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Assessment of Integration in R & D / Marketing Interface Conditions in the New Product Development Process

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# ASSESSMENT OF INTEGRATION IN R&D/MARKETING INTERFACE CONDITIONS IN THE NEW PRODUCT DEVELOPMENT PROCESS

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An Abstract Presented to the Faculty of the Graduate
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ABSTRACT

This thesis will focus on the relationship between the Research
and Development (R&D) and marketing functions as they relate to the
new product development process in a corporate setting.

New product development processes are a complex and dynamic
series of activities which require a transition in the organization
from a hierarchical structure to a colleague-based, horizontal
structure. Cross-departmental teams and project management methods
lead to shared responsibilities for new products among R&D,
manufacturing, and marketing groups.

Work flowing through departmental boundaries flows through
organizational interfaces consisting of formal and informal
communications. The focus of this study is on the interface between
R&D and marketing, considered to be crucial to success in new
product development. Two distinct classes of product development
activities (technical development and marketing/commercialization)
must be coordinated and integrated for new product success.

Research has established that communication problems, goal
conflicts, and a lack of openness often characterize the
relationship between R&D and marketing. Research has also

1

established a relationship between harmonious R&D/marketing interface conditions and success rates in new product development.

Research has validated that one measure of the degree of integration between R&D and marketing is based on the extent of R&D and marketing involvement and information sharing in various stages of the new product development process.

The purpose of the present study is to measure the amount of perceived involvement and information sharing between the R&D and marketing departments of a company involved in new product development in the food industry. Specifically, it is hypothesized that there will be differences found between R&D and marketing personnel's perceptions of the degree of involvement and information sharing (1) ideally required, and (2) actually achieved in key areas of the new product development process. It is also hypothesized that within each group differences between the perceived degree of ideal and actual involvement and information sharing will measure degree of dissatisfaction with current interface conditions.

An integration scale was administered to 79 research and marketing personnel in the company of study. Data were analyzed by statistical methods through the use of the t-test for differences between means and paired t-tests. Results of the analysis confirmed both hypotheses for differences between and within R&D and marketing groups.

2

ASSESSMENT OF INTEGRATION IN R&D/MARKETING INTERFACE CONDITIONS IN THE NEW PRODUCT DEVELOPMENT PROCESS

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A Culminating Project Presented to the Faculty of the Graduate
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1990

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i

TABLE OF CONTENTS

To Roger,
Brian and Lauren

ii

TABLE OF CONTENTS

iii

List of Tables

viii

List of Illustrations

by buyers or users (Crawford, 16-17).

In the food industry, there are several types of new product development that are important, depending on the dynamic internal and external evironments of the company. New products development focuses on the evolution of new food products. Line extensions development involves the development of alternative flavors or forms of products. Cost reduction development means reducing the total product cost but maintaining product quality. Improvement or maintenance development looks at alternative processes, ingredients, packaging, etc., to maintain current product lines in an optimum way. New technology development involves maximum innovation for new products that are envisioned or provide unique advances (Williams, 2).

New product development in the U.S. is increasing, and in the food industry is skyrocketing. Estimates of new food product introductions vary from 2,000 to 6,000 new food items yearly (Crawford, 16).

A new product is not an invention; the process of developing an invention to a marketable new product is termed innovation (23). The new product process, then, is termed an innovation process and involves a sequence of activities beginning with a strategy to merge a company's technological capability with the needs of the marketplace. It also involves building an organizational structure to carry out strategy; concept creation; technical development;

commercialization; and post-commercialization review, support, and evaluation (33-38).

Souder (1987) defines an innovation process as any system of organized activities that transforms a technology from an idea to commercialization. He proposes that the innovation process itself is not a single process, but a series of many component processes. These processes include invention, product development, decision, need recognition, evaluation, trial and adoption, selling and persuasion, attitude formation and change, market analyses, and demand creation processes. The innovation process involves the contributions of numerous individuals both inside and outside the company. A further complicating factor in the innovation process is that all of these component processes may be going on simultaneously. As Souder states, "The success of these processes usually involves hurdling many obstacles and overcoming many resistances. Because of this, innovations often involve large human, organizational, and social costs" (4-5).

Factors Affecting Success in New Product Development

The new products process is influenced by both internal and external factors, all of which contribute to success or failure in new product development . An understanding of these factors is crucial to successful new product development in the innovative

company.

Figure 1 shows a model of the new products process, and the internal and external factors which affect the project's outcome.

Figure 1

Factors Affecting New Product Development Project Outcome
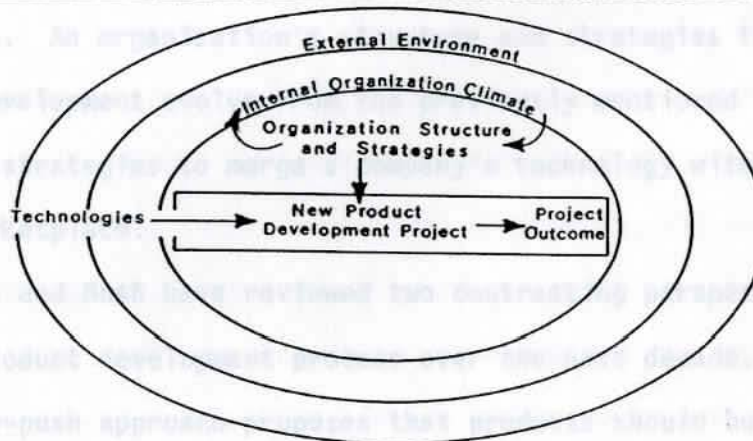
SOURCE: William E. Souder, Managing New Product Innovation, Lexington, MA: Lexington Books, 1987, p. 12.

The external environment includes environmental pressures which work against the innovation process. These include smaller marketing arenas for new products, with smaller sales potential due to increasing market segmentation; short response times to new products from competitors; and shorter product life cycles due to the rapid rate of technological progress. Increased government regulation has also accelerated some technologies, and restricted or halted others.

Internal factors which affect project outcome include the internal organization climate, organizational structure and strategies, and the technologies of the company.

The interplay between external and internal factors must also be considered in predicting success in new product development.

This study will focus on internal factors in assessing success criteria, specifically on the organization's structure and strategies. An organization's structure and strategies for new product development evolve from the previously mentioned need for efficient strategies to merge a company's technology with the needs of the marketplace.

Lucas and Bush have reviewed two contrasting perspectives in the new product development process over the past decade. The technology-push approach proposes that products should be developed by advancing the cutting edge of technology and then developing a product that creates a market. Followers of this approach advocate marketing involvement only after Research and Development (R&D) develops a product.

In the market-pull perspective, the firm's focus should be on the market, and consumers' responses to market research should drive the development of new products (258).

Johne and Snelson state that studies have shown that most successful new product development is in response to the recognition of a need in the marketplace, i.e., need-pull, as opposed to the

recognition of a new technological development, i.e., technology-push. These authors stress, however, that:

> ...good marketing skills alone will not pick up major
> developments in the technical environment. A
> company's technical resource cannot be left to be
> triggered by marketing input...(T)ruly successful
> product innovators insure the interplay and balance
> between highly skilled marketing inputs and highly
> skilled technical inputs. (119)

Pessemier takes an industry-specific approach to defining R&D's and marketing's roles. In industries where products originate with research discoveries (e.g., industrial chemicals), R&D drives new product development. Less complex products, such as food and beverages, tend to be more dominated by marketing personnel.

Theorists and researchers are now beginning to propose that the real issue is not selecting either technology-push or market-pull as the new product development strategy. The new approach suggests that true success can be realized by attaining a high level of cooperation between the technology-driven R&D department and the customer-oriented marketing department. They see a strong need to link R&D and marketing productively (Lucas and Bush, 259).

Conflict vs. Integration in Technical/Marketing Activities

The requirements of the new product development process involve

the talents of many individuals who collectively possess

interdisciplinary knowledge (Souder, 85). Individuals from various

company functions, with different loyalties and orientations, are

pulled together to work toward the common goal of development and

commercialization of a new product. These requirements necessitate

a structural transition from "classical" organizing principles to

"innovative" organizing principles within organizations involved in

successful product innovation. In organizing for innovation,

horizontal, colleague-based relationships are stressed, rather than

a rigid linear chain of command from the top of the organization

down through a hierarchy. Cross-departmental teams (traditionally

called "task forces") and project management methods are used. The

use of cross-departmental teams leads to shared responsibilities for

new products among technical (R&D), manufacturing, and marketing

groups. There is a constant adjustment of tasks through the

interactions of new product project team members. Communication

runs in all directions between people of different ranks, rather

than vertical communications between superiors and subordinates

(Souder, 86-87).

Drucker terms this difference in organizational structure as

the "innovative organization" vs. the "managerial organization"; he

states that the innovative organization is structured differently

and set up differently from the managerial organization (788). In

his view, there are differences from the traditional organizational

8

functions in innovation.

> The traditional functions organize work from where we
> are today to where we are going. The innovative
> function organizes work from where we want to be, back
> to what we now have to do in order to get
> there...(T)his means setting aside the traditional time
> sequence in which "research" comes first, followed by
> "development", followed by "manufacturing", with
> "marketing" at the very end. (801).

Crawford states that five options are currently preferred in
effective company organization for optimal product innovation. Each
is a variation of the team concept, involving an assigned group of
people from different company functions, (e.g., R&D, marketing,
manufacturing), who work together on a new product project (475).
Figure 2 lists these options together with members' degree of
projectization, or "extent to which participants in the team see
themselves as independent from the project or committed to it" (476).

As seen in Figure 2, in the project team structure (which
Crawford observes is the most common today) degree of projectization
is between 40-70%. Therefore, in the project team structure, team
members are involved in a conflict situation. They must remain
loyal to their departments, and at the same time, work toward goals
of new product development on a given project (usually at an
accelerated pace).

Figure 2

Options in New Products Organization

Options				
	Teams			
New products committee	Task force	Project team product manager matrix	Venture team	Spinout

0% ——— 20% ——— 40% ——— 60% ——— 80% ——— 100%

Degree of Projectization*
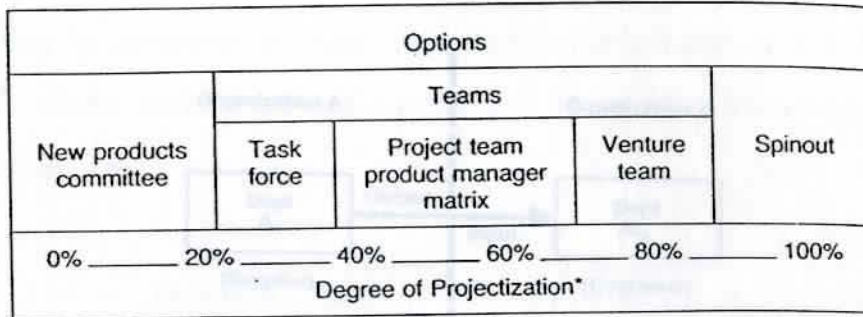
SOURCE: C. Merle Crawford, New Products Management. Homewood,
         Ill.: Richard D. Irwin, Inc., 2nd Ed., 1987, p. 476.

Takeuchi and Nonaka propose a rugby-type approach to new
product development, as a replacement to the old sequential
approach. This approach has six characteristics: built-in
instability, self-organizing project teams, overlapping development
phases, "multi-learning" (141), subtle control, and organizational
transfer of learning (137). This new approach requires extensive
communication and interaction among the various departments within
an organization (Lucas and Bush, 258).

When work flows across group or departmental boundaries, it
flows through an organizational interface (Figure 3), which is a
point of contact between one organization and another. It consists
of both formal communications (good for control purposes) and

Figure 3

Work Flow Interface

Organization A | Organization B

Dept A_H
Output
Input
Dept B_M

(Supplier) | (Customer)

Interface
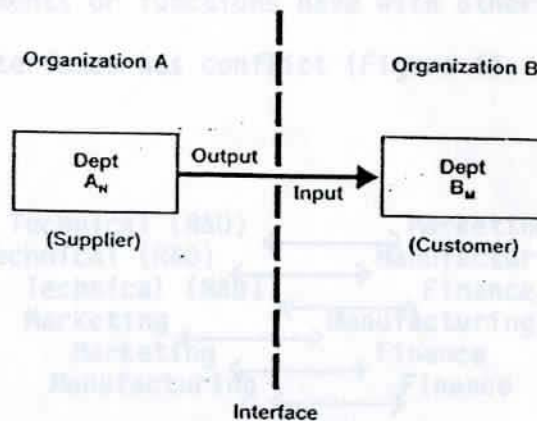
SOURCE: E. H. Melan, "Improving Responsiveness in Product
Development", Quality Progress, June, 1989, p. 26.

informal communications (good for interpersonal roles and building
communication levels).

These new approaches to organizational structure can lead to
conflict or integration in R&D and marketing activities at the
interface. The extent of conflict or integration is dependent on
strategies for managing this organizational interface.

Crawford states that the technical (R&D), manufacturing, and
marketing groups make three interfaces and that "One of the most
difficult and frustrating parts of the new products task is keeping
peace and harmony between the three major players in the new

products game" (490). He terms this process interface management.

In Rosenau's discussion of the disharmony problem in new product development, he illustrates the three key interfaces that operating departments or functions have with others, and states that each of these interfaces has conflict (Figure 4). These key interfaces are:

Technical (R&D) → Marketing
Technical (R&D) ← Manufacturing
Technical (R&D) → Finance
Marketing ← Manufacturing
Marketing → Finance
Manufacturing ↔ Finance
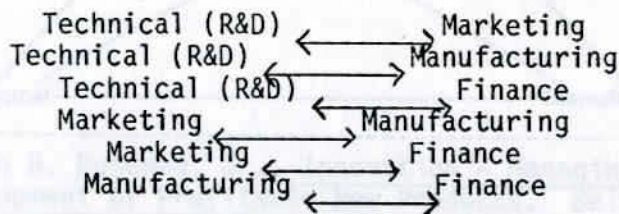
Rosenau also states that the problem is most damaging when disharmony exists between technical (R&D) and marketing or manufacturing (164-165). Sources of organizational conflict for R&D are listed in Table 1. For example, the marketing and sales departments emphasize a quick response to competitors and a low price for a new product. The R&D department emphasizes thorough analysis and technical perfection prior to production. These goals are at odds, and can lead to conflict in the new product development process.

In Rosenau's discussion of improving interface harmony, he states that no procedure or analysis can eliminate the traditional conflict between the marketing and R&D or manufacturing departments, but that teamwork between the marketing department and technical departments is crucial for new product development success (165).

Figure 4

Departmental Interfaces that Exhibit Organizational Conflict
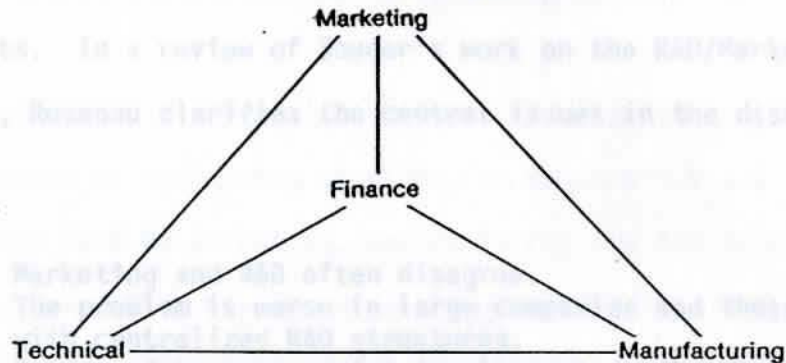
SOURCE: Milton D. Rosenau, Jr., Innovation - Managing the
Development of Profitable New Products. Belmont, CA:
Wadsworth, Inc. 1982, p. 165.

Table 1

Sources of Organizational Conflict for R&D

Other Departments	Other Department Goals	R&D Goals
Corporate Management	Business Profit	Technology Money for R&D
Marketing & Sales	Quick Response Low Price	Thorough Analysis Technical Perfection
Manufacturing	Few Variations Current Technology	Optimized Features Advanced Technology

SOURCE: Milton D. Rosenau, Jr., Innovation - Managing the
Development of Profitable New Products. Belmont, CA:
Wadsworth, Inc. 1982, p. 166.

Interdepartmental conflict can be a severe barrier to innovation. Goal conflicts, communication problems, and a lack of openness often characterize the relationship between R&D and other departments. In a review of Souder's work on the R&D/Marketing interface, Rosenau clarifies the central issues in the disharmony problem.

1. Marketing and R&D often disagree.
2. The problem is worse in large companies and those with centralized R&D structures.
3. Degree of harmony, joint involvement, and perceived partnership between R&D and Marketing is a significant determinant of project success.
4. Special mechanisms and management attention are needed to overcome these differences.
5. Firms most successful at innovation have organizational climates that promote collaboration by stressing frequent face-to-face exchanges. (165-166)

In his field research of 289 new product development innovation projects at 53 firms over 10 years, Souder (1987) determined nine common problems in managing successful new product development (8). These are:

1. Avoiding technologies that fail.
2. Designing the best organization for innovation.
3. Picking projects that have the best chances of success.
4. Determining how much effort to spend on innovation projects, and when to terminate unsuccessful projects.
5. Managing innovation projects for timely completion.
6. Coping with uncertain technologies.
7. Transferring technologies and new products to other parties.
8. Developing organizational climates that stimulate innovation.

9.   Handling problems at the Research & Development (R&D)
     and Marketing interface. (8)

Importance of Integration in R&D/Marketing Interface Conditions

Calantone and di Benedetto reviewed the importance stressed in
the literature of downstream coupling, or cooperation and
coordination between marketing, manufacturing and R&D in a
technology-based firm, to new product success (205). They have
proposed a model (Figure 5) of the new product development process
in which both technical and marketing activities complement each
other within an environment defined by the company, the marketplace,
and the nature of the project. In this model, technical activities
and marketing activities are integrated by joint evaluation at each
stage of the new product development process. Relevant information
is gathered, assessed, and evaluated, and decisions are made jointly
on whether to continue with the project (206).

