisfaction with your marketing department's relationships with manufacturing and R&D departments.

|                      |                      |              |                                       |           |                   |
|----------------------|----------------------|--------------|---------------------------------------|-----------|-------------------|
| <i>Manufacturing</i> | VERY<br>DISSATISFIED | DISSATISFIED | NEITHER DISSATISFIED<br>NOR SATISFIED | SATISFIED | VERY<br>SATISFIED |
| <i>R&amp;D</i>       | VERY<br>DISSATISFIED | DISSATISFIED | NEITHER DISSATISFIED<br>NOR SATISFIED | SATISFIED | VERY<br>SATISFIED |

6. Circle the appropriate response that identifies the degree to which the following is true about your marketing department. Use the following scale:

|   | DF<br>Definitely False | MF<br>Mostly False | SFST<br>Sometimes False/Sometimes True | MT<br>Mostly True | DT<br>Definitely True |      |    |    |
|---|------------------------|--------------------|--|-------------------|-----------------------|------|----|----|
| Following policies, rules, and regulations is stressed in my department.                |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| My department can get the information it needs to make decisions.                       |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Everyone in my department does the same job in the same way every day.                  |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Little action is taken until a manager approves a decision.                             |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| My department can get reliable information to help with decision-making.                |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Everyone in my department is responsible for a wide range of tasks.                     |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| There are specific procedures to deal with most situations that arise in my department. |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| One thing people like around here is the variety of work.                               |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Employees are assigned to unique activities in my department.                           |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Individuals are discouraged from making their own decisions.                            |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Going through the proper channels is constantly stressed.                               |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| All matters have to be referred to managers for a final answer.                         |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| My department has easy access to credible information.                                  |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Most jobs have something new happening everyday.  |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| There is a historical record of everyone's job performance.                             |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Everyone knows specifically what they should be doing.                                  |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Any decision and/or activity has to have a manager's approval.                          |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Much of the activity in my department can be considered routine.                        |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| The information my department obtains allows for confident decisions.                   |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Everyone here is considered an expert in their own area.                                |                        |                    |  | DF                | MF                    | SFST | MT | DT |
| Problems are resolved in a specific, systematic manner.                                 |                        |                    |  | DF                | MF                    | SFST | MT | DT |

7. Circle the appropriate response that identifies the degree to which the following is true about your company's primary markets. Use the following scale:

|   | DF<br>Definitely False | MF<br>Mostly False | SFST<br>Sometimes False/Sometimes True | MT<br>Mostly True | DT<br>Definitely True |    |    |
|---|------------------------|--------------------|--|-------------------|-----------------------|----|----|
| The overall customer base is stable.                          |                        |                    | DF                                     | MF                | SFST                  | MT | DT |
| The majority of markets are turbulent.                        |                        |                    | DF                                     | MF                | SFST                  | MT | DT |
| My company does not have much competition.                    |                        |                    | DF                                     | MF                | SFST                  | MT | DT |
| Market demand can be forecasted accurately.                   |                        |                    | DF                                     | MF                | SFST                  | MT | DT |
| My company contends with a high rate of technological change. |                        |                    | DF                                     | MF                | SFST                  | MT | DT |



8. Below are pairs of words which are opposite in meaning. You are asked to describe *the person in your marketing department with whom you can work least well*. He or she does not have to be the person you like least, but should be the person with whom you have had the most difficulty in getting a job done. Look at the words at both ends of each line before you circle your response. Do not omit any items. Mark each item only once.

|               |   |   |   |   |   |   |   |   |               |
|---------------|---|---|---|---|---|---|---|---|---------------|
| Pleasant      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unpleasant    |
| Friendly      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unfriendly    |
| Rejecting     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Accepting     |
| Tense         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Relaxed       |
| Distant       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Close         |
| Cold          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Warm          |
| Supportive    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Hostile       |
| Boring        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Interesting   |
| Quarrelsome   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Harmonious    |
| Gloomy        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Cheerful      |
| Open          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Guarded       |
| Backbiting    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Loyal         |
| Untrustworthy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Trustworthy   |
| Considerate   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Inconsiderate |
| Nasty         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Nice          |
| Agreeable     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Disagreeable  |
| Insincere     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Sincere       |
| Kind          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unkind        |

9. In evaluating and considering the potential of a new product, there are many considerations that will concern different departments. While all the items below are new product concerns, which are most important to your marketing department? Place a "1" by the three criteria of biggest concern to your marketing department. Place a "2" by the next three criteria that are of second biggest concern to your marketing department. In total, three concerns should be designated as "1" and three concerns as "2."

- |  |   |
|--|---|
| <input type="checkbox"/> Manufacturing costs                                 | <input type="checkbox"/> Competitors' responses                 |
| <input type="checkbox"/> Technical processing problems                       | <input type="checkbox"/> Customer Satisfaction                  |
| <input type="checkbox"/> Contribution to scientific knowledge                | <input type="checkbox"/> Sales potential                        |
| <input type="checkbox"/> Equipment requirements                              | <input type="checkbox"/> Personnel requirements                 |
| <input type="checkbox"/> Impact on other product lines                       | <input type="checkbox"/> Procurement of raw materials           |
| <input type="checkbox"/> Product/Service Quality                             | <input type="checkbox"/> Distribution through existing channels |
| <input type="checkbox"/> Maintenance schedules                               | <input type="checkbox"/> Market Share                           |
| <input type="checkbox"/> Profit  | <input type="checkbox"/> Return on investment                   |
| <input type="checkbox"/> Potential for patents and/or scientific publication | <input type="checkbox"/> Other (Please specify _____)           |

10. What percent of your marketing department's time is spent working on matters which will directly impact your company within each of the periods indicated. Your answers should total 100%.

- |                               |                              |
|-------------------------------|------------------------------|
| a) less than 1 week _____     | b) 1 quarter to 1 year _____ |
| b) 1 week to 1 month _____    | d) 1 year to 5 years _____   |
| c) 1 month to 1 quarter _____ | e) over 5 years _____        |

11. In the past three months when disagreements or disputes arose between your **MARKETING DEPARTMENT** and the **MANUFACTURING DEPARTMENT**, circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. Use the following scales:

|   | USAGE:                  |          | OCC-OCCASIONALLY      |   |   | O-OFTEN           | A-ALMOST ALWAYS      |    |    |
|---|-------------------------|----------|-----------------------|---|---|-------------------|----------------------|----|----|
|   | N-NEVER                 | S-SELDOM |                       |   |   |                   |                      |    |    |
| EFFECTIVENESS:  | NE-NOT EFFECTIVE AT ALL |          | SE-SOMEWHAT EFFECTIVE |   |   | VE-VERY EFFECTIVE |                      |    |    |
|   |                         |          | <u>USAGE</u>          |   |   |                   | <u>EFFECTIVENESS</u> |    |    |
|   |                         |          | OCC                   | O | A |                   | NE                   | SE | VE |
| Ignoring or avoiding the issues   | N                       | S        |                       |   |   |                   |                      |    |    |
| Smoothing over the issues   | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |
| Bringing the issues out in the open and working them out among the parties involved | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |
| Having upper management resolve the issue between the parties involved              | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |
| Other (specify _____ )  | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |

