

PRODUCT DESIGN PROCESSES AND DECISIONS

an Honors Thesis (ID 499)  
by

Daniel C. Barcus

Thesis Director:  
Dr. Shaheen Borna  
Department of Marketing

*Shaheen Borna*

Ball State University  
Muncie, Indiana

May 1, 1989

graduation: May 6, 1989

## INTRODUCTION <sup>1</sup>

Over the course of the last century, the United States has mass-produced numerous products, but even today many people do not have a clear understanding of how new product decisions are made. For example, we do not know which people in companies have decision-making authority in the design process, or the position of the person who is ultimately responsible for these decisions. Other pertinent questions about design relate to where the ideas come from and what tests are run before consumers find a product in stores.

Decisions about design play an important role in the level of success a product will achieve in the marketplace. The problem is that very little information is available about how product design decisions are made and who participants are in the decision process. Research such as the ensuing study will help to offer information about product design decisions. This study should also shed light on the effects of competition on design and what criteria are most heavily weighed in making design decisions.

### Definition

What are the parameters for defining product design? Here is one definition:

Design is the process of seeking to optimize consumer satisfaction and company profitability through the creative use of major design elements (performance, quality, durability, appearance, and cost) in connection with products, environments, information and corporate identities. (Kotler and Rath, 1984, p. 17)

---

<sup>1</sup> The author would like to acknowledge the editorial assistance of Rebecca Brewer, whose help was invaluable in allowing this thesis to be finished.

## TABLE OF CONTENTS

	pages
Introduction	1
Definition of Design	1
Thesis Objectives	2
Literature Review	3
Research Design	6
Table 1	7
Analysis of Data	7
1) What is the position and level in management hierarchy of the person ultimately responsible for product design?	8
2) What is the general procedure for product design?	9
Table 2	9
3) How is the cost of designing a product weighed?	13
4) Does your company do its design work internally or externally?	14
5) How do consumer preferences and perceptions fit into your design process?	15
6) How often does your company make changes in the design process?	17
7) Where do initiatives for new product design in your company come from?	17
Initiating Factors for Redesign	18
8) Is the design of new products mentioned in your company's mission statement?	19
9) How many different departments overall are involved in planning product designs? How many people?	19
10) How much time is typically spent in planning a new product design?	20
11) How does your organization decide between the costs of product aesthetics or beauty versus the absolute utility and value analysis of the product?	21
American versus European Design	21
Conclusion	22
References	24

## INTRODUCTION <sup>1</sup>

Over the course of the last century, the United States has mass-produced numerous products, but even today many people do not have a clear understanding of how new product decisions are made. For example, we do not know which people in companies have decision-making authority in the design process, or the position of the person who is ultimately responsible for these decisions. Other pertinent questions about design relate to where the ideas come from and what tests are run before consumers find a product in stores.

Decisions about design play an important role in the level of success a product will achieve in the marketplace. The problem is that very little information is available about how product design decisions are made and who participants are in the decision process. Research such as the ensuing study will help to offer information about product design decisions. This study should also shed light on the effects of competition on design and what criteria are most heavily weighed in making design decisions.

### Definition

What are the parameters for defining product design? Here is one definition:

Design is the process of seeking to optimize consumer satisfaction and company profitability through the creative use of major design elements (performance, quality, durability, appearance, and cost) in connection with products, environments, information and corporate identities. (Kotler and Rath, 1984, p. 17)

---

<sup>1</sup> The author would like to acknowledge the editorial assistance of Rebecca Brewer, whose help was invaluable in allowing this thesis to be finished.

The authors add that the overall idea behind design is not only to create profit for the company but also to create highly satisfied customers within their selected markets in the process. Merriam-Webster lists several definitions for the word design, a few of which apply to product design: "(verb) <sup>3</sup> to devise for a specific function or end, and (noun) <sup>2</sup> plan as well as (noun) <sup>6</sup> an underlying scheme that governs functioning, developing, or unfolding" (Merriam-Webster Dictionary, 1974, p. 200). Perhaps the most workable definition provided was this one: "Product design [is the] process of planning, developing, and approving authorized products for manufacture" (source, survey data 18)<sup>2</sup>.