Calantone and di Benedetto state that although normative models
of new product development often recognize two distinct classes of
product development activities (technical development and
marketing/commercialization), they must be coordinated and
integrated for product success despite disagreement between the two
departments as to what activities and tasks they should do together
(205).

Figure 5

A Model of the New Product Process

| ENVIRONMENTS |
| Nature of the Firm |
| Nature of the Marketplace |
| Nature of the Project |

TECHNICAL ACTIVITIES

EVALUATION

MARKET ACTIVITIES

Technical Breakthroughs

Identifying Customer Needs

Screening Ideas

Preliminary Design and Technical Feasibility

Preliminary Market Assessment

Preliminary Venture Analysis

Product Development

Market Research

Detailed Business Analysis

Pilot Production

Test Marketing

Pre-Commercialization Analysis

Full Production

Market Introduction

Post-Commercialization Analysis
(Review and Revise)

Commercial Entity

Outcome: Success or Failure

SOURCE: R. J. Calantone and C. A. di Benedetto, "An Integrative Model of the New Product Development Process", Journal of Product Innovation Management, 1988, 5, p. 205. (Adapted from Cooper, pp. 24 and 27).

Johne and Snelson have used and extended the McKinsey 7 Ss framework proposed by Peters and Waterman to review internal factors that affect product innovation success. Table 2 presents this framework, which is used to help managers check factors over which they have direct control when developing new products (114).

In Johne and Snelson's discussion of the "Systems" factor in this framework, (see Table 2), they review the wide recognition in the literature of the importance of effective integration between the separate functional inputs required during the product innovation process. Most recent research has focused on the R&D/marketing interface (125). They state that lack of communication is the largest barrier in reaching an integration between R&D and marketing. This is especially true during the product development phase of the innovation process, when effective communication is critically important because cooperation is needed on a daily basis (126).

To summarize, it can be concluded that success in new product development is dependent on a high level of coordination and integration between the R&D and marketing departments. New approaches to organizational structure can lead to conflict or integration in R&D and marketing activities dependent on strategies for managing the interface between the two departments. Communications and involvement between R&D and marketing during the various stages of the new product development process are critically important.

Table 2

Principle Factors Underlying Efficient Product Development

Skills   What specialist knowledge and techniques
                  are applied for executing product
                  development tasks?

Strategy   Is there a product development strategy
                  that defines the sort of new products to be
                  developed and the resources to be released
                  for the purpose?

Structure   What type of formal organization structures
                  are used to implement product development
                  activities?

Shared Values   Is there a shared belief in the need to
                  pursue product development for the purpose
                  of growing the business?

Style   Does top management provide active support
                  for those involved in key product
                  development tasks, or is a divide and rule
                  management style practiced in which
                  individual functions are left to slug it
                  out between themselves?

Staff   What type of functional specialists are
                  there for executing product development
                  tasks?

Systems   What type of control and coordination
                  mechanisms are used for executing product
                  development tasks?

SOURCE: F. A. Johne and P. A. Snelson, "Success factors in product
         innovation: A selective review of the literature", Journal
         of Product Innovation Management, 1988, 5, p. 117. (Adapted
         from Pascale and Athos and Peters and Waterman)

This thesis will focus on the relationship between the R&D and marketing functions in the new product development process. Two distinct classes of product development activities (technical development and marketing/commercialization) must be coordinated and integrated for new product success. The focus of the study is on the organizational interface between R&D and marketing, considered to be crucial to success in new product development.

Statement of Purpose

The purpose of this study is to investigate and explore various aspects of R&D/Marketing interface conditions in a company involved in new product development and marketing in the food industry.

The company of study is a food ingredient company involved in new product development and marketing of functional and nutritional products for international food and feed markets.

Integration or conflict in interface conditions will be assessed by measuring perceived involvement and information sharing between the R&D and marketing departments within the company of study. The assessment of integration in R&D/marketing interface conditions can provide useful implications in managing this interface in the company of study.

Chapter II

LITERATURE REVIEW

Strategies to merge a company's technological activity with the needs of the marketplace are at the core of the new product process (Crawford, 33). Technical activities and marketing activities must be integrated to achieve success in new product development. This requires collaboration and cooperation between R&D and marketing.

Traditional marketing functions include identification of potential customers, marketing research to determine customer needs, defining demand and price-volume relationships for the potential product, market trend analysis, analysis of competitive products, and determination of price, positioning and distribution strategies.

Traditional functions of R&D include the choice of technical means to develop the product, determination of what types of technologies to use in developing the product, R&D work on the new product, scheduling development work within time limits established, and allocating R&D resources to development work.

These functions were traditionally separate, with one or the other departments driving the new product development process. The traditional separation of R&D and marketing roles creates problems with collaboration. This problem is compounded because R&D and

19

States for a long time. Researchers had stated as far back as the late 1960s that the majority of project failures are due to a lack of a continual, collaborative relationship between marketing and R&D (Gerstenfeld et al, 24). In 1980, the issues were larger than ever but the solution was still not clear. Gerstenfeld and Sumiyoshi stress the importance of the correct balance of integration and differentiation in effective organizations. They conclude that differentiation is emphasized in the United States, leading to continual adversarial relationships between R&D and marketing (31).

In early research on the need to combine both technical and marketing inputs in product development, Young studied research and marketer teams, called dyads, who were jointly working on a developing product (7). Comparisons of the researchers' and marketers' responses revealed problem areas affecting the successful combination of the inputs. Young studied 16 health care firms in a large metropolitan area, representing approximately 15% of the total North American health care market. Data were based on interviews and questionnaires administered to 29 marketers and 29 researchers who formed 29 dyads (7). Results indicated that a combination of communication problems, management errors, and inappropriate reward structures hindered successful product development (8). The dyads did not communicate effectively. One-third of the dyads did not agree on a common definition for the market that they were developing a product for. Most of the dyads did not agree on the

product's stage of development, and their estimates for
commercialization were diverse. They also did not agree on how the
product fit into the firm's product line or on its chance for
success. The most common reason reported by the respondents for the
delay of a developing product was improper or incomplete market
specification (10).

Carroad and Carroad reviewed the general agreement in the
literature that good communication is the key to building and
maintaining a productive R&D/marketing interface. These authors
emphasize the importance of active communication and the use of
dyads in new product development. With an increase in successful
commercial applications arising from market pull as opposed to
technology push, knowledge about markets (size, competition, cost of
gaining acceptance, desired share, risks, etc.) must be communicated
to R&D. This is important in guiding the direction of research and
generating product ideas. The use of dyads are also important in
the development of new products arising from market pull (29).

Gupta, Raj and Wilemon (1986) have presented a conceptual
framework for the study of R&D/marketing integration in the
innovation process based on a synthesis of the literature from
marketing, organizational behavior, new product development, and
research management (Figure 6). The focus of the present study is
on organizational factors within this model, specifically on
R&D/marketing operating characteristics.

Figure 6
A Model for the Study of R&D/Marketing Interface Conditions

		Explanation	
Organizational Strategies	**Perceived Environmental Uncertainty**	**Organizational Factors**	**Individual Factors**
Prospector Analyzer Defender Reactor	Competition Consumer requirements Technological changes Regulatory constraints	1. Structural —formalization —centralization —participative —method of organizing new product activity —physical proximity 2. Senior management —values integration —encourages risk-taking —establishes joint reward system —tolerates failures 3. R&D—marketing operating characteristics	Sociocultural differences between R&D—marketing managers —professional/bureaucratic orientation —tolerance of ambiguity —time orientation —types of products/projects preferred

SOURCE: Ashok K. Gupta, S. P. Raj, and David Wilemon. "A Model
for Studying R&D-Marketing Interface in the Product
Innovation Process." Journal of Marketing. April, 1986: 8

These authors state that "although all functional interfaces
are important in the product development process, the R&D/marketing
interface is one of the most critical ones." (7) After a review of
the literature through the early 80s, they concluded that it is
well-established that R&D/marketing integration has a strong

positive relationship with innovation success. Gupta et al. cite numerous research studies which emphasize the importance of effective integration of R&D and marketing for innovation success. They also cite several studies which note that the failure to integrate R&D and marketing early in the innovative process is one of the biggest contributors to product failure (13). Gupta et al. note that this relationship has been documented not only by researchers in marketing and research management but also by researchers in general management and economics (14).

In defining optimal interface conditions within this model, Gupta et al. propose that one measure of degree of integration between R&D and marketing is based on the extent of R&D/marketing involvement and information sharing in various stages of the new product development process. This process includes the planning phase, the product development phase, and post-commercialization (15).

The authors also propose that the more "harmonious" (12) R&D/marketing operating characteristics, the greater the degree of integration that will be achieved. Operating characteristics are considered harmonious if R&D and marketing are involved from the early stages of the innovation process, if they attempt to understand each other's point of view, if conflicts between them are resolved at the lowest possible level in the organization, and if they discuss issues rather than simply accept them (12).

Gupta, Raj, and Wilemon (1985) previously studied the causes of barriers existing at the R&D/marketing interface by collecting data from 109 marketing managers and 107 R&D managers involved in new product development in 167 research intensive firms (14). The companies had R&D expenditures of at least 2% of sales in 1981, sales between 20 million and 1 billion dollars, and were selected from the chemical, electrical, electronics, information processing, instrumentation, semiconductors, and telecommunications industries (22).

The instrument used in the present study was first developed and used by Gupta et al. in their 1985 study. It was developed by examining each stage of a typical new product development process and identifying activities where the authors thought it important to have the joint involvement of R&D and marketing. These activities included areas considered to be of primary concern to R&D as well as areas with a marketing focus (15).

R&D and marketing managers' perceptions were examined in 19 key areas thought to need some degree of R&D/marketing integration. First, managers were asked to indicate their perceptions of the ideal degree of involvement required in these areas. Differences found between R&D and marketing managers' perceptions of the degree of integration required were statistically significant ($p = \leq.05$) in nine of 13 key areas (based on 13 of 19 areas in which managers considered integration most important). Marketing wanted more

integration than R&D in almost all of the areas (15).

Second, managers were asked to indicate the actual degree of involvement achieved in the same key areas in the new product development process. Results indicated that a significantly smaller percentage (p = .001) of R&D managers perceive that marketing managers are involved or share information with them to a great extent in six of 10 areas where integration is considered important by both R&D and marketing managers (16). Results indicated that R&D perceives that marketing does not share enough information and is not adequately involved with them in the new product development process; marketing managers feel that they do share information and do involve themselves with R&D (16).

The authors note that R&D often perceives that marketing does not provide them with sufficient information on customer requirements of new products, test marketing results, competitors' strategies, and customer feedback on product performance (19).

Third, the difference between the degree of integration ideally required and actually achieved, as perceived by each group, was considered as a measure of the level of dissatisfaction in each group. In eight out of 10 areas where R&D/marketing integration is considered most important by both groups, either R&D or marketing was significantly more dissatisfied (p = .05) than the other (17).

Gupta et al. conclude that an important perceptual gap exists between R&D and marketing managers regarding the extent of their

involvement and information sharing with each other in the new product development process. They hypothesize that the disagreement between R&D and marketing managers on the need for integration may itself be a barrier to achieving an effective integration. Gupta et al. also conclude that their operationalization of the concept of integration in terms of R&D/marketing involvement and information sharing in various activities of the innovation process is valid (20).

As part of this study, statements in response to an open-ended question asking each manager what he/she personally considered to be the major barrier in achieving an effective integration were content-analyzed. The top five barriers were: (1) communication barriers; (2) insensitivity to each others' capabilities and perspectives; (3) lack of senior management support; (4) personality and cultural differences, and (5) lack of market knowledge (18-19).

Gupta and Wilemon (1988a) again studied the link between R&D's perception of the quality of marketing input they receive during the new product development process and its possible influence on cooperation between R&D and marketing. This study was based on a survey of R&D directors in 80 technology-intensive companies involved in new product development (20). The companies had R&D expenditures of at least 2% of sales in 1982 or 1983, and were selected from the chemical, electrical, electronics, information processing, instrumentation, semiconductors, and telecommunications

industries (30).

These authors proposed a model combining the concepts of
credibility, organizational practices, and cooperation (Figure 7)
based on previous research (Gupta et al., 1985). Their previous
research suggested that credibility problems at the R&D-marketing
interface can affect cooperation between R&D-marketing in the new
product development process (20).

Figure 7

Relationship between Credibility and Cooperation in
R&D/Marketing Interface
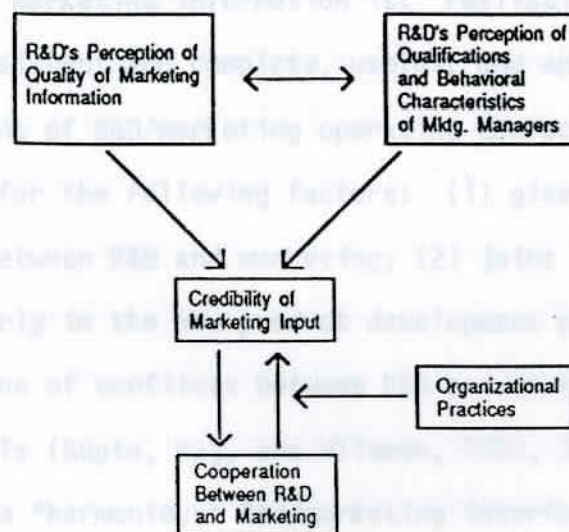
SOURCE: Ashok K. Gupta and David Wilemon. "The Credibility-
Cooperation Connection at the R&D-Marketing Interface.
Journal of Product Innovation Management. 5 (1988a): 21.

Companies were first defined as either low integration or high

integration companies based on the integration scale used in the present study and in the authors' previous research. A high integration company was defined as one that had an overall, average score of more than 4.52 on a 7 point, 13 item integration scale (4.52 was the mean integration level for all responding companies) (25).

Data revealed that in high integration companies, R&D has a more favorable perception of the quality of marketing information. R&D managers in high integration companies perceived to a significantly greater extent ($p \leq .01$) than those in low integration companies that marketing information is: realistic and valid, objective, consistent and complete, useful, and appealing (25-26).

Perceptions of R&D/marketing operating characteristics were also assessed for the following factors: (1) give-and-take relationship between R&D and marketing; (2) joint involvement of both groups early in the new product development process, and (3) quick resolution of conflicts between R&D and marketing at the operating levels (Gupta, Raj, and Wilemon, 1987, 38). These factors characterized a "harmonious" R&D/marketing interface. Harmonious operating characteristics were positively correlated ($p \leq .01$) with six information credibility dimensions (i.e., information is realistic and valid, analyzed and well-presented, objective, consistent and complete, useful, appealing) (Gupta and Wilemon, 1988a, 27).

The authors concluded that R&D managers' perceptions of marketing information differ significantly in high and low integration companies. In high integration companies, credibility, organizational practices that promote integration, and cooperative behavior between the two departments exist. The data supported their thesis that the level of R&D/marketing cooperation is low or moderate if organizational practices are not conducive to integration, or if credibility problems exist at the interface, or both (28).

A content analysis of open-ended questions asked of the R&D managers about the reasons for not using marketing information provided to them and what they would like the marketing group to do to establish and maintain credibility with them revealed the information presented in Tables 3 and 4.

These findings concurred with interview results from R&D and marketing managers from the 167 high-technology firms surveyed in the Gupta et al. 1985 study. In this study, the authors found that senior management in high integration companies provided significantly greater opportunities for their R&D and marketing managers to communicate and understand one another's needs. These opportunities helped R&D managers appreciate the pressures and perspectives of marketing, and aided marketing managers to become more sensitive to the skills and limitations of R&D (Gupta, Raj, & Wilemon, 1987, 42).

Table 3

Why R&D Doesn't Use Marketing Information

Reason	% of R&D Managers Citing This Reason
Information is incomplete	72%
Information is inaccurate	49%
Marketing's lack of technical competence	35%
Information has narrow focus	29%
Marketing's working style	19%
Information not timely	16%
R&D's attitude	12%

SOURCE: Ashok K. Gupta and David Wilemon. "Why R&D Resists Using Marketing Information." Research & Technology Management. 31 1988b: 39.

These authors' findings on R&D/marketing interface problems in high technology firms support the findings from previous research by Souder in firms with new product activities in both consumer and industrial goods (Gupta, Raj, and Wilemon, 1985, 20).

Souder carried out an ex post exploratory field study on a comprehensive database of product life cycle information on 289 new product development innovation projects. The purpose of the study was to determine attitudinal and behavioral descriptors of the R&D/marketing interface in these projects. The data were collected through 10 years of intensive field research at 56 consumer and

Table 4

What Can Marketing Do?

Suggestion	Percentage of R&D Managers Giving This Suggestion
Improve information quality	57%
Work with R&D	54%
Understand technology	32%
Sharpen communication skills	26%
Know the market	18%
Understand R&D people	15%
Realize the cost of changes	11%

SOURCE: Ashok K. Gupta and David Wilemon. "Why R&D Resists Using Marketing Information." Research & Technology Management. 31 1988b: 40.

industrial product firms (Souder, 1977, 1980, 1981, 1987, 1988; Souder and Chakrabarti, 1978). Firms were selected from the following industries: metals, glass, transportation, plastics, machinery, electronics, chemicals, food, aerospace, and pharmaceuticals. A total of 27 instruments were used, as well as telephone interviews and in-depth personal interviews to obtain detailed descriptions and ratings of key events, activities, attitudes, and behaviors of the R&D and marketing personnel who worked on each project. These items were reduced to 42 attitudinal

and behavioral descriptors of the R&D/marketing interface, which were statistically analyzed into seven clusters (p $\leq$ .05) representing different R&D/marketing interface conditions (1988, 6-7). Termed "states" (8) by Souder, they are presented in Table 5.