12. In the past three months when disagreements or disputes arose between your **MARKETING DEPARTMENT** and the **R & D DEPARTMENT**, circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. Use the following scales:

|   | USAGE:                  |          | OCC-OCCASIONALLY      |   |   | O-OFTEN           | A-ALMOST ALWAYS      |    |    |
|---|-------------------------|----------|-----------------------|---|---|-------------------|----------------------|----|----|
|   | N-NEVER                 | S-SELDOM |                       |   |   |                   |                      |    |    |
| EFFECTIVENESS:  | NE-NOT EFFECTIVE AT ALL |          | SE-SOMEWHAT EFFECTIVE |   |   | VE-VERY EFFECTIVE |                      |    |    |
|   |                         |          | <u>USAGE</u>          |   |   |                   | <u>EFFECTIVENESS</u> |    |    |
|   |                         |          | OCC                   | O | A |                   | NE                   | SE | VE |
| Ignoring or avoiding the issues   | N                       | S        |                       |   |   |                   |                      |    |    |
| Smoothing over the issues   | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |
| Bringing the issues out in the open and working them out among the parties involved | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |
| Having upper management resolve the issue between the parties involved              | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |
| Other (specify _____ )  | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |

13. Circle the appropriate response to describe your marketing department's usage and the effectiveness of the following information technologies. Use the following scales:

|                       | USAGE:            |          | OCC-OCCASIONALLY |   |    | O-OFTEN               | QF-QUITE FREQUENTLY  |    |                   |    |
|-----------------------|-------------------|----------|------------------|---|----|-----------------------|----------------------|----|-------------------|----|
|                       | N-NEVER           | S-SELDOM |                  |   |    |                       |                      |    |                   |    |
| EFFECTIVENESS:        | NA-NOT APPLICABLE |          | NE-NOT EFFECTIVE |   |    | SE-SOMEWHAT EFFECTIVE |                      |    | VE-VERY EFFECTIVE |    |
|                       |                   |          | <u>USAGE</u>     |   |    |                       | <u>EFFECTIVENESS</u> |    |                   |    |
|                       |                   |          | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Computers in general  | N                 | S        |                  |   |    |                       | N/A                  |    |                   |    |
| Computer-Aided-Design | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Computer Databases    | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Computer Spreadsheets | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Electronic Mail       | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Phone Mail            | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Conference Calling    | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Teleconferencing      | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Word Processing       | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |

14. During the past 3 months, to what degree did your marketing department interact with manufacturing and R&D departments in regards to the below activities. Use this scale:

|                           | N-NEVER | S-SELDOM | OCC-OCCASIONALLY     | O-OFTEN | QF-QUITE FREQUENTLY |
|---------------------------|---------|----------|----------------------|---------|---------------------|
|                           |         |          | <u>MANUFACTURING</u> |         |                     |
| Meetings                  | N       | S        | OCC                  | O       | QF                  |
| Committees/Task Forces    | N       | S        | OCC                  | O       | QF                  |
| Teleconferencing          | N       | S        | OCC                  | O       | QF                  |
| Phone Conversations       | N       | S        | OCC                  | O       | QF                  |
| Phone Mail                | N       | S        | OCC                  | O       | QF                  |
| Conference Calls          | N       | S        | OCC                  | O       | QF                  |
| Exchange of Forms         | N       | S        | OCC                  | O       | QF                  |
| Exchange of Reports       | N       | S        | OCC                  | O       | QF                  |
| Exchange of Memorandums   | N       | S        | OCC                  | O       | QF                  |
| Exchange of FAX materials | N       | S        | OCC                  | O       | QF                  |
| Electronic mail           | N       | S        | OCC                  | O       | QF                  |
| Other (specify _____)     | N       | S        | OCC                  | O       | QF                  |

15. Please check the item most appropriate for your marketing department's situation:

- My department interacts more with manufacturing than with R&D.
- My department interacts more with R&D than with manufacturing.
- My department interacts equally with manufacturing and R&D.
- My department does not interact with manufacturing or R&D.

16. During the past 3 months, to what degree did your marketing department pursue the following activities with manufacturing and R&D departments. Use this scale:

|  | N-NEVER | S-SELDOM | OCC-OCCASIONALLY     | O-OFTEN | QF-QUITE FREQUENTLY |
|--|---------|----------|----------------------|---------|---------------------|
|  |         |          | <u>MANUFACTURING</u> |         |                     |
| Achieve goals collectively                 | N       | S        | OCC                  | O       | QF                  |
| Have a mutual understanding                | N       | S        | OCC                  | O       | QF                  |
| Informally work together                   | N       | S        | OCC                  | O       | QF                  |
| Share ideas, information, and/or resources | N       | S        | OCC                  | O       | QF                  |
| Share the same vision for the company      | N       | S        | OCC                  | O       | QF                  |
| Work together as a team                    | N       | S        | OCC                  | O       | QF                  |

17. Please check the item most appropriate for your marketing department's situation:

- My department has a better relationship with manufacturing than with R&D.
- My department has a better relationship with R&D than with manufacturing.
- My department has good relationships with both manufacturing and R&D.
- My department does not have good relationships with manufacturing or R&D.

18. Approximately how many full-time employees are in the marketing department? \_\_\_\_\_

19. How would you describe the size of the marketing department?    SMALL            MEDIUM            LARGE            VERY LARGE

20. Considering your company's (division's) overall business activity in the past year, please grade each of the following areas on a scale of 0% to 100%, with 100% meaning perfect performance:

Your MARKETING DEPARTMENT'S OVERALL PERFORMANCE? \_\_\_\_\_

Your COMPANY'S/DIVISION'S OVERALL PERFORMANCE? \_\_\_\_\_

Your COMPANY'S/DIVISION'S PERFORMANCE IN PRODUCT DEVELOPMENT? \_\_\_\_\_

Your COMPANY'S/DIVISION'S PERFORMANCE IN PRODUCT MANAGEMENT? \_\_\_\_\_

21. Circle the response that identifies the type of production process that your company/division *primarily* uses:

JOB SHOP      SMALL BATCH FLOW      LARGE BATCH FLOW      ASSEMBLY LINE      CONTINUOUS      OTHER (Specify \_\_\_\_\_)

22. Approximately how many product lines can your primary production process readily produce? \_\_\_\_\_

23. In what state and country (if not United States) is the *primary marketing office* located? \_\_\_\_\_

24. Is the *primary manufacturing office* for this company/division located in the same building as the primary marketing office?  
YES      NO

If no, how many miles away is the primary manufacturing office? \_\_\_\_\_

25. Is the *primary R&D office* for this company/division located in the same building as the primary marketing office? YES NO

If no, how many miles away is the primary R&D office? \_\_\_\_\_

26. Is this company/division a foreign subsidiary?      YES      NO      If yes, what country? \_\_\_\_\_

27. Approximately what is the Annual Sales in US Dollars of your company/division? \_\_\_\_\_

28. Approximately what is the number of employees for your company/division? \_\_\_\_\_

29. Circle the appropriate response for what your company/division primarily provides:

Consumer Products      Consumer Services      Industrial Products      Industrial Services

30. Check the appropriate response that best describes your company's/division's current market position?

\_\_\_ Leader for the market, i.e., dominant position      \_\_\_ Definite edge over competitors, but not dominant  
\_\_\_ Unique position due to a market niche      \_\_\_ Slight difficulty in gaining/retaining market share  
\_\_\_ Unstable/Weak position

Thank you for your time and cooperation.  
If you have any comments you wish to make, please write them on the back of this questionnaire.