#### THESIS OBJECTIVES

The purpose of this study is to gain a greater understanding of the procedures and ideas behind actual product design within companies in the midwest region. Important areas which this study focuses on include communication channels, authority in decision making and developing new ideas.

Employees from fifteen companies have been interviewed about their own procedures regarding product design and their perceptions about the field of design as it relates to the firm's operation. The companies ranged in size from very small (less than twenty employees) to firms that employ more than a thousand including assembly workers. In addition, several other

---

<sup>2</sup> By their request, the names of survey participants and the corporations they represent are not noted to protect any information which may be considered sensitive.

sources of information have been consulted, mainly consisting of recent periodicals with pertinent data.

#### LITERATURE REVIEW

Several authors have already made contributions in various key areas related to design, but pieces of information are missing from the available research. One article points out the profit advantages of using design to add perceived value to products, and asks questions such as "how does the marketing team effectively measure the impact of a specific design?" The author claims that novelty is the key factor in the appeal of design and illustrates this concept with several pictorial examples of today's products. The article concludes that industrial design can effectively lower the risk involved in bring a new product to the market-place (Abler, 1986, pp. 96-103).

Another article points out several very good product designs which were never successfully marketed because they were too radically different from already established standards. According to the article, a few designs still need to be developed, such as "a completely convincing chair." While not a lengthy piece, this article provides much insight into the psychological issues which lie behind design (Anderson, 1988, pp. 1-2).

Working to promote closer affiliation between design and manufacturing departments was the subject of another in-depth study. The authors here point out that, traditionally, manufacturing has been left out of the design process, which has resulted not only in products performing poorly, but also in

exorbitantly high production costs. The article promotes collaboration between designers and manufacturing engineers. The end result should be products which are designed to be readily manufacturable, rather than those for which a battle must literally be waged between the designers and production engineers. This kind of battle often occurs, for the two disciplines come from very different schools of thought: one stressing creativity, while the other stresses efficiency. The article stresses collaboration between departments from the inception of the product. The authors also point out that use of a company "integrator" may help to get communication flowing between the two areas. They do admit, however, that there are downfalls to employing the integrator technique. The major flaw is that "[because] the integrator is there to worry about the producibility, no one else does" (Dean and Susman, 1989, pp. 28-36).

One article in particular delves into the issues related to product design. This article provides a working definition of design and discusses whether to have design work done internally or through an outside firm. The authors point out a few companies that have done very well in design work, such as IBM, Herman Miller and Olivetti. The authors also state that "well-managed, high-quality design offers the company several benefits" including "corporate distinctiveness, personality for a newly-launched product," and a revitalization of interest for mature products (Kotler and Rath, 1984, pp. 16-21).

A graduate study done at Ball State University addresses very similar questions to those examined in this study, but leaves many questions unanswered because of the narrow scope of the study. In the study, several companies were interviewed including Procter and Gamble, Ball Corporation, Brooks Foods and Draper Shade and Screen Company, to find out how those companies handle product design. The authors concluded that the size of a company determines whether the design will be done within the company. They also found that consumer preference is the main criteria influencing product design (Sipe, et al, 1988, pp. 1-18).

Yet another article deals more with new product development than with product design but addresses the issue of product decisions (design, packaging, continuation or withdrawal) as strategic decisions. Companies in certain strategic states have a much higher propensity to succeed in introducing new designs than do companies in other strategic states, according to the article. Specifically, the authors claimed that companies in either of only two strategic states should even attempt new product designs and introductions. The two kinds of companies fit for new product development are those which are young and seeking unnoticed business opportunities (they call this the "Eagle" stage), and "established businesses seeking to strengthen and maintain their position" which they call "Forts" (Wall and White, 1989, pp. 1-5).