Table 5

Incidence of Harmony and Disharmony States
in R&D/Marketing Interface Conditions

States	Percentage of Projects Experiencing Each State
Mild Disharmony	
Lack of interaction	7.6%
Lack of communication	6.6
Too-good friends	6.3
Subtotal	20.5
Severe Disharmony	
Lack of appreciation	26.9
Distrust	11.8
Subtotal	38.7
Disharmony total	59.2
Harmony	
Equal partners	11.7
Dominant partner	29.1
Harmony total	40.8
Overall total	100%

SOURCE: William E. Souder. "Managing relations between R&D and marketing in new product development projects." Journal of Product Innovation Management 5 (1988): p. 8.

Percentage of projects from the 289 project database experiencing each state is also presented.

Souder has termed the conflict in interface conditions between R&D and marketing as "disharmony" (12). A high incidence of R&D/marketing disharmony was found. Almost 60% of the projects studied (p = .001) experienced some type of interface disharmony. Of this 60%, approximately 20% of the projects experienced mild disharmony, while nearly 40% of the projects experienced severe disharmony (p = .001) (12). Approximately 40% of the projects experienced harmony states.

Souder discusses two types of harmony states. In the equal partners state, each party appeared to have equal political and decision making powers. One feature common to all the equal partners cases was the proactive, early involvement of R&D and marketing personnel. In nearly all of the equal-partners projects, R&D and marketing personnel jointly made field visits to prospective customers and followed up on potential new product leads. Both engaged in new product planning and strategy formulation, made presentations to top management, and actively searched out emerging technological and market trends.

In the dominant partner state, one party was content to let the other direct or lead them. Some cases were found where R&D was content to have marketing specify precisely what was wanted and when. Cases were found where marketing was content to be led by

R&D; in these cases new products consisted primarily of engineering modifications to established products. The marketing function was very limited in these cases, mainly displaying the product and its performance data to purchasing agents (Souder, 1981, 70).

Success and failure outcomes of projects were then compared to the level of harmony or disharmony. Mild disharmonies generally depreciated the degree of success of project products but seldom resulted in product failures. Cases of severe disharmony resulted in a high frequency of failures. The harmony state resulted in

Table 6

Distribution of Project Outcomes by Harmony/Disharmony States

States	Percentage of Projects in Each State Exhibiting Each Outcome		
	Success	Partial Success	Failure
Harmony	52%	35%	13%
Mild disharmony	32%	45%	23%
Severe disharmony	11%	21%	68%

SOURCE: William E. Souder. "Managing relations between R&D and marketing in new product development projects." Journal of Product Innovation Management 5 (1988): p. 12.

significantly more successful projects than either the mild or severe disharmony states. The results showed a statistically significant relationship (p = .001) between the degree of harmony/disharmony and the degree of project success/failure.

Souder concluded that the quality of the R&D/marketing interface affects the degree of success of new product development efforts (Souder, 1988, 12).

Behavioral and attitudinal indicators of the "Lack of Interaction" and "Lack of Communication" states as described by Souder (1987, 162-163) (presented in Tables 7 and 8) are similar to the involvement and information sharing items measured on the instrument used in the Gupta et al. research (1985, 1988a, 1988b), and in the present study (see Appendix A).

Table 7

Mild Disharmony: Lack of Interaction

Behaviors	Attitudes
There are few informal meetings between R&D and marketing personnel.	Marketing feels they cannot afford the time to get involved in details with R&D.
There are few formal decision meetings between R&D and marketing personnel.	R&D feels there is little value in becoming intimately involved with marketing.
Neither party attends the other's staff meetings.	Both parties are deeply concerned with their own narrow specialties and neither sees any reason to learn more about the other party.
Working documents, salesperson's call reports, and progress reports are not circulated between the R&D and marketing personnel.	Neither party sees the need for interaction; R&D expects marketing to use whatever they give them, and marketing expects R&D to create useful products.

SOURCE: William E. Souder. Managing New Product Innovations: Lexington, MA: Lexington Books, 1987, p. 162.

Table 8

Mild Disharmony: Lack of Communication

Behaviors	Attitudes
There is some communication between the parties, but potential problem areas are glossed over and there is no real depth of communication between them.	Neither party sees any reason to inform the other of their activities.
Marketing is not fully informed of the new technologies that R&D is working on until very late in the life of the technology.	Neither party feels that the other has any information of special value.
R&D is not fully informed of the market need and the rationale for the new product.	Neither party feels any need to give the other any detailed information or explanations.

SOURCE: William E. Souder. Managing New Product Innovations: Lexington, MA: Lexington Books, 1987, p. 163.

In summary, the R&D/marketing interface has consistently been described in the product innovation literature as the most critical functional interface in new product development processes. This interface can be characterized as having conflict (disharmony) or integration (harmony). Research has established that R&D/marketing integration has a strong positive relationship with new product development success; however, there were few empirical investigations of this relationship prior to the 1980s.

Early research focused on dyads, researcher and marketer teams

jointly working on a developing product. Results of these studies indicated that problem areas in successful product development were a combination of communication problems, management errors, and inappropriate reward structures. Problems in communications from marketing to R&D were stressed.

Later research found important perceptual gaps between R&D and marketing managers regarding both current and ideal extent of involvement and information sharing in the new product development process. An operationalization of the concept of integration based on the extent of R&D/marketing involvement and information sharing in various stages of the new product development process was validated. R&D and marketing managers' opinions on the top five barriers to achieving an effective integration were also determined. These are: (1) communication barriers; (2) insensitivity to each others' capabilities and perspectives; (3) lack of senior management support; (4) personality and cultural differences, and (5) lack of market knowledge.

Researchers have concluded that credibility problems at the interface affect cooperation between R&D and marketing. Research has further determined that high integration companies are characterized by credibility in marketing input, organizational practices that promote integration, and harmonious operating characteristics at the interface. Low integration is found in companies in which credibility problems exist at the interface, or

in which organizational practices are not conducive to integration, or both.

In other research, attitudinal and behavioral descriptors of the R&D/marketing interface were compared to success rates in new product development projects. Behavioral and attitudinal indicators of "lack of interaction" and "lack of communication" descriptors are similar to the involvement and information sharing items measured on the instrument used in previous research on the R&D/marketing interface and in the present study (see Appendix A).

Following research previously carried out in this area, the focus of the present study will be on assessment of R&D/marketing interface conditions between the R&D and marketing departments of a food ingredient company manufacturing functional and nutritional products for international food and feed markets.

The following measurements are of interest: (1) R&D and marketing personnel's perceptions of the ideal degree of involvement and information sharing in the new product development process in 19 key areas of primary concern to R&D and marketing; (2) perceived actual degree of involvement achieved in these same areas, and (3) differences between the perceived degree of involvement and information sharing ideally required and actually achieved as a measure of dissatisfaction with current interface conditions in each group. In addition, responses to an open-ended question will be content-analyzed to determine R&D and marketing personnel's opinions

on barriers to effective integration between R&D and marketing in the company of study.

The measurement of involvement and information sharing in various activities of the new product development process is an operationalization of the degree of integration between the two departments in interface conditions in the new product development process. It can provide useful information on interface conditions in the new product development process in the company of study.

It is hypothesized that there will be differences found between R&D and marketing personnel's perceptions of the degree of involvement and information sharing (1) ideally required, and (2) actually achieved in key areas of the new product development process in this company. It is also hypothesized that within each group differences between the perceived degree of ideal and actual involvement and information sharing will measure degree of dissatisfaction with current interface conditions.

Chapter III

RESEARCH METHODOLOGY

Locus of Study

This study was conducted in a corporate setting, at international headquarters of a company involved in new product development and marketing of functional and nutritional products for food and feed markets. Estimated annual sales in 1989 were $200 million. Research & Development (R&D) and marketing are centralized. R&D and marketing departments are maintained in separate buildings in the same complex. The company mission statement states an objective of "building customer sales with new products," and that "...ongoing technological development will be backed by an adaptive organization with primary focus on market relevant innovation."

Subjects

A total of 98 subjects participated in the study. Subject population consisted of all managerial, professional, and technical personnel from R&D, marketing, and market operations involved in new product activity in the company. Subjects included 57 R&D, 17 marketing, and 24 market operations respondents. Marketing and market operations responses were combined as marketing responses.

41

The R&D department population consisted of vice presidents, directors, managers, project leaders, process development engineers, food technologists, meat scientists, chemists, and technical service specialists. The marketing department population consisted of vice presidents, directors, managers, and marketing and sales representatives. A breakdown of the population by title is presented in Table 9. The five vice-presidents and one director surveyed had prior knowledge of the study as summarized in an abstract. In addition, they were aware of the instrument used. This was necessary for approval and authorization of the study within the company.

Table 9

Subject Population by Title

Title	Number of Subjects	
	Research	Marketing
Vice President	2	3
Director	13	11
Manager	11	22
Sales Account Representative	--	5
Process Development Engineer	4	--
Project Leader	8	--
Food Technologist	8	--
Chemist	3	--
Meat Scientist	4	--
Quality Assurance Auditor	1	--
Product Developer	1	--
Technical Service Specialist	2	--
Total	57	41

The remaining 92 subjects had no prior knowledge of the study, nor were they aware of the instrument used.

Instrument

The integration scale developed by Gupta, Raj, and Wilemon (1985) was used in this study (Appendix A). It was developed by examining each stage of a typical new product process, and identifying 19 activities in which the authors thought it important to have the joint involvement of R&D and marketing. Activities included areas considered to be important to both R&D, and marketing. These activities were then summarized and used as 19 items on the scale (14-15).

Gupta, Raj, and Wilemon concluded in their 1985 study that this operationalization of the concept of integration in terms of R&D/marketing involvement and information sharing in various activities of the innovation process, as measured in their integration scale, was valid (20). They further validated a shortened version of the scale (13-item) by using it in a 1988 (a) study. Companies in this study were defined as either low integration or high integration companies based on overall average scores on this scale. Results indicated that in high integration companies, credibility, organizational practices that promote integration, and cooperative behavior between R&D and marketing exist (28).

Questionnaire - Part I

In Part I of the instrument used, subjects were asked to
indicate the extent of their involvement and information sharing in
the new product development process in the 19 areas shown on the
scale as they:

1. Currently perceive it to be in their organization,

    and

2. As they would ideally like it to be for their organization
    and its strategies.

Three different areas of concern were measured on the scale:

A. perceptions of marketing involvement with R&D in areas
    with primarily a research focus;

B. perceptions of information provided to R&D from marketing;

C. perceptions of R&D involvement with marketing in areas
    with primarily a marketing focus.

A 6-point bi-polar scale was used to measure the extent of
involvement and information sharing. On the scale, 1 indicated that
no involvement/information sharing was currently achieved or ideally
required, and 6 indicated a very high degree of involvement/
information sharing was currently achieved or ideally required

between R&D and marketing. Mean scores were calculated for both R&D and marketing responses for each area of integration (for both current and ideal perceptions). Mean scores were then compared using t-test analysis. In addition, a paired t-test was used to compare mean differences between current and ideal perceptions within R&D and within marketing groups.

Questionnaire - Part II

In Part II of the instrument, subjects were asked an open-ended question: "We are most interested in what you personally consider to be the major barriers in achieving an effective integration of efforts between R&D and marketing during the new product development process in your organization. Please list them below." Responses to this question were content-analyzed by frequency of citation and presented in descending order of frequency.

Procedure

Instruments were mailed to subjects through inter-office mail. A cover letter stating approval of the survey by respective vice-president for each group was attached to the instruments (Appendix B). The cover letter assured that responses were confidential and anonymous. The cover letter also requested that instruments be completed and returned within one week. The Vice-Presidents and one Director were told an Executive Summary of results would be sent to

them at the conclusion of the study. Other respondents were told
that the results would be summarized and available to them in report
format at the end of the study. Subjects had no prior knowledge of
the study nor were they aware of the instrument used. A numbered
coding system was used for collection of the instruments to ensure
confidentiality and anonymity. The coding system used either an "M"
(for marketing/market operations) or an "R" (for R&D) identifier on
each questionnaire for purposes of data analysis.

Data Analysis

The following measures were of interest in Part I of the
instrument:

1.   Mean scores on each item on the scale for R&D:

     (a) R_C = current perceptions of extent of
           involvement and information sharing in the
           new product development process, and

     (b) R_I = as they would ideally like it to be for
           their organization and its strategies.

2.   Mean scores on each item on the scale for marketing:

(a) M_C = current perceptions of extent of involvement and information sharing in the new product development process, and

(b) M_I = as they would ideally like it to be for their organization and its strategies.

3. Differences between R&D and marketing for (a) and (b), as a measure of integration in R&D/marketing interface conditions. This involved a comparison of $R_C \longleftrightarrow M_C$ and a comparison of $R_I \longleftrightarrow M_I$ for each of the 19 items on the scale.

4. Differences between (a) and (b) within R&D and within marketing as a measure of dissatisfaction with current interface conditions. This involved a comparison of $R_C \longleftrightarrow R_I$ and $M_C \longleftrightarrow M_I$ for each of the 19 items on the scale.

A t-test analysis was used to calculate differences between means between the R&D and marketing groups. A paired t-test analysis was used to calculate differences within the two groups.

Part II data analysis consisted of a content analysis of

responses to an open-ended question regarding barriers to integration between research and marketing. Responses to this question were content-analyzed by frequency of citation and presented in descending order of frequency.

Chapter IV
RESULTS

Questionnaire - Part I

Three different areas of concern were assessed in Part I of the questionnaire.

A.   perceptions of marketing involvement with R&D in areas
     with primarily a research focus;

B.   perceptions of information provided to R&D from marketing;

C.   perceptions of R&D involvement with marketing in areas
     with primarily a marketing focus.

The first area concerned perceptions of marketing involvement with R&D. Results are presented in Tables 10 and 11 for differences between R&D and marketing.

Differences were found in perceptions of the current degree of marketing involvement in one area, i.e., finding commercial applications of R&D's product ideas and technologies (p = .05).

Differences were found in perceptions of ideal degree of involvement in 5 of 6 areas: setting new product goals and priorities (p = .0005), R&D's budget proposals (p = .05),

49

establishing product development schedules (p = .001), generating
new product ideas (p = .05), and screening new product ideas
(p = .01).

The second area concerned perceptions of marketing's
information sharing with R&D. Results are presented in Tables 12
and 13 for differences between R&D and marketing.

Differences were found in perceptions of current degree of
information sharing in 4 of 5 areas: customer requirements of new
products (p = .001), regulatory and legal restrictions on product
performance and design (p = .0001), feedback from customers
regarding product performance on a regular basis (p = .001), and
competitors' moves (p = .05).

Differences were also found in ideal degree of information
sharing in 3 of 5 areas: customer requirements of new products
(p = .005), feedback from customers regarding product performance
and design (p = .05), and competitors' moves (p = .0005).

The third area concerned perceptions of R&D involvement with
marketing in areas with primarily a marketing focus. Results are
shown in Tables 14 and 15 for differences between R&D and marketing.

Perceptions of current degree of R&D involvement differed in
one area, i.e., marketing's budget proposals (p = .05). Perceptions
of ideal degree of R&D involvement required differed in 6 of 8
areas: marketing's budget proposals (p = .01), screening new
product ideas (p = .001), modifying products according to
marketing's recommendations (p = .005), developing new products

according to the market's needs (p = .001), designing user and service literature (p = .005), and training users of new products (p = .005).

Differences within the R&D and marketing groups were also compared in the three areas of concern, as a measure of dissatisfaction with current interface conditions. Results are presented in Tables 16-21 and in Appendix C.

Results demonstrated significant differences in 19 of 19 areas of integration assessed between marketing personnel's perceptions of current and ideal degree of (1) marketing involvement with R&D, (2) information provided to R&D from marketing, and (3) R&D involvement with marketing.

Similar results were demonstrated for R&D, except that in one area measuring marketing involvement with R&D, no significant difference was found. This area was marketing's involvement in establishing product development schedules.

Statistical analyses are presented in Appendix D.

Number of Subjects Responding to Questionnaire

A total of 79 subjects responded to the questionnaire. These included 56/57 R&D respondents, 15/17 marketing respondents, and 8/24 market operations respondents. Non-respondents included subjects from the following title categories:

	R&D	Marketing	Market Operations
Vice President		1	
Manager	1	1	11
Director			3
Account Representative			2
Total	1	2	16

The survey of market operations was problematic. The vice president of market operations was out of the country for an extended period of time and unable to authorize the mailing out of questionnaires to the market operations group until late in the data collection process. In addition, numerous respondents were based outside of corporate headquarters or were traveling and were unable to return questionnaires in the short time allotted. The majority of non-respondents in market operations were regional sales managers based outside of corporate headquarters.

Due to the smaller percentage of return from market operations, data were analyzed both with and without market operations returns. When these returns were removed, there were no differences found altering statistical significance of the results (comparing current versus ideal perceptions) within the marketing group. Minor differences were found in comparisons between the groups. These are noted in individual tables. Statistical analyses showing removal of market operations returns are attached in Appendix E.

Questionnaire - Part II

In Part II of the study, a content analysis of responses to an open-ended question regarding barriers to integration between R&D and marketing was done. Respondents were asked to list responses to the following statement on Part II of the questionnaire: "We are most interested in what you personally consider to be the major barriers in achieving an effective integration of efforts between R&D and marketing during the new product development process in your organization. Please list them below."

Part II was answered by 38/56 R&D respondents, with a total of 98 statements made. This section was answered by 19/23 marketing/market operations respondents, with a total of 52 statements made. A total of 150 statements were categorized from both groups.

Categories used for content analysis were those described by Gupta, Raj, and Wilemon (1985), as follows: (1) communication barriers; (2) insensitivity to each others' capabilities and perspectives; (3) lack of senior management support; (4) personality and cultural differences, and (5) lack of market knowledge. Other categories specific to the present study were also derived from responses received, as follows: (1) strategies; (2) time pressures; (3) group divergence; (4) lack of contact (meetings); (5) prioritization; (6) politics; (7) manpower restrictions; (8) technology security; (9) structure, and (10) budget. Categories of

responses and frequency of each are presented in Table 22.

Communication barriers included responses referring to lack of information sharing and communication involving both groups due to reluctance or lack of effort; lack of effective existing communications; the need for communications on specific issues; more systematic/consistent communications, more complete communications at lower levels, and clearer communication of goals and strategies.