**COVER LETTERS AND QUESTIONNAIRES SENT TO  
MANUFACTURING MANAGERS**

703-231-6949  
703-552-1741 (FAX)

August 6, 1993

Dear Manufacturing/Operations Executive:

The enclosed questionnaire is part of my doctoral dissertation research on how to facilitate and manage interdepartmental relationships, specifically those relationships between marketing, manufacturing, and research and development (R&D). I would appreciate your filling out this questionnaire, giving honest opinions about your manufacturing department and the relationships your manufacturing department maintains with the marketing and/or R&D sectors of your company.

The questionnaire is designed to be completed in less than 20 minutes, with most questions requiring you only to circle the appropriate response. When you have completed the questionnaire, please place it in the enclosed self-addressed, stamped envelope and return it to me.

Your responses will be confidential. Neither your company nor you will be identified; only aggregate data will be analyzed and reported. If you would like a copy of the findings of this study, please include your business card with the questionnaire. I will separate business cards from questionnaires as they are returned so that all responses remain confidential. When all returns are in and the data have been analyzed, I will send copies of my findings to those respondents who have requested them.

It is vital to my research that I receive your response. Please take a few minutes to complete and return the enclosed questionnaire. I greatly appreciate your help.

Sincerely yours,

Kenneth B. Kahn  
Virginia Tech Ph.D. Candidate

enclosures

September 17, 1993

Dear Manufacturing/Operations Executive:

In August, I sent you a questionnaire as part of my doctoral dissertation research on how to facilitate and manage the relationships between manufacturing, marketing, and research and development (R&D). Due to the type of analysis that I am doing, a large response rate is required. Thus, it is vital to my research that I receive your input. If you have already completed a copy of the questionnaire, please disregard this letter and thank you for your help.

If you have not yet completed the questionnaire, please take several minutes to complete it today. For your convenience, an extra copy of the questionnaire is enclosed along with a self-addressed, stamped envelope for returning the completed questionnaire to me.

Let me remind you that your response will be confidential. Neither your company nor you will be identified. Only aggregate data will be analyzed and reported.

If you would like to receive a copy of my findings, please include your business card with the completed questionnaire. I will separate them when the envelope is opened so that your response will remain confidential.

Once again, thank you for your help.

Sincerely yours,

Kenneth B. Kahn  
Ph.D. Candidate

enclosures

**MANUFACTURING/OPERATIONS DEPARTMENT SURVEY**

**Instructions:** The following questionnaire concerns the manufacturing (manufacturing/operations) department/function and its interrelationships with marketing (marketing/sales) and R&D (R&D/engineering). Please provide your honest opinion when answering each question. Thank you for your time filling out this survey.

1. **For marketing and R&D to accomplish their goals and responsibilities**, how much do they need your manufacturing department's:

|  | <u>MARKETING NEEDS...</u> |   |   |   |                     | <u>R&amp;D NEEDS...</u> |   |   |   |                     |
|--|---------------------------|---|---|---|---------------------|-------------------------|---|---|---|---------------------|
|  | <u>Small Extent</u>       |   |   |   | <u>Great Extent</u> | <u>Small Extent</u>     |   |   |   | <u>Great Extent</u> |
| <i>Resources (e.g. \$, personnel, equipment, info)</i> | 1                         | 2 | 3 | 4 | 5                   | 1                       | 2 | 3 | 4 | 5                   |
| <i>Support (e.g. advice or technical assistance)</i>   | 1                         | 2 | 3 | 4 | 5                   | 1                       | 2 | 3 | 4 | 5                   |
| <i>Outputs (e.g. manufactured product)</i>             | 1                         | 2 | 3 | 4 | 5                   | 1                       | 2 | 3 | 4 | 5                   |

2. **For your manufacturing department to accomplish its goals and responsibilities**, how much does it need marketing's and R&D's:

|  | <u>DEPEND ON MARKETING FOR...</u> |   |   |   |                     | <u>DEPEND ON R&amp;D FOR...</u> |   |   |   |                     |
|--|-----------------------------------|---|---|---|---------------------|---------------------------------|---|---|---|---------------------|
|  | <u>Small Extent</u>               |   |   |   | <u>Great Extent</u> | <u>Small Extent</u>             |   |   |   | <u>Great Extent</u> |
| <i>Resources (e.g. \$, personnel, equipment, info)</i> | 1                                 | 2 | 3 | 4 | 5                   | 1                               | 2 | 3 | 4 | 5                   |
| <i>Support (e.g. advice or technical assistance)</i>   | 1                                 | 2 | 3 | 4 | 5                   | 1                               | 2 | 3 | 4 | 5                   |
| <i>Outputs (e.g. customer data, technology)</i>        | 1                                 | 2 | 3 | 4 | 5                   | 1                               | 2 | 3 | 4 | 5                   |

3. Circle the appropriate response that identifies the degree of status that your manufacturing department has in relation to marketing and R&D departments.

| <u>Compared to...</u> | <u>Manufacturing has...</u> |                      |              |                      |                  |
|-----------------------|-----------------------------|----------------------|--------------|----------------------|------------------|
| <i>Marketing</i>      | MUCH LESS STATUS            | SOMEWHAT LESS STATUS | EQUAL STATUS | SOMEWHAT MORE STATUS | MUCH MORE STATUS |
| <i>R&amp;D</i>        | MUCH LESS STATUS            | SOMEWHAT LESS STATUS | EQUAL STATUS | SOMEWHAT MORE STATUS | MUCH MORE STATUS |

4. Circle the appropriate response that best describes the relationships between the goals of your manufacturing department and those goals of marketing and R&D departments. Use the following definitions:

**COMPETITIVE GOALS:** a department's goal attainment interferes with/makes less likely goal attainment of another department.

**INDEPENDENT GOALS:** a department's goal attainment neither helps or interferes with goal attainment of another department.

