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消費者行爲對產品品質與工業設計之影響

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CONSUMER BEHAVIOR/MARKETING AND ITS IMPACT ON PRODUCT QUALITY AND INDUSTRIAL DESIGN

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摘　要

在產品開發的過程中，工業設計對定義出消費者需求及慾望之研究能有相當之貢獻。在此研究中，作者藉由消費者對產品之視覺上及操作上之品質要素進行其喜好及認知上之測試，並提出了一個概念的產品品質模式。此外，在消費者行爲研究中，區分出特定及一般的產品品質要項，可供工業設計師參考及運用。對公司管理人員亦提出了一些建議，以共同設計出具有高品質的產品。最後，在產品品質評估的架構中，整合了不同的專業，例如，工業設計、市場行銷及製造工程。

關鍵詞：消費者需求及慾望，消費者喜好及認知，概念的產品品質模式。

ABSTRACT

In the product development process, industrial design can contribute to the research process of identifying consumer wants and needs. A conceptual product quality model is formulated based on the findings of this exploratory research combining consumer preference and perception with visual and operational function determinants of product quality. Moreover, guidelines are established for industrial designers who contribute to product quality that is categorical and universal dimensions within consumer behavior research. Several recommendations for corporate management during the research process are given. This study also provides a comprehensive structure of product quality assessment, which integrates several different disciplines such as industrial design, marketing, and engineering.

Key words: Consumer needs and wants, Consumer preference and perception, Conceptual product quality model.

I. INTRODUCTION

Marketing research suggests that consumers should be considered as one of the important focal areas for identifying quality determinants for consumer products. Marketing surveys have identified the components in the consumer response process as it relates to product quality, such as price, brand, salient attributes, segmenta-

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tion, needs, and decision making. These components identify the product features and properties that make the difference in consumer buying behavior. In many cases, consumer perception can identify the key determinants that are most relevant to the product. For example, consumer perception about the purchase of a coffee maker may focus on such determinants as appearance, price, brand, operating comfort, and maintenance. These are some of the basic evaluation processes for consumers.

Due to changing consumer wants and needs, acceptable product quality is not always easy to predict. For example, consumer decision-making elements as they relate to product quality and the purchase of an automobile may include performance, styling, safety, reputation, social status, speed, maintenance, features, serviceability, and durability. Design development should relate to the above criteria in addition to the specific visual and functional determinants such as form studies, color, human factors, production costs, uniqueness of shape, and new technology used. In contrast, corporate manufacturers may limit product development to the amount of money they are willing to invest because of cost effect, which may have a negative impact on market share and growth.

In the traditional product development process, the marketing and design activities are normally performed independently within corporate organizations. By using focus groups, the marketing research department can prepare a survey related to product quality and then evaluate how consumers select products based on product quality determinants. Once this makreting survey has been completed, the data is compiled and given to industrial designers who may or may not interpret it properly. Consequently, corporate management may be misled to develop a strategy which can not improve product quality effectively. In other words, this process lacks continuous interaction between marketing, industrial design, and corporate management.

The identifiable literature on product quality is not extensive enough to provide a conceptual foundation for investigating product quality determinants. The difficulty in researching this area has been described as inadequate and inconsistent within its assessment procedures and methodology. Therefore, this research attempts to rectify this situation by: (1) reviewing a number of studies that have investigated product quality; (2) re-examining the role, responsibility, and relationship between the industrial designer, marketer, and engineer in order to improve product quality; (3) developing a model for designing high quality products which meet consumer needs; and (4) establishing guidelines on how to optimize the interface of industrial design and consumer behavior research.

II. EXISTING KNOWLEDGE OF CONSUMER BEHAVIOR ABOUT PRODUCT QUALITY

Consumer Needs

Marketing professors at Wheaton College and The Ohio State University, Engel, Blackwell and Miniard (1990, pp. 489-490) claim:

"Need recognition essentially depends on how much discrepancy exists between the actual state (i.e., the consumer's current situation) and the desired state (i.e., the situation the consumer wants to be in). When this discrepancy exceeds a certain level or threshold, a need is recognized.....Need recognition does not automatically activate some action. This will depend on a couple of factors. First, the recognized need must be of sufficient importance. Second, consumers must believe that a solution to the need is within their means."