Strategy barriers included responses referring to differences in short-term versus long-term objectives; need for consistent strategy, agreement between groups on issues prior to product development; agreement on performance standards and product definitions, and need for project leadership.

Insensitivity barriers included responses referring to lack of understanding between the groups of product development and marketing processes and negative attitudes between groups.

Time pressures included responses referring to unrealistic scheduling, different timeframes, or inability to produce information on a timely basis.

Group divergence included responses referring to lack of team effort, lack of coordination, and a gap or separation between the two groups.

Remaining categories in the content analysis are self-explanatory.

Table 10

Current Degree of Marketing Involvement
Achieved as Perceived by R&D and Marketing Personnel

Areas of Integration in the New Product Development Process	M_C Marketing	R_C R&D	Prob T
Setting new product goals and priorities	4.17	3.76	.1989
R&D's budget proposals	2.04	2.58	.0550
Establishing product development schedules	3.65	3.53	.7364
Generating new product ideas	3.69	3.33	.2311
Screening new product ideas	3.43	3.44	.9702
Finding commercial applications of R&D's product ideas/technologies	4.26	3.60	.0439[f]

[f]Difference is significant at .05 level.

Note: N=79, R&D=56, Marketing/Market Operations=23

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved.

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 11

Ideal Degree of Marketing Involvement

Required as Perceived by R&D and Marketing Personnel

Areas of Integration in the New Product Development Process	M_C Marketing	R_C R&D	Prob T
Setting new product goals and priorities	5.34	4.44	.0002[b]
R&D's budget proposals	3.52	2.94	.0278[f]*
Establishing product development schedules	4.68	3.58	.0008[c]
Generating new product ideas	5.08	4.44	.0216[f]
Screening new product ideas	5.21	4.57	.0084[e]
Finding commercial applications of R&D's product ideas/technologies	5.26	4.89	.0794**

[b]Difference is significant at .0005 level.
[c]Difference is significant at .001 level.
[e]Difference is significant at .01 level.
[f]Difference is significant at .05 level.

*= Diff is nonsignificant when market operations removed (p =.0897).
**= Diff is significant when market operations removed (p =.0057).

Note: N=79, R&D=56, Marketing/Market Operations=23

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration required.

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 12

Current Degree of Information Sharing from Marketing

as Perceived by R&D and Marketing Personnel

Areas of Integration in the New Product Development Process	M_C Marketing	R_C R&D	Prob T
Customer requirements of new products	4.34	3.39	.0009[c]
Regulatory and legal restrictions on product performance	3.91	2.76	.0001[a]
Test marketing results	4.17	3.53	.0502**
Feedback from customers	4.17	3.16	.0010[c]
Competitors' Moves	3.52	2.78	.0106[f]

[a]Difference is significant at .0001 level.
[c]Difference is significant at .001 level.
[f]Difference is significant at .05 level.

**= Diff is significant when market operations removed (p =.0100).

Note: N=79, R&D=56, Marketing/Market Operations=23

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved.

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 13

Ideal Degree of Information Sharing Required from Marketing
as Perceived by R&D and Marketing Personnel

Areas of Integration in the New Product Development Process	M_C Marketing	R_C R&D	Prob T
Customer requirements of new products	5.52	4.94	.0011[d]
Regulatory and legal restrictions on product performance	4.86	4.26	.0549
Test marketing results	5.39	5.03	.0711**
Feedback from customers	5.47	5.05	.0168[f]
Competitors' Moves	5.39	4.85	.0005[b]

[b]Difference is significant at .0005 level.
[d]Difference is significant at .005 level.
[f]Difference is significant at .05 level.

**= Diff is significant when market operations removed (p =.0349).

Note: N=79, R&D=56, Marketing/Market Operations=23

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration required.

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 14

Current Degree of R&D Involvement Achieved

as Perceived by R&D and Marketing Personnel

Areas of Integration in the New Product Development Process	M_C Marketing	R_C R&D	Prob T
Marketing's budget proposals	2.26	1.60	.0279[f]*
Screening new product ideas	3.73	3.25	.1340
Modifying products according to marketing's recommendations	4.30	4.08	.4228
Developing new products according to the market's needs	4.30	4.16	.6295
Designing communication strategies for the customers of new products	3.21	3.26	.8743
Designing user and service literature	3.56	3.76	.5135
Training users of new products	4.17	3.76	.1369**
Analyzing customer needs	3.65	3.21	.1753

[f]Difference is significant at .05 level.

 *= Diff is nonsignificant when market operations removed (p =.0585).
**= Diff is significant when market operations removed (p =.0105).

Note: N=79, R&D=56, Marketing/Market Operations=23

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved.

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 15

Ideal Degree of R&D Involvement Required

as Perceived by R&D and Marketing Personnel

Areas of Integration in the New Product Development Process	M_C Marketing	R_C R&D	Prob T
Marketing's budget proposals	3.52	2.74	.0074[e]*
Screening new product ideas	5.13	4.57	.0008[c]
Modifying products according to marketing's recommendations	5.21	4.60	.0047[d]
Developing new products according to the market's needs	5.56	5.00	.0006[c]
Designing communication strategies for the customers of new products	4.82	4.46	.1539
Designing user and service literature	5.00	4.28	.0037[d]
Training users of new products	5.04	4.50	.0045[d]
Analyzing customer needs	4.91	4.51	.0931

[c]Difference is significant at .001 level.
[d]Difference is significant at .005 level.
[e]Difference is significant at .01 level.

*= Diff is nonsignificant when market operations removed (p =.0768).

Note: N=79, R&D=56, Marketing/Market Operations=23

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration required.

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 16

Marketing Dissatisfaction with Current Interface Conditions:

Marketing Involvement with R&D

Areas of Integration in the New Product Development Process	$\underline{M}_C$	$\underline{M}_I$	Prob T
Setting new product goals and priorities	4.17	5.35	.0001[a]
R&D's budget proposals	2.04	3.52	.0001[a]
Establishing product development schedules	3.65	4.68	.0001[a]
Generating new product ideas	3.70	5.09	.0001[a]
Screening new product ideas	3.43	5.22	.0001[a]
Finding commercial applications of R&D's product ideas/technologies	4.26	5.26	.0026[d]

[a]Difference is significant at .0001 level.
[d]Difference is significant at .005 level.

Note: N=23, Marketing/Market Operations

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved (C) or required (I).

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 17

R&D Dissatisfaction with Current Interface Conditions:

Marketing Involvement with R&D

Areas of Integration in the New Product Development Process	R_C	R_I	Prob T
Setting new product goals and priorities	3.77	4.45	.0003[b]
R&D's budget proposals	2.59	2.95	.0170[f]
Establishing product development schedules	3.54	3.59	.7825
Generating new product ideas	3.34	4.45	.0001[a]
Screening new product ideas	3.45	4.57	.0001[a]
Finding commercial applications of R&D's product ideas/technologies	3.61	4.89	.0001[a]

[a]Difference is significant at .0001 level.
[b]Difference is significant at .0005 level.
[f]Difference is significant at .05 level.

Note: N=56, R&D
        Numbers denote mean scores on a scale of 1 to 6 below. The
        greater the mean score, the greater the degree of integration
        achieved (C) or required (I).

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 18

Marketing Dissatisfaction with Current Interface Conditions:

Information Sharing with R&D

Areas of Integration in the New Product Development Process	M_C	M_I	Prob T
Customer requirements of new products	4.35	5.52	.0001[a]
Regulatory and legal restrictions on product performance	3.91	4.87	.0002[b]
Test marketing results	4.17	5.39	.0001[a]
Feedback from customers	4.17	5.48	.0001[a]
Competitors' moves	3.52	5.39	.0001[a]

[a]Difference is significant at .0001 level.
[b]Difference is significant at .0005 level.

Note: N=23, Marketing/Market Operations

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved (C) or required (I).

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 19

R&D Dissatisfaction with Current Interface Conditions:

Information Sharing from Marketing

Areas of Integration in the New Product Development Process	R_C	R_I	Prob T
Customer requirements of new products	3.39	4.95	.0001[a]
Regulatory and legal restrictions on product performance	2.77	4.27	.0001[a]
Test marketing results	3.54	5.04	.0001[a]
Feedback from customers	3.16	5.05	.0001[a]
Competitors' moves	2.79	4.86	.0001[a]

[a]Difference is significant at .0001 level.

Note: N=56, R&D

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved (C) or required (I).

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 20

Marketing Dissatisfaction with Current Interface Conditions:

R&D Involvement with Marketing

Areas of Integration in the New Product Development Process	M_C	M_I	Prob T
Marketing's budget proposals	2.26	3.52	.0001[a]
Screening new product ideas	3.74	5.13	.0001[a]
Modifying products according to marketing's recommendations	4.30	5.22	.0015[d]
Developing new products according to the market's needs	4.30	5.57	.0001[a]
Designing communication strategies for the customers of new products	3.22	4.83	.0001[a]
Designing user and service literature	3.57	5.00	.0001[a]
Training users of new products	4.17	5.04	.0005[b]
Analyzing customer needs	3.65	4.91	.0001[a]

[a]Difference is significant at .0001 level.
[b]Difference is significant at .0005 level.
[d]Difference is significant at .005 level.

Note: N=23, Marketing/Market Operations

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved (C) or required (I).

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 21

R&D Dissatisfaction with Current Interface Conditions:
R&D Involvement with Marketing

Areas of Integration in the New Product Development Process	R_C	R_I	Prob T
Marketing's budget proposals	1.60	2.75	.0001[a]
Screening new product ideas	3.25	4.57	.0001[a]
Modifying products according to marketing's recommendations	4.09	4.61	.0008[c]
Developing new products according to the market's needs	4.16	5.00	.0001[a]
Designing communication strategies for the customers of new products	3.27	4.46	.0001[a]
Designing user and service literature	3.77	4.29	.0015[d]
Training users of new products	3.77	4.50	.0001[a]
Analyzing customer needs	3.21	4.52	.0001[a]

[a]Difference is significant at .0001 level.
[c]Difference is significant at .001 level.
[d]Difference is significant at .005 level.

Note: N=56, R&D

Numbers denote mean scores on a scale of 1 to 6 below. The greater the mean score, the greater the degree of integration achieved (C) or required (I).

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

Table 22

Content Analysis by Category:

Barriers to Achieving Effective Integration of Efforts

between R&D and Marketing

Category	% Response
Communication barriers	24.7
Strategy Barriers	12.7
Insensitivity to each other's capabilities and perspectives	11.3
Time pressures	10.0
Group divergence	9.3
Lack of market/product knowledge	6.0
Lack of contact (meetings)	4.7
Technology security	4.7
Prioritization	3.3
Personality and cultural differences	3.3
Lack of management support	2.7
Politics	2.7
Manpower restrictions	2.0
Structure	2.0
Budget	.6
Total	100.0%

Note: N= 57 respondents (38 R&D + 19 marketing/market operations)
      N=150 statements (98 R&D + 52 marketing/marketing operations)

Chapter V

DISCUSSION

Summary

The purpose of this study was to investigate various aspects of
R&D/marketing interface conditions in the new product development
process. The company studied was a food ingredient company involved
in new product development and marketing of functional and
nutritional products for international food and feed markets.
Nineteen key areas in the new product development process were
assessed to determine perceptions of both current and ideal degree
of R&D and marketing involvement and information sharing. The
degree of R&D and marketing involvement and information sharing in
these areas is a measure of integration in interface conditions in
the new product development process.

Results confirmed the hypothesis that differences were found
between R&D and marketing personnel's perceptions of the degree of
involvement and information sharing (1) ideally required, and (2)
actually achieved in key areas of the new product development
process. More differences were seen in perceptions of ideal degree
of integration required than in current degree of integration

68

achieved.

Results also confirmed the hypothesis that within each group differences between the perceived degree of ideal and actual involvement and information sharing revealed dissatisfaction with current interface conditions.

Perceptions of Involvement in the New Product Development Process

Results demonstrated that perceptions of R&D and marketing personnel are similar regarding the current degree of marketing involvement in these areas:

Marketing is involved in setting new product goals and priorities.
Marketing is involved in R&D's budget proposals.
Marketing is involved in establishing product development schedules.
Marketing is involved in generating new product ideas.
Marketing is involved in screening new product ideas.

R&D and marketing agree that marketing is least involved in R&D budget proposals. R&D and marketing also agree that marketing is currently most involved in (1) setting new product goals and priorities, and (2) finding commercial applications of R&D product ideas and technologies. However, perceptions differ significantly regarding marketing's current involvement in finding commercial applications. Marketing perceives they are more involved in this area than R&D does.

Perceptions of R&D and marketing personnel are also similar regarding current degree of R&D involvement in these areas:

R&D is involved in screening new product ideas.
R&D is involved in modifying products according to marketing's recommendations.
R&D is involved in developing new products according to the market's needs.
R&D is involved in designing communication strategies for customers of new products.
R&D is involved in designing user and service literature.
R&D is involved in training users of new products.
R&D is involved in analyzing customer needs.

R&D and marketing also agree that R&D is currently most involved in modifying products according to marketing's recommendations and developing new products according to the market's needs. They agree that R&D is least involved in marketing's budget proposals; however, R&D's and marketing's perceptions differ significantly regarding R&D's involvement in marketing's budget proposals. Marketing perceives R&D to be more involved in this area than R&D thinks it is.

This similarity in perceptions decreases significantly when R&D and marketing personnel are asked to indicate ideal degree of involvement in the new product development process. There are significant differences in R&D and marketing perceptions of the ideal degree of marketing involvement in 5 of 6 areas. These areas are:

> Marketing is involved in setting new product goals and
> priorities.
> Marketing is involved in R&D's budget proposals.
> Marketing is involved in establishing product development
> schedules.
> Marketing is involved in generating new product ideas.
> Marketing is involved in screening new product ideas.

It should be noted that although R&D does want an increase in

degree of marketing involvement in these areas, marketing wants

significantly more involvement than does R&D.

R&D and marketing do agree on the extent to which they want

more marketing involvement in finding commercial applications of

R&D's product ideas and technologies.

There are also significant differences in 6 of 8 areas

assessing ideal degree of R&D involvement in the new product

development process. These are:

> R&D is involved in marketing's budget proposals.
> R&D is involved in screening new product ideas.
> R&D is involved in modifying products according to marketing's
> recommendations.
> R&D is involved in developing new products according to the
> market's needs.
> R&D is involved in designing user and service literature.
> R&D is involved in training users of new products.

Again, it should be noted that although R&D does want an

increase in degree of R&D involvement in these areas, marketing

wants significantly more R&D involvement in the above areas than

does R&D.

R&D and marketing do agree on the extent to which they want

more R&D involvement in designing communication strategies for

customers of new products, and in analyzing customer needs.

Perceptions of Information Sharing in the New Product Development Process

Differences were found in R&D and marketing perceptions of both

current and ideal degree of information sharing from marketing in 4

of 5 areas as follows:

	Significant Differences in current perceptions	Significant Differences in ideal perceptions
Marketing provides information to R&D on:		
Customer requirements of new products	Yes	Yes
Regulatory and legal restrictions on product performance	Yes	No
Feedback from customers	Yes	Yes
Competitors' moves	Yes	Yes

Differences within the R&D and marketing groups were also

compared in the three areas of concern, as a measure of

dissatisfaction with current interface conditions.

Results demonstrated significant differences in 19 of 19 areas

of integration assessed between marketing personnel's perceptions of

current and ideal degree of (1) marketing involvement with R&D, (2)

information provided to R&D from marketing, and (3) R&D involvement

with marketing.

Similar results were demonstrated for R&D, except that in one

area measuring marketing involvement with R&D, no significant

difference was found between R&D's current and ideal perceptions.

This area was marketing's involvement in establishing product

development schedules.

Conclusions: R&D and Marketing Perceptions of Current Integration

It can be concluded that R&D and marketing perceptions of

current integration achieved between R&D and marketing in 12 of 14

areas measuring involvement are similar. Exceptions are the areas

of marketing's involvement in finding commercial applications of R&D

product ideas and technologies, and R&D's involvement in marketing's

budget proposals. In these areas, marketing perceives more

marketing involvement in finding commercial applications, and more

R&D involvement in marketing's budget proposals than R&D does.

Differences were found in 4 of 5 areas measuring current

information sharing from marketing to R&D, with marketing perceiving

more information sharing in each area than R&D does.

Conclusions: R&D and Marketing Perceptions of Ideal Integration

R&D and marketing perceptions of ideal integration required

differ significantly in 11 of 14 areas measuring involvement they

would ideally like for their organization and its strategies.

Marketing wants more involvement by both marketing and R&D in these

areas. R&D and marketing agree on the extent to which they want

more marketing involvement in finding commercial applications of R&D product ideas and technologies, more R&D involvement in designing communication strategies for customers of new products, and more R&D involvement in analyzing customer needs.

Differences were also found in 3 of 5 areas measuring ideal degree of information sharing from marketing to R&D, with marketing wanting more information sharing in each area than R&D does.

Conclusions: Differences Within Groups as Measure of Dissatisfaction with Current Interface Conditions

Both R&D and marketing showed significant differences within each group in integration actually achieved versus integration ideally required. These differences occurred in all 19 areas assessed for involvement and information sharing in marketing and in 18 of 19 areas assessed for R&D. These results confirm dissatisfaction with current interface conditions within both R&D and marketing groups.

Conclusions: Content Analysis

In addition, a content analysis of responses to an open-ended question (Part II of the questionnaire) revealed the top four barriers to integration between R&D and marketing to be (1) communication barriers (25% of responses); (2) strategy barriers (13% of responses); (3) insensitivity to each others' capabilities

and perspectives (11% of responses); and (4) time pressures (10% of responses).