**COOPERATIVE GOALS:** a department's goal attainment helps another department reach its goals.

| <u>The goals of manufacturing and...</u> | <u>are...</u>    |                      |             |                      |                  |
|--|------------------|----------------------|-------------|----------------------|------------------|
| <i>Marketing</i>                         | VERY COMPETITIVE | SOMEWHAT COMPETITIVE | INDEPENDENT | SOMEWHAT COOPERATIVE | VERY COOPERATIVE |
| <i>R&amp;D</i>                           | VERY COMPETITIVE | SOMEWHAT COMPETITIVE | INDEPENDENT | SOMEWHAT COOPERATIVE | VERY COOPERATIVE |

5. Circle the appropriate response that identifies the degree of your satisfaction with your manufacturing department's relationships with marketing and R&D departments.

|                  |                   |              |                                    |           |                |
|------------------|-------------------|--------------|------------------------------------|-----------|----------------|
| <i>Marketing</i> | VERY DISSATISFIED | DISSATISFIED | NEITHER DISSATISFIED NOR SATISFIED | SATISFIED | VERY SATISFIED |
| <i>R&amp;D</i>   | VERY DISSATISFIED | DISSATISFIED | NEITHER DISSATISFIED NOR SATISFIED | SATISFIED | VERY SATISFIED |



6. Circle the appropriate response that identifies the degree to which the following is true about your manufacturing department. Use the following scale:

| DF<br>Definitely False  | MF<br>Mostly False | SFST<br>Sometimes False/Sometimes True | MT<br>Mostly True | DT<br>Definitely True |
|---|--------------------|--|-------------------|-----------------------|
| Following policies, rules, and regulations is stressed in my department.                | DF                 | MF                                     | SFST              | MT DT                 |
| My department can get the information it needs to make decisions.                       | DF                 | MF                                     | SFST              | MT DT                 |
| Everyone in my department does the same job in the same way every day.                  | DF                 | MF                                     | SFST              | MT DT                 |
| Little action is taken until a manager approves a decision.                             | DF                 | MF                                     | SFST              | MT DT                 |
| My department can get reliable information to help with decision-making.                | DF                 | MF                                     | SFST              | MT DT                 |
| Everyone in my department is responsible for a wide range of tasks.                     | DF                 | MF                                     | SFST              | MT DT                 |
| There are specific procedures to deal with most situations that arise in my department. | DF                 | MF                                     | SFST              | MT DT                 |
| One thing people like around here is the variety of work.                               | DF                 | MF                                     | SFST              | MT DT                 |
| Employees are assigned to unique activities in my department.                           | DF                 | MF                                     | SFST              | MT DT                 |
| Individuals are discouraged from making their own decisions.                            | DF                 | MF                                     | SFST              | MT DT                 |
| Going through the proper channels is constantly stressed.                               | DF                 | MF                                     | SFST              | MT DT                 |
| All matters have to be referred to managers for a final answer.                         | DF                 | MF                                     | SFST              | MT DT                 |
| My department has easy access to credible information.                                  | DF                 | MF                                     | SFST              | MT DT                 |
| Most jobs have something new happening everyday.  | DF                 | MF                                     | SFST              | MT DT                 |
| There is a historical record of everyone's job performance.                             | DF                 | MF                                     | SFST              | MT DT                 |
| Everyone knows specifically what they should be doing.                                  | DF                 | MF                                     | SFST              | MT DT                 |
| Any decision and/or activity has to have a manager's approval.                          | DF                 | MF                                     | SFST              | MT DT                 |
| Much of the activity in my department can be considered routine.                        | DF                 | MF                                     | SFST              | MT DT                 |
| The information my department obtains allows for confident decisions.                   | DF                 | MF                                     | SFST              | MT DT                 |
| Everyone here is considered an expert in their own area.                                | DF                 | MF                                     | SFST              | MT DT                 |
| Problems are resolved in a specific, systematic manner.                                 | DF                 | MF                                     | SFST              | MT DT                 |

7. Circle the appropriate response that identifies the degree to which the following is true about your company's primary markets. Use the following scale:

| DF<br>Definitely False  | MF<br>Mostly False | SFST<br>Sometimes False/Sometimes True | MT<br>Mostly True | DT<br>Definitely True |
|---|--------------------|--|-------------------|-----------------------|
| The overall customer base is stable.                          | DF                 | MF                                     | SFST              | MT DT                 |
| The majority of markets are turbulent.                        | DF                 | MF                                     | SFST              | MT DT                 |
| My company does not have much competition.                    | DF                 | MF                                     | SFST              | MT DT                 |
| Market demand can be forecasted accurately.                   | DF                 | MF                                     | SFST              | MT DT                 |
| My company contends with a high rate of technological change. | DF                 | MF                                     | SFST              | MT DT                 |

8. Below are pairs of words which are opposite in meaning. You are asked to describe the person in your manufacturing department with whom you can work least well. He or she does not have to be the person you like least, but should be the person with whom you have had the most difficulty in getting a job done. Look at the words at both ends of each line before you circle your response. Do not omit any items. Mark each item only once.

|               |   |   |   |   |   |   |   |   |               |
|---------------|---|---|---|---|---|---|---|---|---------------|
| Pleasant      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unpleasant    |
| Friendly      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unfriendly    |
| Rejecting     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Accepting     |
| Tense         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Relaxed       |
| Distant       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Close         |
| Cold          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Warm          |
| Supportive    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Hostile       |
| Boring        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Interesting   |
| Quarrelsome   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Harmonious    |
| Gloomy        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Cheerful      |
| Open          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Guarded       |
| Backbiting    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Loyal         |
| Untrustworthy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Trustworthy   |
| Considerate   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Inconsiderate |
| Nasty         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Nice          |
| Agreeable     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Disagreeable  |
| Insincere     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Sincere       |
| Kind          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unkind        |

9. In evaluating and considering the potential of a new product, there are many considerations that will concern different departments. While all the items below are new product concerns, which are most important to your manufacturing department? Place a "1" by the three criteria of biggest concern to your manufacturing department. Place a "2" by the next three criteria that are of second biggest concern to your manufacturing department - three concerns should be designated as "1" and three concerns as "2."

- |  |   |
|--|---|
| <input type="checkbox"/> Manufacturing costs                                 | <input type="checkbox"/> Competitors' responses                 |
| <input type="checkbox"/> Technical processing problems                       | <input type="checkbox"/> Customer Satisfaction                  |
| <input type="checkbox"/> Contribution to scientific knowledge                | <input type="checkbox"/> Sales potential                        |
| <input type="checkbox"/> Equipment requirements                              | <input type="checkbox"/> Personnel requirements                 |
| <input type="checkbox"/> Impact on other product lines                       | <input type="checkbox"/> Procurement of raw materials           |
| <input type="checkbox"/> Product/Service Quality                             | <input type="checkbox"/> Distribution through existing channels |
| <input type="checkbox"/> Maintenance schedules                               | <input type="checkbox"/> Market Share                           |
| <input type="checkbox"/> Profit  | <input type="checkbox"/> Return on investment                   |
| <input type="checkbox"/> Potential for patents and/or scientific publication | <input type="checkbox"/> Other (Please specify _____)           |

10. What percent of your manufacturing department's time is spent working on matters which will directly impact your company within each of the periods indicated. Your answers should total 100%.