What all of these studies lack, though, is a description of the design process. Other questions still unanswered are: what

are the positions of the people who make the decisions? What information and research is used to make these decisions? For example, who decides whether the cap of a bottle should be twisted off or pulled off? And how is this decision reached? New research should help provide answers to these questions and assist in making the study of product design more complete.

#### RESEARCH DESIGN

The questionnaire utilized in the interviews appears on the next page. Some interviews were conducted in person, while most were conducted over the telephone. The information sought was qualitative because of the high cost of collecting data to obtain statistically significant results in a field that is not even well defined. The topics discussed were structured to allow flexibility, and served to gain more data in areas which applied more to each individual company. For example, in very small firms, the president usually makes all the big decisions, so the interview would look more closely at how design decisions were evaluated rather than how the different levels of decision makers interacted.

Table 1  
PRODUCT DESIGN DECISIONS RESEARCH SURVEY

---

- 1) What is the position and level in management hierarchy of the person ultimately responsible for product design?
  - 2) What is the general procedure for product design?
  - 3) How is the cost of designing a product weighed?
  - 4) Does your company do its design work internally or externally?
  - 5) How do consumer preferences and perceptions fit into your design process?
  - 6) How often does your company make changes in the design process?
  - 7) Where do initiatives for new product design in your company come from?
  - 8) Is the design of new products mentioned in your company's mission statement?
  - 9) How many different departments overall are involved in planning product designs? How many people?
  - 10) How much time is typically spent in planning a new product design?
  - 11) How does your organization decide between the costs of product aesthetics or beauty versus the absolute utility and value analysis of the product?
- 

#### ANALYSIS OF DATA

The results of the survey provide insight about how design decisions are made. Also helpful is information relating to different design stages and the advantages or disadvantages to doing design work internally versus hiring an outside firm. The next eleven sections address the results obtained to the specific questions asked in the survey.

1) What is the position and level in management hierarchy of the person ultimately responsible for product design?

One area which 13 companies agreed on, large or small, is that actual product design decisions tend to be made at the top level of the management hierarchy. The president or vice-president of marketing, for instance, will frequently be a key decision-maker in design. In larger firms, recommendations originate with lower echelons, but the decisions about which designs to produce are reserved for top management. Sometimes upper-level managers will delay the design process by being more involved in making detail-oriented decisions than they are useful in making design decisions. This should be an area of concern, for it slows the process down. An example of this can be seen in the consumer-goods division of a multi-million dollar international company whose division president has spent months alone deciding which bottle to use for a newly designed product, sometimes completely ignoring the recommendations of the staff who have worked on the project.

2) What is the general procedure for product design?

The interviews show that products are designed by most of the firms interviewed in these rough phases:

Table 2  
THE PRODUCT DESIGN PROCESS

1. examine strategy of business and competition, environment initial research
2. concept design initial design review
3. marketability model prototype refinement
4. engineering drawings working prototype refinement
5. final design final model begin manufacturing

(source, survey data 1)

Just as in the case of the consumer behavior model where a consumer may skip through most of the stages which lead to a purchase decision, so may a manufacturer skip through many of these phases. For instance, the manufacturer of a low technology product-line does not require re-tooling for simple product changes, and they operate in a market they are very familiar with. In this case, someone from the assembly floor developed an idea for a new product in a line that was already being produced. The president, acting in this company as production manager, had some of the production workers run a model of the new design through the production line the next day, and he liked the way

the new design turned out. He felt that it would do well in the market, so he ordered the supplies, and as few as 72 hours later the "newly designed" product was rolling off the production lines (source, survey data 2). In this example, the design of the product involved copying a competitor's product by merely refining an existing one in their own line to create a new design. What is surprising is that some companies researched operate in a similarly haphazard way, even with products they are not familiar with, though it is well-known that developing products in markets the company does not already deal in is much riskier.