These results concur with results previously reported by Gupta, Raj, and Wilemon (1985), who found significant differences between R&D and marketing managers' perceptions of ideal degree of integration required in 9 of 13 key areas. In their study, marketing also wanted more integration than R&D. Similarly, in their study, differences were found between the degree of integration ideally required and actually achieved within each group in 8 of 10 key areas. Other similarities include perceptions of information sharing from marketing. The Gupta et al. study found current differences in 4 of 4 areas assessed, and ideal differences in 2 of 4 areas assessed.

Results differ in the company of study from the Gupta et al. study in that more agreement on the current level of involvement achieved was found in the company of study. This agreement on current level of involvement may be unique to this firm.

Other differences include content analysis results. Gupta et al. determined the top four barriers to integration in their study to be: (1) communication barriers (30% of responses); (2) insensitivity to each other's capabilities and perspectives (20% of responses); lack of senior management support (12% of responses); and (4) personality and cultural differences (7% of responses).

Lack of management support and personality and cultural differences were rarely mentioned in responses to this question in the company of study.

Results of the content analysis do reveal evidence of the mild disharmony state termed "lack of communication" by Souder (1987, 163). Nearly 25% of the responses analyzed mentioned communication barriers as barriers to R&D/marketing integration.

Differences between R&D and marketing in perceptions of current and ideal degree of information sharing in the company of study also point to credibility problems at the interface. These results may suggest a low or moderate level of integration, according to previous research by Gupta and Wilemon (1988a). Their research supported the thesis that the level of R&D/marketing cooperation is low or moderate if credibility problems exist at the interface.

It is helpful to compare these results at the company of study to the model for studying the R&D/marketing interface in the product innovation process presented in Chapter II. The model terms the difference between "perceived need for integration" and "degree of integration achieved" as an "integration gap" in the organization. This model also proposes that the greater the gap between the degree of integration ideally required and actually achieved, the lower the probability of innovation success. It is recommended that organizations must first assess the need for integration and then attempt to reduce the gap between the degree of integration ideally

required and currently achieved (Gupta, Raj, and Wilemon, 1986, 14).

To relate the model to the company of study, perceptions of the current "degree of integration achieved" in the company of study are similar concerning involvement except for one area of marketing involvement and one area of R&D involvement. However, perceptions of the current "degree of integration achieved" differ concerning information sharing from marketing in 4 of 5 areas.

The "perceived need for integration" differs between the R&D and marketing groups. Differences occur in 11 of 14 areas for ideal involvement between the two groups, and in 3 of 5 areas for ideal information sharing between the two groups. However, both groups agree on the need for increased integration. Within the marketing group, marketing wants more marketing or R&D involvement in 14 of 14 areas measuring ideal involvement, and more marketing information sharing in 5 of 5 areas measuring ideal information sharing. Within the R&D group, R&D also wants more R&D or marketing involvement in 13 of 14 areas measuring ideal involvement, and more marketing information sharing in 5 of 5 areas measuring ideal information sharing. Neither R&D nor marketing want less involvement by either group in any area assessed.

There is, then, a definite "integration gap" in the company of study.

There are implications for senior management, R&D, and marketing in the company of study from this conceptualization of

integration in terms of the degree of R&D/marketing involvement and information sharing in the various stages of the innovation process. This framework can help answer questions regarding in which areas either group wants greater involvement, or in what areas one group is providing information and the other is not getting it. When areas of discrepancy are known, reasons for the gap in perceptions can be determined. This aid in identifying specific problem areas can help in building integration between R&D and marketing in the company of study (15).

Limitations

The low response rate from market operations posed a problem in this research. As discussed in Chapter IV, response rate from market operations differed significantly from marketing and R&D response rates. Market operations was originally included in the study due to its close working relationship with marketing, and the significant number of communications from market operations to R&D, particularly call reports from customers. These communications contain vital information for the new product development process. A month was alloted for data collection, and would have been sufficient, if not for the absence of the vice president of market operations for an extended period of time. The consequent lack of approval for questionnaires to be distributed to the market operations group was the cause of this problem. This is a problem

in carrying out reseach in a corporate setting, and was not planned for.

Another limitation may have been the concentration of personnel below managerial level in the R&D group. There were 31 respondents below managerial level in the R&D group, versus 5 in the marketing group. Diferences in response based on title were not assessed, because no background information was requested of any of the respondents. This was done to increase participation in the study, and to assure anonymity to the respondents. It should be noted that this study differed from previous research on the R&D/marketing interface in that technical personnel below the managerial level were included.

Response bias may have been present in responses to the open-ended question about barriers to integration between R&D and marketing. The cover letter attached to the questionnaire described the study as part of a thesis project for an M. S. in Corporate and Industrial Communications. In addition, one section of the questionnaire was concerned with information sharing from marketing. This may have led to an increase in responses stating "communication" as a barrier to integration, leading to approximately 25% of responses falling in this category.

Suggestions for Future Research

Future research in a corporate setting should be well-planned

in terms of time variables.

It is suggested that differences in response based on title, level, or function in the new product development process be looked at to see if and where variability occurs.

It may be appropriate to separate the open-ended question regarding barriers to integration (Part II of the questionnaire) from Part I of the questionnaire regarding involvement and information sharing, so that no response bias occurs in responses to this question. It may be best to ask this question first separately, followed by a time interval, before administering the involvement and information sharing parts of the questionnaire.

APPENDIX A

INTEGRATION SCALE

I. In this section we have listed a number of areas and issues where R&D and marketing/market operations are involved together and share information with each other in the new product development process.

We would like to know your perception of their degree of involvement and information sharing in the new product development context:

(a) as you currently perceive them to be in your organization

(b) as you would ideally like them to be for your organization and its strategies.

Please indicate your perception of the degree of involvement and information sharing by circling a number between 1 and 6 in the two columns to the right of each statement given below: Here:

1	2	3	4	5	6
None	Little	Some Extent	Quite a bit	A great deal	A very great deal

A. Marketing/Market operations is involved with R&D in

(a) Current Degree of Involvement | (b) Ideal Degree of Involvement

	(a) Current Degree of Involvement						(b) Ideal Degree of Involvement					
1. Setting new product goals and priorities . .	1	2	3	4	5	6	1	2	3	4	5	6
2. R&D's budget proposals	1	2	3	4	5	6	1	2	3	4	5	6
3. Establishing product development schedules .	1	2	3	4	5	6	1	2	3	4	5	6
4. Generating new product ideas	1	2	3	4	5	6	1	2	3	4	5	6
5. Screening new product ideas	1	2	3	4	5	6	1	2	3	4	5	6
6. Finding commercial applications of R&D's product ideas/technologies	1	2	3	4	5	6	1	2	3	4	5	6

B. Marketing/Market operations provides information to R&D on

	(a) Current Degree of Information Sharing						(b) Ideal Degree of Information Sharing					
1. Customer requirements of new products . . .	1	2	3	4	5	6	1	2	3	4	5	6
2. Regulatory and legal restrictions on product performance and design	1	2	3	4	5	6	1	2	3	4	5	6
3. Test marketing results	1	2	3	4	5	6	1	2	3	4	5	6
4. Feedback from customers regarding product performance on a regular basis . .	1	2	3	4	5	6	1	2	3	4	5	6
5. Competitors' moves	1	2	3	4	5	6	1	2	3	4	5	6

C. R&D is involved with Marketing/Market operations in

	(a) Current Degree of Involvement						(b) Ideal Degree of Involvement					
1. Marketing's budget proposals	1	2	3	4	5	6	1	2	3	4	5	6
2. Screening new product ideas	1	2	3	4	5	6	1	2	3	4	5	6
3. Modifying products according to marketing's recommendations	1	2	3	4	5	6	1	2	3	4	5	6
4. Developing new products according to the market's needs	1	2	3	4	5	6	1	2	3	4	5	6
5. Designing communication strategies for the customers of new products	1	2	3	4	5	6	1	2	3	4	5	6
6. Designing user and service literature	1	2	3	4	5	6	1	2	3	4	5	6
7. Training users of new products	1	2	3	4	5	6	1	2	3	4	5	6
8. Analyzing customer needs	1	2	3	4	5	6	1	2	3	4	5	6

II. We are most interested in what you personally consider to be the major barriers in achieving an effective integration of efforts between R&D and marketing during the new product development process in your organization. Please list them below:

APPENDIX B

COVER LETTER

February 16, 1990

You have been selected as a respondent in a study investigating the degree of involvement and information sharing between R&D and marketing in the new product development process at Protein Technologies International.

Questionnaire

The attached questionnaire is in 2 parts. Part I asks for your perceptions of the degree of involvement and information sharing in key areas of new product development. Please respond to all of these items even though you may not be directly involved in these areas.

Part II is an open-ended question asking you to list your responses.

Confidentiality and Anonymity

This survey is part of my thesis project for an M. S. in Corporate and Industrial Communications. Your responses are confidential and anonymous:

- Do not write your name on the questionnaire. Each questionnaire is coded with a number for purposes of questionnaire collection only. The only identification made is an "M" for marketing/market operations or an "R" for research respondents.

- Data will be presented in summary form only. Answers to Part II will be content-analyzed and summarized. Individual responses will not be presented in any form.

Your input is very important, and will provide valuable information on the relationship between R&D and marketing in the new product development process at Protein Technologies International. A summary of the results will be available in early April.

Thank you for taking the time to complete this questionnaire and return it to P. Hoffman - 4RN by March 12. If you have any questions, call me at 3178.

Pam Hoffman - 4RN

Approval: _____

APPENDIX C

R&D/MARKETING DISSATISFACTION WITH CURRENT INTERFACE CONDITIONS

QUESTION	INTRFACE		FREQ	RESPONSE MEAN
A1	CURRENT	New product goals & priorities.	23	4.17
	IDEAL		23	5.35
A2	CURRENT	R&D's budget proposals.	23	2.04
	IDEAL		23	3.52
A3	CURRENT	Product development schedules.	23	3.65
	IDEAL		22	4.68
A4	CURRENT	Generating new product ideas.	23	3.70
	IDEAL		23	5.09
A5	CURRENT	Screening new product ideas.	23	3.43
	IDEAL		23	5.22
A6	CURRENT	Finding commercial applications.	23	4.26
	IDEAL		23	5.26

RESPONSE MEAN

0   1   2   3   4   5   6

INTRFACE   CURRENT   IDEAL

MARKETING INVOLVEMENT WITH RESEARCH AND DEVELOPMENT

IDTYPE=MARKETING

84

		FREQ	RESPONSE MEAN
QUESTION	INTRFACE		
A1	CURRENT	56	3.77
	IDEAL	56	4.45
A2	CURRENT	56	2.59
	IDEAL	56	2.95
A3	CURRENT	56	3.54
	IDEAL	56	3.59
A4	CURRENT	56	3.34
	IDEAL	56	4.45
A5	CURRENT	56	3.45
	IDEAL	56	4.57
A6	CURRENT	56	3.61
	IDEAL	56	4.89

New product goals & priorities.

R&D's budget proposals.

Product development schedules.

Generating new product ideas.

Screening new product ideas.

Finding commercial applications.

RESPONSE MEAN

INTRFACE ▨ CURRENT ▨ IDEAL

MARKETING INVOLVEMENT WITH RESEARCH AND DEVELOPMENT

IDTYPE=RESEARCH

QUESTION	INTRFACE		FREQ	RESPONSE MEAN
B1	CURRENT	Customer requirements.	23	4.35
	IDEAL		23	5.52
B2	CURRENT	Regulatory/legal restrictions.	23	3.91
	IDEAL		23	4.87
B3	CURRENT	Test marketing results.	23	4.17
	IDEAL		23	5.39
B4	CURRENT	Feedback from customers.	23	4.17
	IDEAL		23	5.48
B5	CURRENT	Competitors' moves.	23	3.52
	IDEAL		23	5.39

RESPONSE MEAN

INTRFACE   CURRENT   IDEAL

86

INFORMATION SHARING

IDTYPE=MARKETING

QUESTION	INTRFACE		FREQ	RESPONSE MEAN
B1	CURRENT	Customer requirements.	56	3.39
	IDEAL		56	4.95
B2	CURRENT	Regulatory/legal restrictions.	56	2.77
	IDEAL		56	4.27
B3	CURRENT	Test marketing results.	56	3.54
	IDEAL		56	5.04
B4	CURRENT	Feedback from customers.	56	3.16
	IDEAL		56	5.05
B5	CURRENT	Competitors' moves.	56	2.79
	IDEAL		56	4.86

RESPONSE MEAN
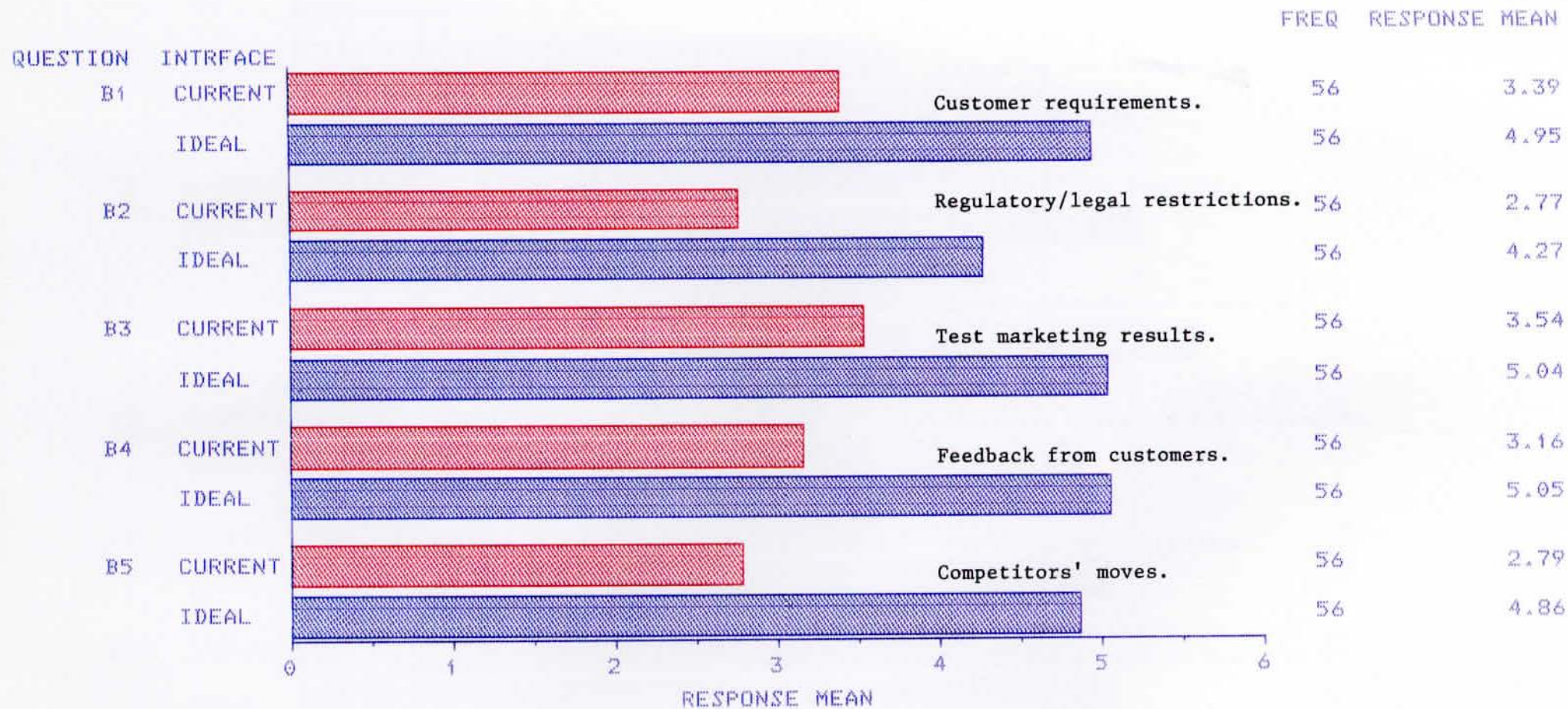
INTRFACE   CURRENT   IDEAL

# INFORMATION SHARING
IDTYPE=RESEARCH

QUESTION	INTRFACE		FREQ	RESPONSE MEAN
C1	CURRENT	Marketing's budget proposals.	23	2.26
	IDEAL		23	3.52
C2	CURRENT	Screening new product ideas.	23	3.74
	IDEAL		23	5.13
C3	CURRENT	Modifying products.	23	4.30
	IDEAL		23	5.22
C4	CURRENT	Developing new products.	23	4.30
	IDEAL		23	5.57
C5	CURRENT	Designing communication strategies.	23	3.22
	IDEAL		23	4.83
C6	CURRENT	Designing user literature.	23	3.57
	IDEAL		23	5.00
C7	CURRENT	Training users of new products.	23	4.17
	IDEAL		23	5.04
C8	CURRENT	Analyzing customer needs.	23	3.65
	IDEAL		23	4.91

0   1   2   3   4   5   6

RESPONSE MEAN

RESEARCH AND DEVELOPMENT INVOLVEMENT WITH MARKETING

IDTYPE=MARKETING

QUESTION	INTRFACE		FREQ	RESPONSE MEAN
C1	CURRENT	Marketing's budget proposals.	55	1.60
	IDEAL		55	2.75
C2	CURRENT	Screening new product ideas.	56	3.25
	IDEAL		56	4.57
C3	CURRENT	Modifying products.	56	4.09
	IDEAL		56	4.61
C4	CURRENT	Developing new products.	56	4.16
	IDEAL		56	5.00
C5	CURRENT	Designing communication strategies.	56	3.27
	IDEAL		56	4.46
C6	CURRENT	Designing user literature.	56	3.77
	IDEAL		56	4.29
C7	CURRENT	Training users of new products.	56	3.77
	IDEAL		56	4.50
C8	CURRENT	Analyzing customer needs.	56	3.21
	IDEAL		56	4.52