- |                         |       |                        |       |
|-------------------------|-------|------------------------|-------|
| a) less than 1 week     | _____ | b) 1 quarter to 1 year | _____ |
| b) 1 week to 1 month    | _____ | d) 1 year to 5 years   | _____ |
| c) 1 month to 1 quarter | _____ | e) over 5 years        | _____ |

11. In the past three months when disagreements or disputes arose between your **MANUFACTURING DEPARTMENT** and the **MARKETING DEPARTMENT**, circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. Use the following scales:

| <i>USAGE:</i>   | N-NEVER                 | S-SELDOM | OCC-OCCASIONALLY      |   |   | O-OFTEN           | A-ALMOST ALWAYS      |    |    |  |
|---|-------------------------|----------|-----------------------|---|---|-------------------|----------------------|----|----|--|
| <i>EFFECTIVENESS:</i>   | NE-NOT EFFECTIVE AT ALL |          | SE-SOMEWHAT EFFECTIVE |   |   | VE-VERY EFFECTIVE |                      |    |    |  |
|   |                         |          | <u>USAGE</u>          |   |   |                   | <u>EFFECTIVENESS</u> |    |    |  |
|   |                         |          | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Ignoring or avoiding the issues   | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Smoothing over the issues   | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Bringing the issues out in the open and working them out among the parties involved | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Having upper management resolve the issue between the parties involved              | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Other (specify _____ )  | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |

12. In the past three months when disagreements or disputes arose between your **MANUFACTURING DEPARTMENT** and the **R & D DEPARTMENT**, circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. Use the following scales:

| <i>USAGE:</i>   | N-NEVER                 | S-SELDOM | OCC-OCCASIONALLY      |   |   | O-OFTEN           | A-ALMOST ALWAYS      |    |    |  |
|---|-------------------------|----------|-----------------------|---|---|-------------------|----------------------|----|----|--|
| <i>EFFECTIVENESS:</i>   | NE-NOT EFFECTIVE AT ALL |          | SE-SOMEWHAT EFFECTIVE |   |   | VE-VERY EFFECTIVE |                      |    |    |  |
|   |                         |          | <u>USAGE</u>          |   |   |                   | <u>EFFECTIVENESS</u> |    |    |  |
|   |                         |          | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Ignoring or avoiding the issues   | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Smoothing over the issues   | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Bringing the issues out in the open and working them out among the parties involved | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Having upper management resolve the issue between the parties involved              | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |
| Other (specify _____ )  | N                       | S        | OCC                   | O | A |                   | NE                   | SE | VE |  |

13. Circle the appropriate response to describe your manufacturing department's usage and the effectiveness of the following information technologies. Use the following scales:

| <i>USAGE:</i>         | N-NEVER           | S-SELDOM | OCC-OCCASIONALLY |   |    | O-OFTEN               | QF-QUITE FREQUENTLY  |    |                   |    |
|-----------------------|-------------------|----------|------------------|---|----|-----------------------|----------------------|----|-------------------|----|
| <i>EFFECTIVENESS:</i> | NA-NOT APPLICABLE |          | NE-NOT EFFECTIVE |   |    | SE-SOMEWHAT EFFECTIVE |                      |    | VE-VERY EFFECTIVE |    |
|                       |                   |          | <u>USAGE</u>     |   |    |                       | <u>EFFECTIVENESS</u> |    |                   |    |
|                       |                   |          | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Computers in general  | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Computer-Aided-Design | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Computer Databases    | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Computer Spreadsheets | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Electronic Mail       | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Phone Mail            | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Conference Calling    | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Teleconferencing      | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |
| Word Processing       | N                 | S        | OCC              | O | QF |                       | N/A                  | NE | SE                | VE |

14. During the past 3 months, to what degree did your manufacturing department interact with marketing and R&D departments in regards to the below activities. Use this scale:

|                           | N-NEVER | S-SELDOM | OCC-OCCASIONALLY |   | O-OFTEN |   | QF-QUITE FREQUENTLY |                |      |
|---------------------------|---------|----------|------------------|---|---------|---|---------------------|----------------|------|
|                           |         |          | <u>MARKETING</u> |   |         |   |                     | <u>R&amp;D</u> |      |
| Meetings                  | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Committees/Task Forces    | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Teleconferencing          | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Phone Conversations       | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Phone Mail                | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Conference Calls          | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Exchange of Forms         | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Exchange of Reports       | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Exchange of Memorandums   | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Exchange of FAX materials | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Electronic mail           | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Other (specify _____)     | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |

15. Please check the item most appropriate for your manufacturing department's situation:

- My department interacts more with marketing than with R&D.
- My department interacts more with R&D than with marketing.
- My department interacts equally with marketing and R&D.
- My department does not interact with marketing or R&D.

16. During the past 3 months, to what degree did your manufacturing department pursue the following activities with marketing and R&D departments. Use this scale:

|  | N-NEVER | S-SELDOM | OCC-OCCASIONALLY |   | O-OFTEN |   | QF-QUITE FREQUENTLY |                |      |
|--|---------|----------|------------------|---|---------|---|---------------------|----------------|------|
|  |         |          | <u>MARKETING</u> |   |         |   |                     | <u>R&amp;D</u> |      |
| Achieve goals collectively                 | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Have a mutual understanding                | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Informally work together                   | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Share ideas, information, and/or resources | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Share the same vision for the company      | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |
| Work together as a team                    | N       | S        | OCC              | O | QF      | N | S                   | OCC            | O QF |

17. Please check the item most appropriate for your manufacturing department's situation:

- My department has a better relationship with marketing than with R&D.
- My department has a better relationship with R&D than with marketing.
- My department has good relationships with both marketing and R&D.
- My department does not have good relationships with marketing or R&D.

18. Approximately how many full-time employees are in the manufacturing department? \_\_\_\_\_

19. How would you describe the size of the manufacturing department? SMALL MEDIUM LARGE VERY LARGE

20. Considering your company's (division's) overall business activity in the past year, please grade each of the following areas on a scale of 0% to 100%, with 100% meaning perfect performance:

Your MANUFACTURING DEPARTMENT'S OVERALL PERFORMANCE? \_\_\_\_\_

Your COMPANY'S/DIVISION'S OVERALL PERFORMANCE? \_\_\_\_\_

Your COMPANY'S/DIVISION'S PERFORMANCE IN PRODUCT DEVELOPMENT? \_\_\_\_\_

Your COMPANY'S/DIVISION'S PERFORMANCE IN PRODUCT MANAGEMENT? \_\_\_\_\_

21. Circle the response that identifies the type of production process that your company/division *primarily* uses:

JOB SHOP      SMALL BATCH FLOW      LARGE BATCH FLOW      ASSEMBLY LINE      CONTINUOUS      OTHER (Specify \_\_\_\_\_)

22. Approximately how many product lines can your primary production process readily produce? \_\_\_\_\_

23. In what state and country (if not United States) is the *primary manufacturing office* located? \_\_\_\_\_

24. Is the *primary marketing office* for this company/division located in the same building as the primary manufacturing office?  
YES      NO

If no, how many miles away is the primary marketing office? \_\_\_\_\_

25. Is the *primary R&D office* for this company/division located in the same building as the primary manufacturing office?  
YES      NO