The complexity of design can and does, however, reach the other end of the spectrum. One company feels comfortable developing six "product concepts" and then thoroughly researching consumer perceptions and preferences regarding the different product attributes. The company also gains information from these initial research efforts regarding the five-step question of how likely their prospective customers would be to purchase such a product (definitely would/not, might, etc.). For this company, even at this early stage, a "top box" response rate (a definitely will purchase response to the survey) of 20% would be needed for any of the six original product concepts to be considered for development. Next, the managers have more quantitative market research done to provide better statistics on the likelihood of a product concept succeeding. What they actually do is take the product concept they would like to introduce and develop seven different product attribute

statements that describe it. Hundreds of consumers are shown only one of these each (to prevent bias) and then asked for their reactions, ideas, and questions the attribute statement left unanswered. An example of a product attribute statement is one drawn up for a vinegar-based window and appliance cleaner which could be used without rinsing on surfaces which came into contact with food. The company's marketing department developed the seven attribute statements to show to consumers, one of which offers a scenario about a woman who can now clean the counter-top and the inside of the blender with this product and not have to rinse the product-residue off for safety reasons. If the response after this test is not promising, anywhere below a "definitely will purchase" response of 17%, then it becomes obvious that some or all of the product's attributes are not fulfilling a perceived need in the minds of the company's potential target market. If, on the other hand, the results are optimistic, then the product is produced in a very limited quantity for a home-test of about three weeks. A variation of this technique used by the company is that the market researchers will also send home an unmarked competitor's product along with their own and collect equal feedback on the consumer preferences for it, which will tell the company if the new product development team has indeed come up with a product which will out-perform their competitor's products. Feedback is sought from all participants and refinements are made.

Until this stage in the process, the only departments which have really been involved, besides the new product development

team, are the research and development people who began work the very moment they had access to information about what product attributes consumers are seeking. If the response to the most recent take-home test is favorable, the advertising agency is brought in along with the package development team and the designers for the label of the package.

All of the departments work together to run an "Assessor Test" where people who fit the description of the company's target market are brought in from the mall or off the street and shown a series of advertisements, usually four, with only one of them being for the product in question. Next, the participant is taken to another room where there is a mini-mart set up for them to shop for the few products they have just seen advertised. The participants are given some money to make their selection, and then they are free to leave. Hopefully, they buy the product in question. Those that do are called back in about a month to see if they would repurchase the product. Consumers' decisions to make repeat purchases of a product are crucial. In fact, repurchase is the main indication of the product's success in the marketplace for this product-type. For those participants who say they would not make a repeat purchase, the company tries to find out why. If not enough people purchase the product through the "Assessor Test," then the product is usually dropped, perhaps to be retested at a later time. What the "Assessor Test" really provides is a sales forecast for the first year of operation for the product, which can then be matched against the company's minimum expectations or break-even point. If the

product is well-designed and meets the customers' expectations of benefits, then it goes to market. Do they spend too much time and money on market research for a product's design? This company thinks not, and they have a very successful history to back themselves up (source, survey data 3).

Many companies who succeed do not have enough liquid capital to invest in comprehensive market research or even market testing. They have found other ways of deciding if a new design will work. One less complex method involves using ideas given by customers for new product development: "you know, this ought to have more plugs in the back of it, and it ought to come in pink too." If enough customers or retailers who carry the product voice a similar desire, then there is a good indication that the new product will succeed. These same suggestion-givers are then given prototypes for further suggestion and refinements, or orders. One industry expert who has experience in both small and large firms looks at it this way: "sometimes you have to find a quick and dirty way to get a warm glow and a hint" (source, survey data 4).

### 3) How is the cost of designing a product weighed?

No one reached in this survey thought that the cost of design-work itself was heavily weighed, although different companies' rationales varied widely. The best, or most optimistic, train of thought is that good design paid for itself through increased revenue and profit, as well as in lower cost of production. Two examples are a company that designed a new mold for a plastic bottle which cost the firm \$80,000 but resulted in \$5,000,000

increased sales, and a new "blister pack" package for better marketing of a firm's hardware item, replacing its old plastic bag, which began returning a profit on investment within four months (source, survey data 2). Some people who work in design-related areas simply consider design work part of the job, while others accept the cost as an expected overhead. No one could provide a cost estimate on doing design work. Even the firms who earn their living through design were reluctant to comment, perhaps because they do not have relevant cost data available.