RESPONSE MEAN

RESEARCH AND DEVELOPMENT INVOLVEMENT WITH MARKETING

IDTYPE=RESEARCH

89

APPENDIX D

RESEARCH RESULTS WITH MARKET OPERATIONS RETURNS

P. HOFFMAN - SURVEY RESULTS

RESEARCH RESULTS - IDEAL VERSUS CURRENT

VARIABLE	MEAN	N	STANDARD DEVIATION	MINIMUM VALUE	MAXIMU VALUE
--------- IDTYPE=MARKETING INTRFACE=CURRENT ---------				
A1	4.17391304	23	1.26678454	1.00000000	6.0000000
A2	2.04347826	23	1.06507622	1.00000000	5.0000000
A3	3.65217391	23	1.46500685	1.00000000	6.0000000
A4	3.69565217	23	1.18455142	1.00000000	5.0000000
A5	3.43478261	23	1.16095912	1.00000000	6.0000000
A6	4.26086957	23	1.42118361	1.00000000	6.0000000
B1	4.34782609	23	0.93462173	2.00000000	6.0000000
B2	3.91304348	23	1.12464311	1.00000000	5.0000000
B3	4.17391304	23	1.23037961	2.00000000	6.0000000
B4	4.17391304	23	0.98406272	3.00000000	6.0000000
B5	3.52173913	23	1.03877398	2.00000000	5.0000000
C1	2.26086957	23	1.28690578	1.00000000	5.0000000
C2	3.73913043	23	1.09616651	2.00000000	6.0000000
C3	4.30434783	23	1.06321907	3.00000000	6.0000000
C4	4.30434783	23	1.25895998	2.00000000	6.0000000
C5	3.21739130	23	1.16605480	1.00000000	5.0000000
C6	3.56521739	23	1.07981846	2.00000000	5.0000000
C7	4.17391304	23	0.93673388	2.00000000	6.0000000
C8	3.65217391	23	1.07062835	2.00000000	5.0000000
--------- IDTYPE=MARKETING INTRFACE=IDEAL ---------				
A1	5.34782609	23	0.71405982	4.00000000	6.0000000
A2	3.52173913	23	1.08164711	1.00000000	5.0000000
A3	4.68181818	22	1.12911106	3.00000000	6.0000000
A4	5.08695652	23	0.90015370	3.00000000	6.0000000
A5	5.21739130	23	0.73586818	4.00000000	6.0000000
A6	5.26086957	23	0.91539317	3.00000000	6.0000000
B1	5.52173913	23	0.51075392	5.00000000	6.0000000
B2	4.86956522	23	1.21746188	1.00000000	6.0000000
B3	5.39130435	23	0.65637645	4.00000000	6.0000000
B4	5.47826087	23	0.59310931	4.00000000	6.0000000
B5	5.39130435	23	0.49901088	5.00000000	6.0000000
C1	3.52173913	23	1.23838477	1.00000000	6.0000000
C2	5.13043478	23	0.54808326	4.00000000	6.0000000
C3	5.21739130	23	0.79524277	3.00000000	6.0000000
C4	5.56521739	23	0.50686980	5.00000000	6.0000000
C5	4.82608696	23	0.93673388	2.00000000	6.0000000
C6	5.00000000	23	0.79772404	3.00000000	6.0000000
C7	5.04347826	23	0.63805535	4.00000000	6.0000000
C8	4.91304348	23	0.84815540	2.00000000	6.0000000

. P. HOFFMAN - .SURVEY RESULTS

RESEARCH RESULTS - IDEAL VERSUS CURRENT

VARIABLE	MEAN	N	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
----------------------------		IDTYPE=RESEARCH INTRFACE=CURRENT	----------------------------		
A1	3.76785714	56	1.26478272	1.00000000	6.00000000
A2	2.58928571	56	1.15643316	1.00000000	5.00000000
A3	3.53571429	56	1.36134006	1.00000000	6.00000000
A4	3.33928571	56	1.19509278	1.00000000	6.00000000
A5	3.44642857	56	1.29220942	1.00000000	6.00000000
A6	3.60714286	56	1.23109074	1.00000000	6.00000000
B1	3.39285714	56	1.18595679	1.00000000	6.00000000
B2	2.76785714	56	1.09529691	1.00000000	6.00000000
B3	3.53571429	56	1.32066493	1.00000000	6.00000000
B4	3.16071429	56	1.27602772	1.00000000	6.00000000
B5	2.78571429	56	1.17108009	1.00000000	6.00000000
C1	1.60000000	55	0.70972086	1.00000000	4.00000000
C2	3.25000000	56	1.37840488	1.00000000	6.00000000
C3	4.08928571	56	1.08337496	1.00000000	6.00000000
C4	4.16071429	56	1.17205004	1.00000000	6.00000000
C5	3.26785714	56	1.32789747	1.00000000	6.00000000
C6	3.76785714	56	1.30719786	1.00000000	6.00000000
C7	3.76785714	56	1.38814554	1.00000000	6.00000000
C8	3.21428571	56	1.37132034	1.00000000	6.00000000
----------------------------		IDTYPE=RESEARCH INTRFACE=IDEAL	----------------------------		
A1	4.44642857	56	1.02548690	1.00000000	6.00000000
A2	2.94642857	56	1.01658328	1.00000000	6.00000000
A3	3.58928571	56	1.27602772	1.00000000	6.00000000
A4	4.44642857	56	1.17426407	1.00000000	6.00000000
A5	4.57142857	56	1.04197614	2.00000000	6.00000000
A6	4.89285714	56	0.80178373	3.00000000	6.00000000
B1	4.94642857	56	0.98016034	1.00000000	6.00000000
B2	4.26785714	56	1.25757445	1.00000000	6.00000000
B3	5.03571429	56	0.83042784	3.00000000	6.00000000
B4	5.05357143	56	0.90291735	3.00000000	6.00000000
B5	4.85714286	56	0.77291823	3.00000000	6.00000000
C1	2.74545455	55	1.09236715	1.00000000	5.00000000
C2	4.57142857	56	0.82807867	3.00000000	6.00000000
C3	4.60714286	56	0.86714938	3.00000000	6.00000000
C4	5.00000000	56	0.87386290	3.00000000	6.00000000
C5	4.46428571	56	1.04384404	2.00000000	6.00000000
C6	4.28571429	56	1.02183944	1.00000000	6.00000000
C7	4.50000000	56	0.95346259	2.00000000	6.00000000
C8	4.51785714	56	0.97217790	3.00000000	6.00000000

P. HOFFMAN - SURVEY RESULTS
RESEARCH RESULTS - IDEAL VERSUS CURRENT

VARIABLE	MEAN	N	STANDARD DEVIATION	T	PR)|T|
RDA1	0.67857143	56	1.30881130	3.88	0.0003
RDA2	0.35714286	56	1.08591932	2.46	0.0170
RDA3	0.05357143	56	1.44498686	0.28	0.7825
RDA4	1.10714286	56	1.58031725	5.24	0.0001
RDA5	1.12500000	56	1.36265116	6.18	0.0001
RDA6	1.28571429	56	1.23161809	7.81	0.0001
RDB1	1.55357143	56	1.30620398	8.90	0.0001
RDB2	1.50000000	56	1.19087439	9.43	0.0001
RDB3	1.50000000	56	1.37510330	8.16	0.0001
RDB4	1.89285714	56	1.34405859	10.54	0.0001
RDB5	2.07142857	56	1.18869130	13.04	0.0001
RDC1	1.14545455	55	0.98916691	8.59	0.0001
RDC2	1.32142857	56	1.36324679	7.25	0.0001
RDC3	0.51785714	56	1.09529691	3.54	0.0008
RDC4	0.83928571	56	1.18746155	5.29	0.0001
RDC5	1.19642857	56	1.19726420	7.48	0.0001
RDC6	0.51785714	56	1.15979734	3.34	0.0015
RDC7	0.73214286	56	1.10356565	4.96	0.0001
RDC8	1.30357143	56	1.32005018	7.39	0.0001

P. HOFFMAN – SURVEY RESULTS
MARKETING RESULTS – IDEAL VERSUS CURRENT

VARIABLE	MEAN	N	STANDARD DEVIATION	T	PR>|T|
MDA1	1.17391304	23	1.11404969	5.05	0.0001
MDA2	1.47826087	23	1.03877398	6.82	0.0001
MDA3	1.09090909	22	1.10879991	4.61	0.0001
MDA4	1.39130435	23	1.07615183	6.20	0.0001
MDA5	1.78260870	23	0.99802176	8.57	0.0001
MDA6	1.00000000	23	1.41421356	3.39	0.0026
MDB1	1.17391304	23	1.11404969	5.05	0.0001
MDB2	0.95652174	23	1.02150784	4.49	0.0002
MDB3	1.21739130	23	1.12639900	5.18	0.0001
MDB4	1.30434783	23	0.87567027	7.14	0.0001
MDB5	1.86956522	23	1.01373960	8.84	0.0001
MDC1	1.26086957	23	1.25108648	4.83	0.0001
MDC2	1.39130435	23	1.03305066	6.46	0.0001
MDC3	0.91304348	23	1.20276362	3.64	0.0015
MDC4	1.26086957	23	1.09616651	5.52	0.0001
MDC5	1.60869565	23	1.26990087	6.08	0.0001
MDC6	1.43478261	23	1.23678788	5.56	0.0001
MDC7	0.86956522	23	1.01373960	4.11	0.0005
MDC8	1.26086957	23	1.21421098	4.98	0.0001

P. HOFFMAN - SURVEY RESULTS   1
CHECK

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

```
CLASS   LEVELS   VALUES

ID      98       M010 M011 M012 M013 M014 M015 M016 M017 M018 M019 M020 M021
                 M022 M023 M024 M025 M026 M027 M028 M029 M030 M031 M032 M033
                 M158 M159 M160 M161 M162 M163 M164 M165 M166 M167 M168 M169
                 M170 M171 M172 M173 M174 R100 R101 R102 R103 R104 R105 R106
                 R107 R108 R109 R110 R111 R112 R113 R114 R115 R116 R117 R118
                 R119 R120 R121 R122 R123 R124 R125 R126 R127 R128 R129 R130
                 R131 R132 R133 R134 R135 R136 R137 R138 R139 R140 R141 R142
                 R143 R144 R145 R146 R147 R148 R149 R150 R151 R152 R153 R154
                 R155 R156

INTRFACE   2     CURRENT IDEAL
```

NUMBER OF OBSERVATIONS IN DATA SET = 196

NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE
      PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER,
      ONLY   158 OBSERVATIONS CAN BE USED IN THIS ANALYSIS.

```
                        P. HOFFMAN - SURVEY RESULTS
                  .  RESEARCH VERSUS MARKETING, BY INTERFACE

                             INTRFACE=CURRENT

                             TTEST PROCEDURE

VARIABLE: A1

IDTYPE            N                    MEAN              STD DEV           STD ERROR

MARKETING        23             4.17391304           1.26678454          0.26414284
RESEARCH         56             3.76785714           1.26478272          0.16901370

VARIANCES         T        DF   PROB > |T|

UNEQUAL      1.2949        41.0      0.2026
EQUAL        1.2957        77.0      0.1989

FOR H0: VARIANCES ARE EQUAL, F'=    1.00 WITH 22 AND 55 DF     PROB > F'= 0.9522
------------------------------------------------------------------------------------

VARIABLE: A2

IDTYPE            N                    MEAN             ·· STD DEV         STD ERROR

MARKETING        23             2.04347826           1.06507622          0.22208374
RESEARCH         56             2.58928571           1.15643316          0.15453488

VARIANCES         T        DF   PROB > |T|

UNEQUAL     -2.0173        44.3      0.0497
EQUAL       -1.9484        77.0      0.0550

FOR H0: VARIANCES ARE EQUAL, F'=    1.18 WITH 55 AND 22 DF     PROB > F'= 0.6881
------------------------------------------------------------------------------------

VARIABLE: A3

IDTYPE            N                    MEAN              STD DEV           STD ERROR

MARKETING        23             3.65217391           1.46500685          0.30547504
RESEARCH         56             3.53571429           1.36134006          0.18191672

VARIANCES         T        DF   PROB > |T|

UNEQUAL      0.3276        38.4      0.7450
EQUAL        0.3379        77.0      0.7364

FOR H0: VARIANCES ARE EQUAL, F'=    1.16 WITH 22 AND 55 DF     PROB > F'= 0.6428
```

P. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: A4

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	3.69565217	1.18455142	0.2469960
RESEARCH	56	3.33928571	1.19509278	0.1597009

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.2116	41.3	0.2325
EQUAL	1.2071	77.0	0.2311

FOR H0: VARIANCES ARE EQUAL, F'= 1.02 WITH 55 AND 22 DF   PROB > F'= 1.000

VARIABLE: A5

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	3.43478261	1.16095912	0.2420767
RESEARCH	56	3.44642857	1.29220942	0.1726787

VARIANCES	T	DF	PROB > |T|
UNEQUAL	-0.0392	45.4	0.9689
EQUAL	-0.0374	77.0	0.9702

FOR H0: VARIANCES ARE EQUAL, F'= 1.24 WITH 55 AND 22 DF   PROB > F'= 0.592

VARIABLE: A6

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	4.26086957	1.42118361	0.2963372
RESEARCH	56	3.60714286	1.23109074	0.1645114

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.9287	36.3	0.0616
EQUAL	2.0490	77.0	0.0439

FOR H0: VARIANCES ARE EQUAL, F'= 1.33 WITH 22 AND 55 DF   PROB > F'= 0.386

P. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: B1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	4.34782609	0.93462173	0.19488216
RESEARCH	56	3.39285714	1.18595679	0.15848014

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.8018	51.7	0.0004
EQUAL	3.4431	77.0	0.0009

FOR H0: VARIANCES ARE EQUAL, F'=   1.61 WITH 55 AND 22 DF   PROB > F'= 0.2200

VARIABLE: B2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	3.91304348	1.12464311	0.23450439
RESEARCH	56	2.76785714	1.09529691	0.14636521

VARIANCES	T	DF	PROB > |T|
UNEQUAL	4.1427	40.0	0.0002
EQUAL	4.1893	77.0	0.0001

FOR H0: VARIANCES ARE EQUAL, F'=   1.05 WITH 22 AND 55 DF   PROB > F'= 0.8423

VARIABLE: B3

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	4.17391304	1.23037961	0.25655188
RESEARCH	56	3.53571429	1.32066493	0.17648127

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.0495	43.8	0.0464
EQUAL	1.9891	77.0	0.0502

FOR H0: VARIANCES ARE EQUAL, F'=   1.15 WITH 55 AND 22 DF   PROB > F'= 0.7347

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: B4

IDTYPE	N	MEAN	STD DEV	STD ERRO!
MARKETING	23	4.17391304	0.98406272	0.2051912<
RESEARCH	56	3.16071429	1.27602772	0.1705163!

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.7977	52.8	0.0004
EQUAL	3.4096	77.0	0.0010

FOR H0: VARIANCES ARE EQUAL, F'=   1.68 WITH 55 AND 22 DF   PROB > F'= 0.181(

VARIABLE: B5

IDTYPE	N	MEAN	STD DEV	STD ERROF
MARKETING	23	3.52173913	1.03877398	0.2165993!
RESEARCH	56	2.78571429	1.17103009	0.1564921(

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.7544	46.0	0.0084
EQUAL	2.6188	77.0	0.0106

FOR H0: VARIANCES ARE EQUAL, F'=   1.27 WITH 55 AND 22 DF   PROB > F'= 0.5456

VARIABLE: C1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	2.26086957	1.28690578	0.26833840
RESEARCH	55	1.60000000	0.70972086	0.09569874

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.3197	27.8	0.0279
EQUAL	2.9085	76.0	0.0048

FOR H0: VARIANCES ARE EQUAL, F'=   3.29 WITH 22 AND 54 DF   PROB > F'= 0.0004

P. HOFFMAN - SURVEY RESULTS 17
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: C2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	3.73913043	1.09616651	0.22856652
RESEARCH	56	3.25000000	1.37840488	0.18419710

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.6663	51.2	0.1018
EQUAL	1.5146	77.0	0.1340

FOR H0: VARIANCES ARE EQUAL, F'= 1.58 WITH 55 AND 22 DF   PROB > F'= 0.2381

VARIABLE: C3

IDTYPE	N	MEAN	-- STD DEV	STD ERROR
MARKETING	23	4.30434783	1.06321907	0.22169650
RESEARCH	56	4.08928571	1.08337496	0.14477207

VARIANCES	T	DF	PROB > |T|
UNEQUAL	0.8122	41.7	0.4213
EQUAL	0.8058	77.0	0.4228

FOR H0: VARIANCES ARE EQUAL, F'= 1.04 WITH 55 AND 22 DF   PROB > F'= 0.9577

VARIABLE: C4

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	4.30434783	1.25895998	0.26251130
RESEARCH	56	4.16071429	1.17205004	0.15662177

VARIANCES	T	DF	PROB > |T|
UNEQUAL	0.4699	38.5	0.6411
EQUAL	0.4843	77.0	0.6295

FOR H0: VARIANCES ARE EQUAL, F'= 1.15 WITH 22 AND 55 DF   PROB > F'= 0.650?