If no, how many miles away is the primary R&D office? \_\_\_\_\_

26. Is this company/division a foreign subsidiary?      YES      NO      If yes, what country? \_\_\_\_\_

27. Approximately what is the Annual Sales in US Dollars of your company/division? \_\_\_\_\_

28. Approximately what is the number of employees for your company/division? \_\_\_\_\_

29. Circle the appropriate response for what your company/division primarily provides:

Consumer Products      Consumer Services      Industrial Products      Industrial Services

30. Check the appropriate response that best describes your company's/division's current market position?

\_\_\_ Leader for the market, i.e., dominant position      \_\_\_ Definite edge over competitors, but not dominant  
\_\_\_ Unique position due to a market niche      \_\_\_ Slight difficulty in gaining/retaining market share  
\_\_\_ Unstable/Weak position

**Thank you for your time and cooperation.**  
**If you have any comments you wish to make, please write them on the back of this questionnaire.**

COVER LETTERS AND QUESTIONNAIRES SENT TO  
R&D MANAGERS

703-231-6949  
703-552-1741 (FAX)

August 6, 1993

Dear R&D/Engineering Executive:

The enclosed questionnaire is part of my doctoral dissertation research on how to facilitate and manage interdepartmental relationships, specifically those relationships between marketing, manufacturing, and research and development (R&D). I would appreciate your filling out this questionnaire, giving honest opinions about your R&D department and the relationships your R&D department maintains with the marketing and/or manufacturing sectors of your company.

The questionnaire is designed to be completed in less than 20 minutes, with most questions requiring you only to circle the appropriate response. When you have completed the questionnaire, please place it in the enclosed self-addressed, stamped envelope and return it to me.

Your responses will be confidential. Neither your company nor you will be identified; only aggregate data will be analyzed and reported. If you would like a copy of the findings of this study, please include your business card with the questionnaire. I will separate business cards from questionnaires as they are returned so that all responses remain confidential. When all returns are in and the data have been analyzed, I will send copies of my findings to those respondents who have requested them.

It is vital to my research that I receive your response. Please take a few minutes to complete and return the enclosed questionnaire. I greatly appreciate your help.

Sincerely yours,

Kenneth B. Kahn  
Virginia Tech Ph.D. Candidate

enclosures

September 17, 1993

Dear R&D/Engineering Executive:

In August, I sent you a questionnaire as part of my doctoral dissertation research on how to facilitate and manage the relationships between research and development (R&D), marketing, and manufacturing. Due to the type of analysis that I am doing, a large response rate is required. Thus, it is vital to my research that I receive your input. If you have already completed a copy of the questionnaire, please disregard this letter and thank you for your help.

If you have not yet completed the questionnaire, please take several minutes to complete it today. For your convenience, an extra copy of the questionnaire is enclosed along with a self-addressed, stamped envelope for returning the completed questionnaire to me.

Let me remind you that your response will be confidential. Neither your company nor you will be identified. Only aggregate data will be analyzed and reported.

If you would like to receive a copy of my findings, please include your business card with the completed questionnaire. I will separate them when the envelope is opened so that your response will remain confidential.

Once again, thank you for your help.

Sincerely yours,

Kenneth B. Kahn  
Ph.D. Candidate

enclosures



## R&D/ENGINEERING DEPARTMENT SURVEY

**Instructions:** The following questionnaire concerns the R&D (R&D/Engineering) department/function and its interrelationships with marketing (marketing/sales) and manufacturing (manufacturing/operations). Please provide your honest opinion when answering each question. Thank you for your time filling out this survey.

1. **For marketing and manufacturing to accomplish their goals and responsibilities**, how much do they need your R&D department's:

|  | <u>MARKETING NEEDS...</u> |   |   |   |                     | <u>MANUFACTURING NEEDS...</u> |   |   |   |                     |
|--|---------------------------|---|---|---|---------------------|-------------------------------|---|---|---|---------------------|
|  | <u>Small Extent</u>       |   |   |   | <u>Great Extent</u> | <u>Small Extent</u>           |   |   |   | <u>Great Extent</u> |
| <i>Resources (e.g. \$, personnel, equipment, info)</i> | 1                         | 2 | 3 | 4 | 5                   | 1                             | 2 | 3 | 4 | 5                   |
| <i>Support (e.g. advice or technical assistance)</i>   | 1                         | 2 | 3 | 4 | 5                   | 1                             | 2 | 3 | 4 | 5                   |
| <i>Outputs (e.g. new technologies)</i>                 | 1                         | 2 | 3 | 4 | 5                   | 1                             | 2 | 3 | 4 | 5                   |

2. **For your R&D department to accomplish its goals and responsibilities**, how much does it need marketing's and manufacturing's:

|  | <u>DEPEND ON MARKETING FOR...</u> |   |   |   |                     | <u>DEPEND ON MANUFACTURING FOR...</u> |   |   |   |                     |
|--|-----------------------------------|---|---|---|---------------------|---------------------------------------|---|---|---|---------------------|
|  | <u>Small Extent</u>               |   |   |   | <u>Great Extent</u> | <u>Small Extent</u>                   |   |   |   | <u>Great Extent</u> |
| <i>Resources (e.g. \$, personnel, equipment, info)</i> | 1                                 | 2 | 3 | 4 | 5                   | 1                                     | 2 | 3 | 4 | 5                   |
| <i>Support (e.g. advice or technical assistance)</i>   | 1                                 | 2 | 3 | 4 | 5                   | 1                                     | 2 | 3 | 4 | 5                   |
| <i>Outputs (e.g. customer data, products)</i>          | 1                                 | 2 | 3 | 4 | 5                   | 1                                     | 2 | 3 | 4 | 5                   |

3. Circle the appropriate response that identifies the degree of status that your R&D department has in relation to marketing and manufacturing departments.

| <u>Compared to...</u> | <u>R&amp;D has....</u> |                         |                 |                         |                     |
|-----------------------|------------------------|-------------------------|-----------------|-------------------------|---------------------|
| <i>Marketing</i>      | MUCH LESS<br>STATUS    | SOMEWHAT<br>LESS STATUS | EQUAL<br>STATUS | SOMEWHAT<br>MORE STATUS | MUCH MORE<br>STATUS |
| <i>Manufacturing</i>  | MUCH LESS<br>STATUS    | SOMEWHAT<br>LESS STATUS | EQUAL<br>STATUS | SOMEWHAT<br>MORE STATUS | MUCH MORE<br>STATUS |

4. Circle the appropriate response that best describes the relationships between the goals of your R&D department and those goals of marketing and manufacturing departments. Use the following definitions:

**COMPETITIVE GOALS:** a department's goal attainment interferes with/makes less likely goal attainment of another department.

**INDEPENDENT GOALS:** a department's goal attainment neither helps or interferes with goal attainment of another department.