**4) Does your company do its design work internally or externally?**

The question of whether to have product design done in-house or to hire an outside firm is both intriguing and highly complex. It is tempting to say that most small firms hire their design work out, while more large firms have their own design departments. This is true to an extent, but it does not provide a realistic outlook on how industry handles design at large.

Many smaller firms do their work inside for different reasons. Among these reasons are that the company may be more familiar with their markets than they feel a design firm would be, or the company may not want to let their "secret" ideas receive any exposure to the outside before they reach production stages. The design process may be, as pointed out earlier, simple enough that hiring a consultant would be pointless. The most important item for them to consider, though, is the expense of hiring an outside firm. Smaller companies often will go to a design firm for help with the label or package, but few reached

for this study would seek outside design counsel for more than that (source, survey data 6).

Several large companies, some even in the Fortune 500, do not have their own design departments at all. According to an expert in the design industry "[they] always have their design work done here because they can get better, less restricted ideas than they feel they could get from people who work on the inside." He says that many of the companies who put out the most successful new products have their design work done by an outside consulting firm, and there are some good reasons for this.

1) Consultive designers can break the mold of thought; they are not constrained either by being wrapped up in the technology of production nor by the bureaucratic formation of the company.

2) Consultants are best able to form the correct teams to work on the various projects so that communication is enhanced and power games do not become the moving force behind new product designs.

3) Consultants can be productive faster, again through the lack of bureaucracy which must be crossed on the inside of most companies before a new product reaches the decision makers (source, survey data 1).

5) How do consumer preferences and perceptions fit into your design process?

Evidently, all companies think they weigh their customers' preferences and perceptions very highly. On the contrary, some consumers feel that this may be quite a surprise in more than a few cases where the consumer can't get the package open or the instructions seem to skip a step or two. Not all companies do extensive market research as mentioned previously, nor do many run research as simply as asking a few of their favorite

retailers what will work. Most firms do engage in some form of actual market research if they are producing consumer goods, and a few who produce industrial goods do as well. Companies that produce industrial goods also find it feasible to watch what the competition is doing and to ask their customers what will work best for them. For many companies, focus groups and actual test-marketing seem to be the methods for letting the consumers have their say about product design. One company that is ready to begin manufacturing a high-end automotive-care product with a revolutionary design had a small number of the product produced. They then used feedback from a group of their employees and sent samples to the Porsche Club of America to help in finishing out their design.

Some companies or even industries are very responsive to consumer desires, while others are still sitting with what they consider to be better mousetraps. On that subject, a recent article claimed (not for the first time) that simply building a better device is not enough. Instead it said that persuasive marketing efforts are paramount to the success of any new product because society is so reluctant to try new ideas. The author quotes psychologist William James: "[Habit is] the enormous flywheel of society, its most precious conservative agent" and goes on to show several examples of brilliant new product designs which never found acceptance because each lacked a marketing champion, such as the Dvorak Keyboard which allows typist to increase their speeds by up to 28% through better placement of the typing keys (Anderson, 1989, p. 1). It is worth noting that

companies which do a superior job of design will also be very likely to be very strong marketers of their products, both because they have the know-how to market well and because they realize they have filled a void in the market.

**6) How often does your company make changes in the design process?**

The specific question addressing the evaluation of their design process over time proved to be extremely difficult for most companies interviewed. It is much easier for the employees to talk about what leads to changes in the design of an established product. This should demonstrate that there is little consistent clarity within companies about the design process; most handle it on a case-to-case basis and the process does, in fact, change with each new design decision.