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: C5

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	3.21739130	1.16605480	0.2431392
RESEARCH	56	3.26785714	1.32789747	0.1774477

VARIANCES	T	DF	PROB > |T|
UNEQUAL	-0.1677	46.4	0.8676
EQUAL	-0.1587	77.0	0.8743

FOR H0: VARIANCES ARE EQUAL, F'=   1.30 WITH 55 AND 22 DF   PROB > F'= 0.510

VARIABLE: C6

IDTYPE	N	MEAN	..STD DEV	STD ERRO
MARKETING	23	3.56521739	1.07981846	0.2251577
RESEARCH	56	3.76785714	1.30719786	0.1746816

VARIANCES	T	DF	PROB > |T|
UNEQUAL	-0.7111	49.3	0.4804
EQUAL	-0.6564	77.0	0.5135

FOR H0: VARIANCES ARE EQUAL, F'=   1.47 WITH 55 AND 22 DF   PROB > F'= 0.326

VARIABLE: C7

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	4.17391304	0.93673388	0.1953225
RESEARCH	56	3.76785714	1.38814554	0.1854987

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.5074	60.0	0.1369
EQUAL	1.2854	77.0	0.2025

FOR H0: VARIANCES ARE EQUAL, F'=   2.20 WITH 55 AND 22 DF   PROB > F'= 0.045

F. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: C3

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	3.65217391	1.07062835	0.2232414
RESEARCH	56	3.21428571	1.37132034	0.1832503

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.5161	52.2	0.1355
EQUAL	1.3679	77.0	0.1753

FOR HO: VARIANCES ARE EQUAL, F'=   1.64 WITH 55 AND 22 DF   PROB > F'= 0.202

------------------------------- INTRFACE=IDEAL -------------------------------

VARIABLE: A1

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	5.34782609	0.71405982	0.1488917
RESEARCH	56	4.44642857	1.02548690	0.1370364

VARIANCES	T	DF	PROB > |T|
UNEQUAL	4.4545	58.3	0.0001
EQUAL	3.8433	77.0	0.0002

FOR HO: VARIANCES ARE EQUAL, F'=   2.06 WITH 55 AND 22 DF   PROB > F'= 0.064

VARIABLE: A2

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	3.52173913	1.08164711	0.2255390
RESEARCH	56	2.94642857	1.01658328	0.1358466

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.1851	38.8	0.0350
EQUAL	2.2432	77.0	0.0278

FOR HO: VARIANCES ARE EQUAL, F'=   1.13 WITH 22 AND 55 DF   PROB > F'= 0.689

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: A3

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	22	4.68181818	1.12911106	0.240727:
RESEARCH	56	3.58928571	1.27602772	0.170516:

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.7035	43.2	0.0006
EQUAL	3.5096	76.0	0.0008

FOR H0: VARIANCES ARE EQUAL, F'=   1.28 WITH 55 AND 21 DF   PROB > F'= 0.54‹

VARIABLE: A4

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	23	5.08695652	0.90015370	0.187695‹
RESEARCH	56	4.44642857	1.17426407	0.156917‹

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.6182	53.1	0.0115
EQUAL	2.3450	77.0	0.0216

FOR H0: VARIANCES ARE EQUAL, F'=   1.70 WITH 55 AND 22 DF   PROB > F'= 0.17

VARIABLE: A5

IDTYPE	N	MEAN	STD DEV	STD ERR‹
MARKETING	23	5.21739130	0.73586818	0.153439
RESEARCH	56	4.57142857	1.04197614	0.139239‹

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.1176	57.5	0.0028
EQUAL	2.7043	77.0	0.0084

FOR H0: VARIANCES ARE EQUAL, F'=   2.01 WITH 55 AND 22 DF   PROB > F'= 0.07'

P. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: A6

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	5.26086957	0.91539317	0.19087267
RESEARCH	56	4.89285714	0.80178373	0.10714286

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.6813	36.6	0.1012
EQUAL	1.7778	77.0	0.0794

FOR H0: VARIANCES ARE EQUAL, F'= 1.30 WITH 22 AND 55 DF   PROB > F'= 0.4225

VARIABLE: B1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	5.52173913	0.51075392	0.10649955
RESEARCH	56	4.94642857	0.98016034	0.13097943

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.4080	72.5	0.0011
EQUAL	2.6633	77.0	0.0094

FOR H0: VARIANCES ARE EQUAL, F'= 3.68 WITH 55 AND 22 DF   PROB > F'= 0.0014

VARIABLE: B2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	4.86956522	1.21746188	0.25385835
RESEARCH	56	4.26785714	1.25757445	0.16805046

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.9764	42.3	0.0547
EQUAL	1.9495	77.0	0.0549

FOR H0: VARIANCES ARE EQUAL, F'= 1.07 WITH 55 AND 22 DF   PROB > F'= 0.8978

P. HOFFMAN – SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: B3

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	23	5.39130435	0.65637645	0.1368639
RESEARCH	56	5.03571429	0.83042784	0.1109705

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.0181	51.5	0.0488
EQUAL	1.8299	77.9	0.0711

FOR H0: VARIANCES ARE EQUAL, F'=   1.60 WITH 55 AND 22 DF   PROB > F'= 0.225

VARIABLE: B4

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	23	5.47826087	0.59310931	0.1236718
RESEARCH	56	5.05357143	0.90291735	0.1206574

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.4580	61.5	0.0168
EQUAL	2.0752	77.0	0.0413

FOR H0: VARIANCES ARE EQUAL, F'=   2.32 WITH 55 AND 22 DF   PROB > F'= 0.03:

VARIABLE: B5

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	23	5.39130435	0.49901088	0.1040509
RESEARCH	56	4.85714286	0.77291823	0.1032855

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.6434	62.5	0.0005
EQUAL	3.0568	77.0	0.0031

FOR H0: VARIANCES ARE EQUAL, F'=   2.40 WITH 55 AND 22 DF   PROB > F'= 0.02(

P. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

2

.INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: C1

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	3.52173913	1.23838477	0.2582210
RESEARCH	55	2.74545455	1.09236715	0.1472947

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.6113	37.0	0.0129
EQUAL	2.7506	76.0	0.0074

FOR H0: VARIANCES ARE EQUAL, F'=   1.29 WITH 22 AND 54 DF   PROB > F'= 0.448

VARIABLE: C2

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	5.13043478	0.54808326	0.1142832
RESEARCH	56	4.57142857	0.82807867	0.1106566

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.5141	61.1	0.0008
EQUAL	2.9750	77.0	0.0039

FOR H0: VARIANCES ARE EQUAL, F'=   2.28 WITH 55 AND 22 DF   PROB > F'= 0.035

VARIABLE: C3

IDTYPE	N	MEAN	STD DEV	STD ERRO
MARKETING	23	5.21739130	0.79524277	0.1658195
RESEARCH	56	4.60714286	0.86714938	0.1158777

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.0166	44.5	0.0042
EQUAL	2.9084	77.0	0.0047

FOR H0: VARIANCES ARE EQUAL, F'=   1.19 WITH 55 AND 22 DF   PROB > F'= 0.671

F. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: C4

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	23	5.56521739	0.50686980	0.105689(
RESEARCH	56	5.00000000	0.87386290	0.1167745

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.5887	68.0	0.0006
EQUAL	2.9011	77.0	0.0048

FOR H0: VARIANCES ARE EQUAL, F'=   2.97 WITH 55 AND 22 DF   PROB > F'= 0.00(

VARIABLE: C5

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	23	4.82608696	0.93673388	0.195322!
RESEARCH	56	4.46428571	1.04384404	0.139489!

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.5074	45.4	0.1386
EQUAL	1.4401	77.0	0.1539

FOR H0: VARIANCES ARE EQUAL, F'=   1.24 WITH 55 AND 22 DF   PROB > F'= 0.58

VARIABLE: C6

IDTYPE	N	MEAN	STD DEV	STD ERR(
MARKETING	23	5.00000000	0.79772404	0.166336!
RESEARCH	56	4.28571429	1.02183944	0.136549(

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.3191	52.2	0.0017
EQUAL	2.9945	77.0	0.0037

FOR H0: VARIANCES ARE EQUAL, F'=   1.64 WITH 55 AND 22 DF   PROB > F'= 0.20!

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: C7

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	5.04347826	0.63805535	0.1330437‹
RESEARCH	56	4.50000000	0.95346259	0.12741186

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.9503	60.5	0.0045
EQUAL	2.5079	77.0	0.0143

FOR H0: VARIANCES ARE EQUAL, F'=   2.23 WITH 55 AND 22 DF   PROB > F'= 0.0409

VARIABLE: C8

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	23	4.91304348	0.84815540	0.17685263
RESEARCH	56	4.51785714	0.97217790	0.1299127‹

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.8009	46.7	0.0782
EQUAL	1.7004	77.0	0.0931

FOR H0: VARIANCES ARE EQUAL, F'=   1.31 WITH 55 AND 22 DF   PROB > F'= 0.488:

APPENDIX E

RESEARCH RESULTS WITHOUT MARKET OPERATIONS RETURNS

P. HOFFMAN – SURVEY RESULTS   1

RESEARCH RESULTS – IDEAL VERSUS CURRENT

REMOVAL OF MARKETING OPERATIONS RETURNS

VARIABLE	MEAN	N	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
IDTYPE=MARKETING INTRFACE=CURRENT
A1	4.40000000	15	0.98561076	3.00000000	6.00000000
A2	2.06666667	15	0.96115010	1.00000000	3.00000000
A3	4.00000000	15	1.30930734	2.00000000	6.00000000
A4	3.93333333	15	1.03279556	2.00000000	5.00000000
A5	3.93333333	15	1.93279556	2.00000000	6.00000000
A6	4.73333333	15	1.33452328	2.00000000	6.00000000
B1	4.40000000	15	0.63245553	4.00000000	6.00000000
B2	3.80000000	15	1.14642301	1.00000000	5.00000000
B3	4.53333333	15	1.18723368	2.00000000	6.00000000
B4	4.33333333	15	0.97590007	3.00000000	6.00000000
B5	3.53333333	15	0.91547542	2.00000000	5.00000000
C1	2.33333333	15	1.34518542	1.00000000	5.00000000
C2	3.86666667	15	1.12546287	2.00000000	6.00000000
C3	4.60000000	15	0.98561076	3.00000000	6.00000000
C4	4.60000000	15	1.18321596	3.00000000	6.00000000
C5	3.26666667	15	1.27988095	1.00000000	5.00000000
C6	3.93333333	15	0.96115010	2.00000000	5.00000000
C7	4.53333333	15	0.83380939	3.00000000	6.00000000
C8	3.93333333	15	0.96115010	2.00000000	5.00000000
IDTYPE=MARKETING INTRFACE=IDEAL
A1	5.53333333	15	0.63994047	4.00000000	6.00000000
A2	3.46666667	15	1.12546287	1.00000000	5.00000000
A3	4.92857143	14	1.14113882	3.00000000	6.00000000
A4	5.40000000	15	0.63245553	4.00000000	6.00000000
A5	5.46666667	15	0.63994047	4.00000000	6.00000000
A6	5.53333333	15	0.63994047	4.00000000	6.00000000
B1	5.60000000	15	0.50709255	5.00000000	6.00000000
B2	4.86666667	15	1.35576371	1.00000000	6.00000000
B3	5.53333333	15	0.63994047	4.00000000	6.00000000
B4	5.60000000	15	0.63245553	4.00000000	6.00000000
B5	5.40000000	15	0.50709255	5.00000000	6.00000000
C1	3.33333333	15	1.23442680	1.00000000	5.00000000
C2	5.13333333	15	0.51639778	4.00000000	6.00000000
C3	5.33333333	15	0.61721340	4.00000000	6.00000000
C4	5.53333333	15	0.51639778	5.00000000	6.00000000
C5	4.60000000	15	0.91025899	2.00000000	6.00000000
C6	5.00000000	15	0.84515425	3.00000000	6.00000000
C7	5.13333333	15	0.51639778	4.00000000	6.00000000
C8	4.80000000	15	0.94112395	2.00000000	6.00000000

108

F. HOFFMAN — SURVEY RESULTS

RESEARCH RESULTS — IDEAL VERSUS CURRENT

REMOVAL OF MARKETING OPERATIONS RETURNS

·VARIABLE	MEAN	N	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
		IDTYPE=RESEARCH INTRFACE=CURRENT			
A1	3.76785714	56	1.26478272	1.00000000	6.00000000
A2	2.58928571	56	1.15643316	1.00000000	5.00000000
A3	3.53571429	56	1.36134006	1.00000000	6.00000000
A4	3.33928571	56	1.19509278	1.00000000	6.00000000
A5	3.44642857	56	1.29220942	1.00000000	6.00000000
A6	3.60714286	56	1.23109074	1.00000000	6.00000000
B1	3.39285714	56	1.18595679	1.00000000	6.00000000
B2	2.76785714	56	1.09529691	1.00000000	6.00000000
B3	3.53571429	56	1.32066493	1.00000000	6.00000000
B4	3.16071429	56	1.27602772	1.00000000	6.00000000
B5	2.78571429	56	1.17108009	1.00000000	6.00000000
C1	1.60000000	55	0.70972086	1.00000000	4.00000000
C2	3.25000000	56	1.37840488	1.00000000	6.00000000
C3	4.08928571	56	1.08337496	1.00000000	6.00000000
C4	4.16071429	56	1.17205004	1.00000000	6.00000000
C5	3.26785714	56	1.32789747	1.00000000	6.00000000
C6	3.76785714	56	1.30719786	1.00000000	6.00000000
C7	3.76785714	56	1.38814554	1.00000000	6.00000000
C8	3.21428571	56	1.37132934	1.00000000	6.00000000
		IDTYPE=RESEARCH INTRFACE=IDEAL			
A1	4.44642857	56	1.02548690	1.00000000	6.00000000
A2	2.94642857	56	1.01659328	1.00000000	6.00000000
A3	3.58928571	56	1.27602772	1.00000000	6.00000000
A4	4.44642857	56	1.17426407	1.00000000	6.00000000
A5	4.57142857	56	1.04197614	2.00000000	6.00000000
A6	4.89285714	56	0.80178373	3.00000000	6.00000000
B1	4.94642857	56	0.98016034	1.00000000	6.00000000
B2	4.26785714	56	1.25757445	1.00000000	6.00000000
B3	5.03571429	56	0.83042784	3.00000000	6.00000000
B4	5.05357143	56	0.90291735	3.00000000	6.00000000
B5	4.85714286	56	0.77291823	3.00000000	6.00000000
C1	2.74545455	55	1.09236715	1.00000000	5.00000000
C2	4.57142857	56	0.82807867	3.00000000	6.00000000
C3	4.60714286	56	0.86714938	3.00000000	6.00000000
C4	5.00000000	56	0.87386290	3.00000000	6.00000000
C5	4.46428571	56	1.04384404	2.00000000	6.00000000
C6	4.28571429	56	1.02183944	1.00000000	6.00000000
C7	4.50000000	56	0.95346259	2.00000000	6.00000000
C8	4.51785714	56	0.97217790	3.00000000	6.00000000

F. HOFFMAN – SURVEY RESULTS
RESEARCH RESULTS – IDEAL VERSUS CURRENT

REMOVAL OF MARKETING OPERATIONS RETURNS

VARIABLE	MEAN	N	STANDARD DEVIATION	T	PR>|T|
RDA1	0.67857143	56	1.39881130	3.88	0.0003
RDA2	0.35714286	56	1.08591932	2.46	0.0170
RDA3	0.05357143	56	1.44498686	0.28	0.7825
RDA4	1.10714286	56	1.58031725	5.24	0.0001
RDA5	1.12500000	56	1.36265116	6.18	0.0001
RDA6	1.28571429	56	1.23161809	7.81	0.0001
RDB1	1.55357143	56	1.30620398	8.90	0.0001
RDB2	1.50000000	56	1.19087439	9.43	0.0001
RDB3	1.50000000	56	1.37510330	8.16	0.0001
RDB4	1.89285714	56	1.34405859	10.54	0.0001
RDB5	2.07142857	56	1.19869130	13.04	0.0001
RDC1	1.14545455	55	0.98916691	8.59	0.0001
RDC2	1.32142857	56	1.36324670	7.25	0.0001
RDC3	0.51785714	56	1.09529694	3.54	0.0008
RDC4	0.83928571	56	1.18746155	5.29	0.0001
RDC5	1.19642857	56	1.19726420	7.48	0.0001
RDC6	0.51785714	56	1.15979734	3.34	0.0015
RDC7	0.73214286	56	1.10356565	4.96	0.0001
RDC8	1.30357143	56	1.32005018	7.39	0.0001

P. HOFFMAN — SURVEY RESULTS
MARKETING RESULTS — IDEAL VERSUS CURRENT

REMOVAL OF MARKETING OPERATIONS RETURNS

VARIABLE	MEAN	N	STANDARD DEVIATION	T	PR>|T|
MDA1	1.13333333	15	0.99043040	4.43	0.0006
MDA2	1.40000000	15	1.05559733	5.14	0.0002
MDA3	1.00000000	14	0.87705802	4.27	0.0009
MDA4	1.46666667	15	0.91547542	6.20	0.0001
MDA5	1.53333333	15	0.91547542	6.49	0.0001
MDA6	0.80000000	15	1.14642301	2.70	0.0172
MDB1	1.20000000	15	0.86189161	5.39	0.0001
MDB2	1.06666667	15	0.96115010	4.30	0.0007
MDB3	1.00000000	15	0.92582010	4.18	0.0009
MDB4	1.26666667	15	0.88371510	5.55	0.0001
MDB5	1.86666667	15	0.91547542	7.90	0.0001
MDC1	1.00000000	15	1.13389342	3.42	0.0042
MDC2	1.26666667	15	0.79880864	6.14	0.0001
MDC3	0.73333333	15	0.88371510	3.21	0.0062
MDC4	0.93333333	15	0.88371510	4.09	0.0011
MDC5	1.33333333	15	1.23442680	4.18	0.0009
MDC6	1.06666667	15	0.96115010	4.30	0.0007
MDC7	0.60000000	15	0.73678940	3.15	0.0070
MDC8	0.86666667	15	0.91547542	3.67	0.0025

P. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: A1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.40000000	0.98561076	0.25448366
RESEARCH	56	3.76785714	1.26478272	0.16901376

VARIANCES	T	DF	PROB > |T|		
UNEQUAL	2.0692	27.7	0.0480		
EQUAL	1.7920	69.0	0.0775		

FOR H0: VARIANCES ARE EQUAL, F'= 1.65 WITH 55 AND 14 DF   PROB > F'= 0.3051

VARIABLE: A2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	2.06666667	0.96115010	0.24816789
RESEARCH	56	2.58928571	1.15643316	0.15453488

VARIANCES	T	DF	PROB > |T|		
UNEQUAL	-1.7877	26.0	0.0855		
EQUAL	-1.6056	69.0	0.1129		

FOR H0: VARIANCES ARE EQUAL, F'= 1.45 WITH 55 AND 14 DF   PROB > F'= 0.4533

VARIABLE: A3

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.00000000	1.30930734	0.33806176
RESEARCH	56	3.53571429	1.36134006	0.18191672