**COOPERATIVE GOALS:** a department's goal attainment helps another department reach its goals.

| <u>The goals of R&amp;D and...</u> | <u>are...</u>       |                         |             |                         |                     |
|------------------------------------|---------------------|-------------------------|-------------|-------------------------|---------------------|
| <i>Marketing</i>                   | VERY<br>COMPETITIVE | SOMEWHAT<br>COMPETITIVE | INDEPENDENT | SOMEWHAT<br>COOPERATIVE | VERY<br>COOPERATIVE |
| <i>Manufacturing</i>               | VERY<br>COMPETITIVE | SOMEWHAT<br>COMPETITIVE | INDEPENDENT | SOMEWHAT<br>COOPERATIVE | VERY<br>COOPERATIVE |

5. Circle the appropriate response that identifies the degree of your satisfaction with your R&D department's relationships with marketing and manufacturing departments.

|                      |                      |              |                                       |           |                   |
|----------------------|----------------------|--------------|---------------------------------------|-----------|-------------------|
| <i>Marketing</i>     | VERY<br>DISSATISFIED | DISSATISFIED | NEITHER DISSATISFIED<br>NOR SATISFIED | SATISFIED | VERY<br>SATISFIED |
| <i>Manufacturing</i> | VERY<br>DISSATISFIED | DISSATISFIED | NEITHER DISSATISFIED<br>NOR SATISFIED | SATISFIED | VERY<br>SATISFIED |



8. Below are pairs of words which are opposite in meaning. You are asked to describe the person in your R&D department with whom you can work least well. He or she does not have to be the person you like least, but should be the person with whom you have had the most difficulty in getting a job done. Look at the words at both ends of each line before you circle your response. Do not omit any items. Mark each item only once.

|               |   |   |   |   |   |   |   |   |               |
|---------------|---|---|---|---|---|---|---|---|---------------|
| Pleasant      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unpleasant    |
| Friendly      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unfriendly    |
| Rejecting     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Accepting     |
| Tense         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Relaxed       |
| Distant       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Close         |
| Cold          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Warm          |
| Supportive    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Hostile       |
| Boring        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Interesting   |
| Quarrelsome   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Harmonious    |
| Gloomy        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Cheerful      |
| Open          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Guarded       |
| Backbiting    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Loyal         |
| Untrustworthy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Trustworthy   |
| Considerate   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Inconsiderate |
| Nasty         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Nice          |
| Agreeable     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Disagreeable  |
| Insincere     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Sincere       |
| Kind          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Unkind        |

9. In evaluating and considering the potential of a new product, there are many considerations that will concern different departments. While all the items below are new product concerns, which are most important to your R&D department? Place a "1" by the three criteria of biggest concern to your R&D department. Place a "2" by the next three criteria that are of second biggest concern to your R&D department. In total, three concerns should be designated as "1" and three concerns as "2."

- |  |   |
|--|---|
| <input type="checkbox"/> Manufacturing costs                                 | <input type="checkbox"/> Competitors' responses                 |
| <input type="checkbox"/> Technical processing problems                       | <input type="checkbox"/> Customer Satisfaction                  |
| <input type="checkbox"/> Contribution to scientific knowledge                | <input type="checkbox"/> Sales potential                        |
| <input type="checkbox"/> Equipment requirements                              | <input type="checkbox"/> Personnel requirements                 |
| <input type="checkbox"/> Impact on other product lines                       | <input type="checkbox"/> Procurement of raw materials           |
| <input type="checkbox"/> Product/Service Quality                             | <input type="checkbox"/> Distribution through existing channels |
| <input type="checkbox"/> Maintenance schedules                               | <input type="checkbox"/> Market Share                           |
| <input type="checkbox"/> Profit  | <input type="checkbox"/> Return on investment                   |
| <input type="checkbox"/> Potential for patents and/or scientific publication | <input type="checkbox"/> Other (Please specify _____)           |

10. What percent of your R&D department's time is spent working on matters which will directly impact your company within each of the periods indicated. Your answers should total 100%.

- |                               |                              |
|-------------------------------|------------------------------|
| a) less than 1 week _____     | b) 1 quarter to 1 year _____ |
| b) 1 week to 1 month _____    | d) 1 year to 5 years _____   |
| c) 1 month to 1 quarter _____ | e) over 5 years _____        |

11. In the past three months when disagreements or disputes arose between your **R&D DEPARTMENT** and the **MARKETING DEPARTMENT**, circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. Use the following scales:

| <i>USAGE:</i>   |  | N-NEVER                 | S-SELDOM | OCC-OCCASIONALLY | O-OFTEN               | A-ALMOST ALWAYS |                      |    |    |    |
|---|--|-------------------------|----------|------------------|-----------------------|-----------------|----------------------|----|----|----|
| <i>EFFECTIVENESS:</i>   |  | NE-NOT EFFECTIVE AT ALL |          |                  | SE-SOMEWHAT EFFECTIVE |                 | VE-VERY EFFECTIVE    |    |    |    |
|   |  |                         |          | <i>USAGE</i>     |                       |                 | <i>EFFECTIVENESS</i> |    |    |    |
|   |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Ignoring or avoiding the issues   |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Smoothing over the issues   |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Bringing the issues out in the open and working them out among the parties involved |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Having upper management resolve the issue between the parties involved              |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Other (specify _____ )  |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |

12. In the past three months when disagreements or disputes arose between your **R&D DEPARTMENT** and the **MANUFACTURING DEPARTMENT**, circle the appropriate response describing the usage of conflict resolution approaches and the effectiveness of these approaches to resolve the conflict. Use the following scales:

| <i>USAGE:</i>   |  | N-NEVER                 | S-SELDOM | OCC-OCCASIONALLY | O-OFTEN               | A-ALMOST ALWAYS |                      |    |    |    |
|---|--|-------------------------|----------|------------------|-----------------------|-----------------|----------------------|----|----|----|
| <i>EFFECTIVENESS:</i>   |  | NE-NOT EFFECTIVE AT ALL |          |                  | SE-SOMEWHAT EFFECTIVE |                 | VE-VERY EFFECTIVE    |    |    |    |
|   |  |                         |          | <i>USAGE</i>     |                       |                 | <i>EFFECTIVENESS</i> |    |    |    |
|   |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Ignoring or avoiding the issues   |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Smoothing over the issues   |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Bringing the issues out in the open and working them out among the parties involved |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Having upper management resolve the issue between the parties involved              |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |
| Other (specify _____ )  |  | N                       | S        | OCC              | O                     | A               |                      | NE | SE | VE |

13. Circle the appropriate response to describe your R&D department's usage and the effectiveness of the following information technologies. Use the following scales:

| <i>USAGE:</i>         |  | N-NEVER           | S-SELDOM | OCC-OCCASIONALLY | O-OFTEN | QF-QUITE FREQUENTLY   |                      |                   |    |    |    |
|-----------------------|--|-------------------|----------|------------------|---------|-----------------------|----------------------|-------------------|----|----|----|
| <i>EFFECTIVENESS:</i> |  | NA-NOT APPLICABLE |          | NE-NOT EFFECTIVE |         | SE-SOMEWHAT EFFECTIVE |                      | VE-VERY EFFECTIVE |    |    |    |
|                       |  |                   |          | <i>USAGE</i>     |         |                       | <i>EFFECTIVENESS</i> |                   |    |    |    |
|                       |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Computers in general  |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Computer-Aided-Design |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Computer Databases    |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Computer Spreadsheets |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Electronic Mail       |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Phone Mail            |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Conference Calling    |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Teleconferencing      |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |
| Word Processing       |  | N                 | S        | OCC              | O       | QF                    |                      | N/A               | NE | SE | VE |