**7) Where do initiatives for new product design in your company come from?**

Nearly 80% of the products and services available today were not around 15 years ago (source, survey data 3). Most of those consulted agreed that many (one quoted 70%) of the changes for a product's design were technology-oriented, i.e. an increase in the technology available had forced the upgrading or redesign of the product. Sometimes the new technology created the availability and demand for an entirely new product such as the laser printer (source, survey data 3). Of course, for many products such as a computer-processor all that usually has to be done is to make use of a different processing chip and advertise the "new" product. For most other industries, the procedural

lines to follow for design are less clear, more difficult and more risky.

Initiatives for new product development and design can come from countless places, and much depends on the formal structure and informal communication channels of the organization. One company said they regularly were able to produce new designs from ideas given from people on the assembly-line floor, while another company could not conceive that a workable idea could come from that level of the company's hierarchy. Sometimes the suggestions come from customer feedback, or from any of the myriad of other imaginable sources. The company which manufactured a vinegar-based cleaner had problems with their customers perceiving that it streaked windows, even though it cleaned other items very well. Thus, they utilized that feedback from their customers and developed an ammonia-based window cleaner which has since proven to be successful.

#### INITIATING FACTORS FOR REDESIGN

Product design changes are looked at when sales go down or don't meet initial expectations. Changes are also considered when companies wish to maintain a reputation as "progressive", i.e., design changes are made for cosmetic reasons in the truest sense of the word. Products which are still functional can become aesthetically obsolete due to the arrival of modern looking products. This happened in the television industry: many of the televisions produced in the early 1980's still work just fine, but the designs for television appearances have changed so

drastically that the earlier televisions now look old even if they were designed only a few years ago because the new designs have sleeker lines and less cabinetry. Another point to consider is that sometimes product designs are changed to stimulate action in the distribution channels (source, survey data 6).

**8) Is the design of new products mentioned in your company's mission statement?**

Some firms do mention design in their mission while others do not. One company even points out that the question assumes they have a mission statement. No correlation was discovered between the complexity or success of the firms design efforts and whether or not design was part of its stated mission.

**9) How many different departments overall are involved in planning product designs? How many people?**

According to the respondents, the design process will usually involve between two and twenty individuals, and around four departments. "The fewer the better," according to one respondent. If there is a design department, then their involvement is obvious. Beyond that, research and development team members are present, if the company is large enough to have a separate R & D department. The marketing departments are always involved, and so is production management. Engineers, the financial department, and purchasing are all involved at some point in larger firms. Not all of the departments are always involved, though. The size of the firm is the key, because if the total size of the firm is at 100 employees or less, then the "president" is likely to be the one making all of the key decisions, even if the design work is contracted out.

Working with small product development teams seems to be the most popular and successful way to go about designing new products. Small groups are able to communicate effectively, and by drawing on the resources of people from different departments and fields of expertise the teams are able to make the best decisions for the company at minimum expense. This is in contrast to ideas expressed by Dean and Susman, who say: "Often engineers in the two corporate functions... share neither a common language nor compatible goals" and go on to talk about product design being handled in such a way that product designers throw their work over a metaphoric wall for the manufacturing engineers to figure out how to produce the product (1989, p. 28). Perhaps the view from this research angle is different because many of the firms were smaller, or maybe it was by chance that the few large firms interviewed in this survey were especially conscientious about product design. This survey found far less separation between the various functions within companies concerning product design.

**10) How much time is typically spent in planning a new product design?**

As was noted earlier, one firm rolled off a new design in 72 hours. That, however, is not the norm for new product design in any industry. The time-frame typically encountered for a design concept to reach production stages is between 12 and 16 months. Some key variables are the technology involved, whether distribution channels are already in place and how familiar the firm is with the proposed target market. The longest time span

for a consumer good encountered ranges around 5 years before production.

11) How does your organization decide between the costs of product aesthetics or beauty versus the absolute utility and value analysis of the product?