VARIANCES	T	DF	PROB > |T|		
UNEQUAL	1.2094	22.8	0.2389		
EQUAL	1.1821	69.0	0.2412		

FOR H0: VARIANCES ARE EQUAL, F'= 1.08 WITH 55 AND 14 DF   PROB > F'= 0.9229

F. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: A4

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.93333333	1.03279556	0.26666667
RESEARCH	56	3.33928571	1.19509278	0.15970099

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.9112	25.0	0.0675
EQUAL	1.7554	69.0	0.0836

FOR H0: VARIANCES ARE EQUAL, F'=   1.34 WITH 55 AND 14 DF   PROB > F'= 0.5624

VARIABLE: A5

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.93333333	1.03279556	0.26666667
RESEARCH	56	3.44642857	1.29220942	0.17267875

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.5326	27.0	0.1370
EQUAL	1.3463	69.0	0.1826

FOR H0: VARIANCES ARE EQUAL, F'=   1.57 WITH 55 AND 14 DF   PROB > F'= 0.3586

VARIABLE: A6

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.73333333	1.33452328	0.34457243
RESEARCH	56	3.60714286	1.23109074	0.16451142

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.9495	20.8	0.0077
EQUAL	3.0921	69.0	0.0029

FOR H0: VARIANCES ARE EQUAL, F'=   1.18 WITH 14 AND 55 DF   PROB > F'= 0.6391

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: B1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.40000000	0.63245553	0.16329932
RESEARCH	56	3.39285714	1.18595679	0.15848014

VARIANCES	T	DF	PROB > |T|
UNEQUAL	4.4259	43.1	0.0001
EQUAL	3.1594	69.0	0.0023

FOR H0: VARIANCES ARE EQUAL, F'= 3.52 WITH 55 AND 14 DF   PROB > F'= 0.0125

VARIABLE: B2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.80000000	1.14642301	0.29600515
RESEARCH	56	2.76785714	1.09529691	0.14636521

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.1257	21.4	0.0051
EQUAL	3.2103	69.0	0.0020

FOR H0: VARIANCES ARE EQUAL, F'= 1.10 WITH 14 AND 55 DF   PROB > F'= 0.764

VARIABLE: B3

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.53333333	1.18723368	0.30654241
RESEARCH	56	3.53571429	1.32066493	0.1764812

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.8204	24.1	0.0094
EQUAL	2.6504	69.0	0.0100

FOR H0: VARIANCES ARE EQUAL, F'= 1.24 WITH 55 AND 14 DF   PROB > F'= 0.686

P. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: B4

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.33333333	0.97590007	0.25197632
RESEARCH	56	3.16071429	1.27602772	0.17051638

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.8541	28.3	0.0006
EQUAL	3.3030	69.0	0.0015

FOR H0: VARIANCES ARE EQUAL, F'= 1.71 WITH 55 AND 14 DF   PROB > F'= 0.2695

VARIABLE: B5

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.53333333	0.91547542	0.23637474
RESEARCH	56	2.78571429	1.17108009	0.15649218

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.6373	27.6	0.0136
EQUAL	2.2880	69.0	0.0252

FOR H0: VARIANCES ARE EQUAL, F'= 1.64 WITH 55 AND 14 DF   PROB > F'= 0.3115

VARIABLE: C1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	2.33333333	1.34518542	0.34732538
RESEARCH	55	1.60000000	0.70972086	0.09569874

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.0355	16.2	0.0585
EQUAL	2.8643	68.0	0.0056

FOR H0: VARIANCES ARE EQUAL, F'= 3.59 WITH 14 AND 54 DF   PROB > F'= 0.0007

F. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: C2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.86666667	1.12546287	0.29059326
RESEARCH	56	3.25000000	1.37840488	0.18419716

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.7924	26.4	0.0845
EQUAL	1.5936	69.0	0.1156

FOR H0: VARIANCES ARE EQUAL, F'= 1.50 WITH 55 AND 14 DF   PROB > F'= 0.4084

VARIABLE: C3

IDTYPE	N	MEAN	.STD DEV	STD ERROR
MARKETING	15	4.60000000	0.98561076	0.25448366
RESEARCH	56	4.08928571	1.08337496	0.14477207

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.7444	23.9	0.0940
EQUAL	1.6506	69.0	0.1034

FOR H0: VARIANCES ARE EQUAL, F'= 1.21 WITH 55 AND 14 DF   PROB > F'= 0.7262

VARIABLE: C4

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.60000000	1.18321596	0.30550505
RESEARCH	56	4.16071429	1.17205004	0.15662177

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.2795	21.9	0.2141
EQUAL	1.2867	69.0	0.2025

FOR H0: VARIANCES ARE EQUAL, F'= 1.02 WITH 14 AND 55 DF   PROB > F'= 0.8975

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: C5

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.26666667	1.27988095	0.3304638
RESEARCH	56	3.26785714	1.32789747	0.1774477

VARIANCES	T	DF	PROB > |T|
UNEQUAL	-0.0032	22.8	0.9975
EQUAL	-0.0031	69.0	0.9975

FOR H0: VARIANCES ARE EQUAL, F'= 1.08 WITH 55 AND 14 DF   PROB > F'= 0.9308

VARIABLE: C6

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.93333333	0.96115010	0.2481678
RESEARCH	56	3.76785714	1.30719786	0.1746816

VARIANCES	T	DF	PROB > |T|
UNEQUAL	0.5453	29.5	0.5897
EQUAL	0.4572	69.0	0.6489

FOR H0: VARIANCES ARE EQUAL, F'= 1.85 WITH 55 AND 14 DF   PROB > F'= 0.2050

VARIABLE: C7

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.53333333	0.83380939	0.2152886
RESEARCH	56	3.76785714	1.38814554	0.1854987

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.6936	37.3	0.0105
EQUAL	2.0332	69.0	0.0459

FOR H0: VARIANCES ARE EQUAL, F'= 2.77 WITH 55 AND 14 DF   PROB > F'= 0.039

P. HOFFMAN — SURVEY RESULTS   11
RESEARCH:VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=CURRENT

TTEST PROCEDURE

VARIABLE: C8

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.93333333	0.96115010	0.24816789
RESEARCH	56	3.21428571	1.37132934	0.18325039

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.3308	31.1	0.0264
EQUAL	1.9045	69.0	0.0610

FOR H0: VARIANCES ARE EQUAL, F'=   2.04 WITH 55 AND 14 DF   PROB > F'= 0.1437

-- INTRFACE=IDEAL -------------------------------

VARIABLE: A1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.53333333	0.63994047	0.16523192
RESEARCH	56	4.44642857	1.02548690	0.13703645

VARIANCES	T	DF	PROB > |T|
UNEQUAL	5.0633	35.6	0.0001
EQUAL	3.8949	69.0	0.0002

FOR H0: VARIANCES ARE EQUAL, F'=   2.57 WITH 55 AND 14 DF   PROB > F'= 0.0551

VARIABLE: A2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.46666667	1.12546287	0.29059326
RESEARCH	56	2.94642857	1.01658328	0.13584665

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.6218	20.5	0.1201
EQUAL	1.7213	69.0	0.0897

FOR H0: VARIANCES ARE EQUAL, F'=   1.23 WITH 14 AND 55 DF   PROB > F'= 0.5686

RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL.OF.MARKETING OPERATIONS RETURNS

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: A3

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	14	4.92857143	1.14113882	0.30498218
RESEARCH	56	3.58928571	1.27602772	0.17051638

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.8330	21.9	0.0009
EQUAL	3.5818	68.0	0.0006

FOR H0: VARIANCES ARE EQUAL, F'=   1.25 WITH 55 AND 13 DF   PROB > F'= 0.6837

VARIABLE: A4

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.40000000	0.63245553	0.16329932
RESEARCH	56	4.44642857	1.17426407	0.15691764

VARIANCES	T	DF	PROB > |T|
UNEQUAL	4.2105	42.6	0.0001
EQUAL	3.0191	69.0	0.0036

FOR H0: VARIANCES ARE EQUAL, F'=   3.45 WITH 55 AND 14 DF   PROB > F'= 0.0138

VARIABLE: A5

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.46666667	0.63994047	0.16523192
RESEARCH	56	4.57142857	1.04197614	0.13923992

VARIANCES	T	DF	PROB > |T|
UNEQUAL	4.1431	36.3	0.0002
EQUAL	3.1617	69.0	0.0023

FOR H0: VARIANCES ARE EQUAL, F'=   2.65 WITH 55 AND 14 DF   PROB > F'= 0.0479

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE   1

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: A6

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.53333333	0.63994047	0.16523192
RESEARCH	56	4.89285714	0.80178373	0.10714286

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.2523	27.0	0.0031
EQUAL	2.8547	69.0	0.0057

FOR H0: VARIANCES ARE EQUAL, F'=   1.57 WITH 55 AND 14 DF   PROB > F'= 0.3555

VARIABLE: B1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.60000000	0.50709255	0.13093073
RESEARCH	56	4.94642857	0.98016034	0.13097943

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.5290	44.7	0.0010
EQUAL	2.4856	69.0	0.0154

FOR H0: VARIANCES ARE EQUAL, F'=   3.74 WITH 55 AND 14 DF   PROB > F'= 0.0092

VARIABLE: B2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.86666667	1.35576371	0.35005668
RESEARCH	56	4.26785714	1.25757445	0.16805046

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.5421	20.9	0.1380
EQUAL	1.6115	69.0	0.1116

FOR H0: VARIANCES ARE EQUAL, F'=   1.16 WITH 14 AND 55 DF   PROB > F'= 0.6588

P. HOFFMAN — SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: B3

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.53333333	0.63994047	0.16523192
RESEARCH	56	5.03571429	0.83042784	0.11097059

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.5001	28.0	0.0185
EQUAL	2.1517	69.0	0.0349

FOR H0: VARIANCES ARE EQUAL, F'=   1.68 WITH 55 AND 14 DF   PROB > F'= 0.2835

VARIABLE: B4

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.60000000	0.63245553	0.16329932
RESEARCH	56	5.05357143	0.90291735	0.12065741

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.6912	31.1	0.0114
EQUAL	2.1983	69.0	0.0313

FOR H0: VARIANCES ARE EQUAL, F'=   2.04 WITH 55 AND 14 DF   PROB > F'= 0.1430

VARIABLE: B5

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.40000000	0.50709255	0.13093073
RESEARCH	56	4.85714286	0.77291823	0.10328554

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.2552	33.5	0.0026
EQUAL	2.5688	69.0	0.0124

FOR H0: VARIANCES ARE EQUAL, F'=   2.32 WITH 55 AND 14 DF   PROB > F'= 0.084ε

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

15

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: C1

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	3.33333333	1.23442680	0.31872763
RESEARCH	55	2.74545455	1.09236715	0.14729476

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.6743	20.4	0.1094
EQUAL	1.7970	68.0	0.0768

FOR H0: VARIANCES ARE EQUAL, F'=   1.28 WITH 14 AND 54 DF   PROB > F'= 0.5039

VARIABLE: C2

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.13333333	0.51639778	0.13333333
RESEARCH	56	4.57142857	0.82807867	0.11065667

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.2429	35.6	0.0026
EQUAL	2.4937	69.0	0.0150

FOR H0: VARIANCES ARE EQUAL, F'=   2.57 WITH 55 AND 14 DF   PROB > F'= 0.0548

VARIABLE: C3

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.33333333	0.61721340	0.15936381
RESEARCH	56	4.60714286	0.86714938	0.11587771

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.6855	30.5	0.0009
EQUAL	3.0365	69.0	0.0034

FOR H0: VARIANCES ARE EQUAL, F'=   1.97 WITH 55 AND 14 DF   PROB > F'= 0.1615

P. HOFFMAN - SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

. REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: C4

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.53333333	0.51639778	0.13333333
RESEARCH	56	5.00000000	0.87386290	0.11677484

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.0091	38.0	0.0046
EQUAL	2.2533	69.0	0.0274

FOR H0: VARIANCES ARE EQUAL, F'= 2.86 WITH 55 AND 14 DF   PROB > F'= 0.0337

VARIABLE: C5

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.60000000	0.91025899	0.23502786
RESEARCH	56	4.46428571	1.04384404	0.13948953

VARIANCES	T	DF	PROB > |T|
UNEQUAL	0.4966	24.8	0.6239
EQUAL	0.4585	69.0	0.6480

FOR H0: VARIANCES ARE EQUAL, F'= 1.32 WITH 55 AND 14 DF   PROB > F'= 0.5896

VARIABLE: C6

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.00000000	0.84515425	0.21821789
RESEARCH	56	4.28571429	1.02183944	0.13654904

VARIANCES	T	DF	PROB > |T|
UNEQUAL	2.7748	26.1	0.0101
EQUAL	2.4853	69.0	0.0154

FOR H0: VARIANCES ARE EQUAL, F'= 1.46 WITH 55 AND 14 DF   PROB > F'= 0.4407

P. HOFFMAN — .SURVEY RESULTS
RESEARCH VERSUS MARKETING, BY INTERFACE

REMOVAL OF MARKETING OPERATIONS RETURNS

INTRFACE=IDEAL

TTEST PROCEDURE

VARIABLE: C7

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	5.13333333	0.51639778	0.13333333
RESEARCH	56	4.50000000	0.95346259	0.12741180

VARIANCES	T	DF	PROB > |T|
UNEQUAL	3.4341	42.3	0.0013
EQUAL	2.4686	69.0	0.0160

FOR H0: VARIANCES ARE EQUAL, F'=   3.41 WITH 55 AND 14 DF   PROB > F'= 0.0140

VARIABLE: C8

IDTYPE	N	MEAN	STD DEV	STD ERROR
MARKETING	15	4.80000000	0.94112395	0.24299716
RESEARCH	56	4.51785714	0.97217790	0.12991274

VARIANCES	T	DF	PROB > |T|
UNEQUAL	1.0239	22.7	0.3167
EQUAL	1.0047	69.0	0.3186

FOR H0: VARIANCES ARE EQUAL, F'=   1.07 WITH 55 AND 14 DF   PROB > F'= 0.9468

Works Cited

Calantone, Roger J. and C. Anthony di Benedetto. "An integration model of the new product development process: an empirical validation." Journal of Product Innovation Management 5 (1988): 201-215.

Carroad, Paul A. and Connie A. Carroad. "Strategic interfacing of R&D and marketing." Research Management 25 (1982): 28-33.

Crawford, C. Merle. New Products Management. Homewood, Ill.: Richard D. Irwin, Inc. 2nd Edition, 1987.

Drucker, Peter F. Management: tasks, responsibilities, practices. New York: Harper & Row, 1974.

Gupta, Ashok K., S. P. Raj, and David Wilemon. "The R&D-marketing interface in high-technology firms." Journal of Product Innovation Management 2 (1985): 12-24.

Gupta, Ashok K., S. P. Raj, and David Wilemon. "A model for studying R&D-marketing interface in the product innovation process." Journal of Marketing April, 1986: 7-17.

Gupta, Ashok K., S. P. Raj, and David Wilemon. "Managing the R&D-marketing interface." Research Management 30 (1987): 38-43.

Gupta, Ashok K. and David Wilemon. "The credibility-cooperation connection at the R&D-marketing interface." Journal of Product Innovation Management 5 (1988a): 20-31.

Gupta, Ashok K. and David Wilemon. "Why R&D resists using marketing information." Research and Technology Management 31 (1988b): 36-41.

Gerstenfeld, A. and Keyi Sumiyoshi. "The management of innovation in Japan -- seven forces that make the difference." Research Management 23 (1980): 30-34.

Johne, F. Axel and Patricia A. Snelson. "Success factors in product innovation: a selective review of the literature." Journal of Product Innovation Management 5 (1988): 114-128.

Lucas, George H., Jr. and Alan J. Bush. "The marketing-R&D interface: do personality factors have an impact?" Journal of Product Innovation Management 5 (1988): 257-268.

Mansfield, Edwin. "How economists see R&D." Harvard Business Review Nov.-Dec. 1981: 98-106.

Melan, Eugene H. "Improving responsiveness in product development." Quality Progress June 1989: 26-31.

Monteleone, John P. "How R&D and marketing can work together." Research Management 19 (1976): 19-21.

Pascale, R. T and A. G. Athos. The Art of Japanese Management. Hammondsworth, Middlesex: Penguin Books, 1982.

Pessemier, E. A. Product Management: Strategy & Organization. New York: John Wiley & Sons, 1982.

Peters, T. J. and R. H. Waterman. In Search of Excellence: Lessons from America's Best Run Companies. New York: Harper & Row, 1982.

Rosenau, Milton D., Jr. Innovation, Managing the Development of Profitable New Products. Belmont, CA: Wadsworth, Inc., 1982.

Shanklin, William L. and John K. Ryans, Jr. "Organizing for high-tech marketing." Harvard Business Review Nov.-Dec. 1984: 164-171.

Souder, William E. "An exploratory study of the coordinating mechanisms between R&D and marketing as an influence on the innovation process. " Final Report to the National Science Foundation NTIS PB-279-366/AS (Aug. 1977).

Souder, William E. "Promoting an effective R&D/marketing interface." Research Management 23 (1980): 10-15.

Souder, William E. "Disharmony between R&D and marketing." Industrial Marketing Management 10 (1981): 67-73.

Souder, William E. Managing New Product Innovations. Lexington, MA: Lexington Books, 1987.

Souder, William E. "Managing relations between R&D and
     marketing in new product development projects." Journal of
     Product Innovation Management 5 (1988): 20-31.

Souder, William E. and A. K. Chakrabarti. "The R&D/marketing
     interface: results from an empirical study of innovation
     projects." IEEE Transactions on Engineering Management. EM-25
     (1978): 88-93.

Takeuchi, Hirotaka and Ikujiro Nonaka. "The new new product
     development game." Harvard Business Review. Jan.-Feb. 1986:
     137-146.

Young, Clifton H. "Effective management of research-marketing
     teams." Research Management 22 (1979): 7-12.