14. During the past 3 months, to what degree did your R&D department interact with marketing and manufacturing departments in regards to the below activities. Use this scale:

|                           | N-NEVER | S-SELDOM | OCC-OCCASIONALLY |   | O-OFTEN | QF-QUITE FREQUENTLY  |    |  |   |   |     |   |    |
|---------------------------|---------|----------|------------------|---|---------|----------------------|----|--|---|---|-----|---|----|
|                           |         |          | <u>MARKETING</u> |   |         | <u>MANUFACTURING</u> |    |  |   |   |     |   |    |
|                           |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Meetings                  |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Committees/Task Forces    |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Teleconferencing          |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Phone Conversations       |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Phone Mail                |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Conference Calls          |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Exchange of Forms         |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Exchange of Reports       |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Exchange of Memorandums   |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Exchange of FAX materials |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Electronic mail           |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Other (specify _____)     |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |

15. Please check the item most appropriate for your R&D department's situation:

- My department interacts more with marketing than with manufacturing.
- My department interacts more with manufacturing than with marketing.
- My department interacts equally with marketing and manufacturing.
- My department does not interact with marketing or manufacturing.

16. During the past 3 months, to what degree did your R&D department pursue the following activities with marketing and manufacturing departments. Use this scale:

|  | N-NEVER | S-SELDOM | OCC-OCCASIONALLY |   | O-OFTEN | QF-QUITE FREQUENTLY  |    |  |   |   |     |   |    |
|--|---------|----------|------------------|---|---------|----------------------|----|--|---|---|-----|---|----|
|  |         |          | <u>MARKETING</u> |   |         | <u>MANUFACTURING</u> |    |  |   |   |     |   |    |
|  |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Achieve goals collectively                 |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Have a mutual understanding                |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Informally work together                   |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Share ideas, information, and/or resources |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Share the same vision for the company      |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |
| Work together as a team                    |         |          | N                | S | OCC     | O                    | QF |  | N | S | OCC | O | QF |

17. Please check the item most appropriate for your R&D department's situation:

- My department has a better relationship with marketing than with manufacturing.
- My department has a better relationship with manufacturing than with marketing.
- My department has good relationships with both marketing and manufacturing.
- My department does not have good relationships with marketing or manufacturing.

18. Approximately how many full-time employees are in the R&D department? \_\_\_\_\_

19. How would you describe the size of the R&D department?    SMALL    MEDIUM    LARGE    VERY LARGE

20. Considering your company's (division's) overall business activity in the past year, please grade each of the following areas on a scale of 0% to 100%, with 100% meaning perfect performance:

Your R&D DEPARTMENT'S OVERALL PERFORMANCE? \_\_\_\_\_

Your COMPANY'S/DIVISION'S OVERALL PERFORMANCE? \_\_\_\_\_

Your COMPANY'S/DIVISION'S PERFORMANCE IN PRODUCT DEVELOPMENT? \_\_\_\_\_

Your COMPANY'S/DIVISION'S PERFORMANCE IN PRODUCT MANAGEMENT? \_\_\_\_\_

21. Circle the response that identifies the type of production process that your company/division *primarily* uses:

JOB SHOP      SMALL BATCH FLOW      LARGE BATCH FLOW      ASSEMBLY LINE      CONTINUOUS      OTHER (Specify \_\_\_\_\_)

22. Approximately how many product lines can your primary production process readily produce? \_\_\_\_\_

23. In what state and country (if not United States) is the *primary R&D office* located? \_\_\_\_\_

24. Is the *primary marketing office* for this company/division located in the same building as the primary R&D office?  
YES                  NO

If no, how many miles away is the primary marketing office? \_\_\_\_\_

25. Is the *primary manufacturing office* for this company/division located in the same building as the primary R&D office?  
YES                  NO

If no, how many miles away is the primary R&D office? \_\_\_\_\_

26. Is this company/division a foreign subsidiary?      YES      NO      If yes, what country? \_\_\_\_\_

27. Approximately what is the Annual Sales in US Dollars of your company/division? \_\_\_\_\_

28. Approximately what is the number of employees for your company/division? \_\_\_\_\_

29. Circle the appropriate response for what your company/division primarily provides:

Consumer Products      Consumer Services      Industrial Products      Industrial Services

30. Check the appropriate response that best describes your company's/division's current market position?

\_\_\_ Leader for the market, i.e., dominant position      \_\_\_ Definite edge over competitors, but not dominant  
\_\_\_ Unique position due to a market niche      \_\_\_ Slight difficulty in gaining/retaining market share  
\_\_\_ Unstable/Weak position

Thank you for your time and cooperation.  
If you have any comments you wish to make, please write them on the back of this questionnaire.

## VITA OF KENNETH BENJAMIN KAHN

Kenneth Benjamin Kahn has a Bachelor in Industrial Engineering from the Georgia Institute of Technology, a Certificate of Industrial Psychology from the Georgia Institute of Technology, and a Masters of Science in Industrial Engineering from Virginia Polytechnic Institute and State University. Upon acceptance of this dissertation, he will earn a Doctor of Philosophy in General Business (Marketing Major, Sociology Minor).

Prior to his Masters degree, Mr. Kahn worked for the Weyerhaeuser Company as an industrial engineer in Lithonia, Georgia and a project engineer in Rapidan, Virginia. Prior to his pursuit of the doctorate, Mr. Kahn worked for Respirationics, Inc. in Pittsburgh, Pennsylvania as a manufacturing engineer.

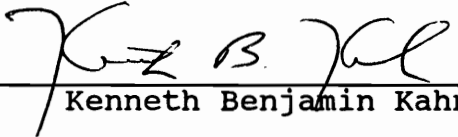
Mr. Kahn's research interests are focused on the integration of departments within companies, with particular emphasis on marketing's integration with other departments. His interests therefore encompass integrated product development, integrated product management, integrated technology management, integrated strategic planning, integrated logistics, integrated forecasting, quality function deployment, and interdepartmental approaches to customer service. He has published in the Journal of

Consumer Satisfaction, Dissatisfaction, and Complaining Behavior, has articles forthcoming in the Journal of Business Research and the Journal of Business Logistics, and has a chapter forthcoming in Great Ideas for Teaching Marketing.

Mr. Kahn is a member of Alpha Pi Mu (Industrial Engineering Honor Society), Alpha Mu Alpha (Marketing Honor Society), and Omicron Delta Kappa (Service Honor Society). He was a 1992 Harold Berry Scholarship Winner from the Purchasing Management Association of Carolinas-Virginia and was a 1992 and 1993 Doctoral Consortium Fellow of the Council of Logistics Management.

Beginning September 1994, Mr. Kahn will join the faculty of the Georgia Institute of Technology as an Assistant Professor in the School of Management.

Kenneth Benjamin Kahn was born on April 1, 1964 in Perth Amboy, New Jersey.

  
Kenneth Benjamin Kahn