This question intended to find out the differences between product function and its aesthetic value in making design decisions. Can aesthetic value be measured? According to midwestern industry today it can. The issue revolves around whether or not the consumer is going to pay extra money for highly aesthetic design. The objective of design is to create more appealing products which are less expensive to produce, but when the added expense of producing a highly aesthetic design occurs, a firm must choose between function and beauty. Clues to successful decisions in this area are often given by what competitors put out, as well as by good market research.

This concludes what may be considered the heart of the research conducted on how product design is accomplished in midwestern companies. Noted one survey respondent: "The process itself does not seem to, and cannot, change a whole lot. Any four texts will outline basically the same procedure, some with four steps, some with eight" (source, survey data 19). On the other hand, the design process does appear to be moving towards a more integrated approach, such as a specifically manufacturable design.

#### AMERICAN VERSUS EUROPEAN DESIGN

One of the more interesting areas concerning product design research relates to the differences between designs in the U.S.

and in Europe. Unfortunately, not enough data has been collected to be able to make definitive statements about why European products are in such high demand in the United States. According to the data collected, the average consumer won't pay for the frills on the shampoo bottle in this country which are standard in Europe. One designer said that some of the reasons for these differences are that in Europe the markets are much smaller than the mass markets in the U.S., and that manufacturers often produce only for a local geographic region. He went on to say that the products in Europe tend to be niche oriented in terms of the firms' marketing strategies (source, survey data 1).

#### CONCLUSION

Design in our society is not ruled by value-analysis rather than aesthetics, and the perceptions and desires of the average consumer are held in high esteem by most product designers, albeit to varying levels of involvement and complexity. The expense of statistically significant market research data on the preferences and desires of consumers for one design over another are often overwhelming. Instead, companies use methods which are less statistically valid but have proven to work for them, such as measuring the sales response to a new product design. Basing future decisions on current and past experiences is another method that works for many companies.

Design statements are indeed often statements of corporate strategy, and an example of this is paying to have a bottle designed for a product not because consumers have shown that they

think highly of the bottle shape or function, but because the company wishes to make a statement about its product's differentiation from those of competitors.

This study has shown that there are fairly predictable stages for the product design process that most firms use. Starting with a highly creative idea flow and ending in a more restrained and mathematical push, the process tries to ensure that the design is manufacturable. Two key variables have proven to be the size of the company, and whether not the new design is going into a market familiar to the company.

Many managers are still highly concerned with value-analysis relative to product function, and thus do not see investing in a high-quality design as a sound decision. The design industry recognizes that design pays for itself and often contributes much to profit, or subtracts from profit in the case of poor design. However, it is harder to convince a manager worried only about the bottom line to take on the additional design work. This probably signifies much of the difference between products designed in the United States versus design in Europe. Managers in the different cultures have been trained in different schools of thought: Europeans have come to the realization that they can earn more money from a product most consumers really like, as opposed to the American designers' function oriented ideas which guide their design processes.

## References

- Abler, Robert A. (1986), "The Value-Added of Design," Business Marketing, (September), pp. 96-103.
- Anderson, Jon. (1989), "We Do Have Better Mousetraps, But Our Instinct Is Not To Bite," The Chicago Tribune, (Friday December 30), Section 5, pp. 1-2).
- Dean, James W. Jr., and Susman, Gerald I. (1989), "Organizing for Manufacturable Design," Harvard Business Review, (January-February), pp. 28-36.
- Kotler, Philip, and Rath, Alexander G. (1984), "Design: A Powerful But Neglected Strategic Tool," The Journal of Business Strategy, (Autumn), pp. 16-21.
- Mirriam-Webster, Dictionary (1974), Henry Bosley Woolf, editor. Pocket Books, New York. p. 200.
- Survey Interviews (19 total), Confidential. October 1988 through April, 1989.
- Sipe, Kent, et al. (1988), "Product Design: the Decision Process," Graduate Paper (Dr. S. Borna - Department of Marketing), Ball State University.
- Wall, Stephen J., and White, Randall P. (1989), "Managing New Product Development Strategically," Issues and Observations, by the Center For Creative Leadership, (Winter), Volume 9 Number 1, pp. 1-6.