The consumer should perceive a discrepancy between the desired state of affairs and the actual situation sufficient to arouse and activate the decision process. Other factors influencing need activation include changing circumstances (e.g., a salary increase), product acquisition (e.g., buying a new home), product consumption (e.g., falling short of consumers' expectation), marketing influences (e.g., product innovations), individual differences (e.g., individual desire for something new), etc.

Price, Brand Name and Perceived Quality

Some evaluative criteria such as price and brand name may help consumers judge the likelihood of their needs and assess whether their expectations have been met or exceeded. According to studies about consumer behavior, consumers appear to depend on product price as a quality signal. In addition, the greater the price variation, the greater the tendency for consumers to use price as a quality indicator. By the way, consumers are not always looking for the lowest possible price or even the best price-to-quality ratio; other factors such as product convenience or brand name may be of a greater priority. The brand name communicates to the consumer through the various information with which it has become associated through advertising, word of mouth, and usage.

Product Attributes Related to Perceived Quality

There are product attributes such as function, mobility, texture, color, and style, which may be used to measure product quality. Paul E. Plsek, a quality management consultant specializing in strategic quality planning (1987, pp. 28-36), identifies some characteristics or dimensions of quality, which are listed below:

Performance	Reliability	Response
Features	Durability	Aesthetics
Conformation	Serviceability	Reputation

Those examples may have provided part of a framework for determining product quality attributes. However, the attributes signaling quality in a product or product line are not static, but change over time. For example, as advanced technology and increasing competition lead to the development of technically better products, the features that signal quality also change.

III. AN AUXILIARY APPROACH FOR INVESTIGATING PRODUCT QUALITY

An Interfunctional Team and Product Quality

For many manufacturers, product quality communicates the corporate image, philosophy, technological level, and position of the product within the market to the public. Thus, the planning and implementation of a corporate policy for product quality does need the involvement of the various professional groups. Generally, an interfunctional team includes five to ten different managerial types such as marketing research, industrial design, manufacturing, production and operations, sales or service, and so forth. In addition, top management executives are also included, especially during the communication and decision-making periods.

An interfunctional team consists of characteristics such as shorter communication channels, faster response to shifting markets, and integration of various areas of professional expertise. In this context, the industrial designer, as a differentiator, an integrator, and a communicator, should be brought in on the ground level of quality product development. With the strong partnership between team members, the interfunctional team can facilitate shorter product development cycles and more rapid response to consumer needs. It can also help corporate manufacturers establish product quality objectives and identify the lists of product quality dimensions based on consumer surveys. Ultimately, the success of product quality planning depends heavily on consistent communication and collaboration between team members.

Industrial Design and Product Quality

The word "quality" has a number of interpretations to design. One is "degree of excellence" of a product, implying a quality scale performance. This might vary from "good", for a product that works perfectly throughout its prescribed life, to "bad" for a product that works inefficiently and requires frequent repair. Another interpretation, ignoring performance, concerns itself with surface finish, straightness, alignment, aesthetic merit, color, graphics, layout and so on. Aesthetic and ergonomic dimensions are relevant to visual and operational qualities, and they should be applied to assist in optimizing quality at required cost levels.

Design, in general, entails some form of compromise among conflicting requirements arising from the various dimensions. Ford's Taurus, for

example, is demanding on its aerodynamic styled exterior which requires new techniques and standards in assembly. Good design can contribute to a product's usefulness as well as its attractiveness. Thus, a design audit instrument to measure good design as well as product quality would help management gauge whether it is adding value through design.

Guidance on designing high quality products is needed in the product development process, and this guidance will mean more to designers if presented in terms of relevant attributes such as performance or appearance. One approach is to maximize consumer needs by carrying a full line of visual, operational and functional qualities. however, it is hoped that information from this research may be useful in identifying product quality determinants to those who are responsible for product planning and quality programs within a corporate manufacturer.

IV. RESEARCH METHODS

A theoretical foundation for this research was established through a review of marketing and consumer behavior research on product quality. Then, three exploratory studies were conducted: (1) a pilot study for generating product quality determinants and testing preferences of consumers, (2) a study for testing the consumer discrimination as it relates to products, and (3) a further exploratory study about the product quality determinants based on consumer preferences and perceptions of products. Moreover, in-depth interviews with industrial designers, marketing experts, and management experts were also conducted as part of this research project.

Survey I

In general, consumers select a product by recalling their experience and knowledge about that product. The results of the survey profile the consumer's preferences in terms of the appeal/unacceptability of different product attributes. In addition, the product quality dimensions may then be dichotomized into universal and categorical dimensions:

Universal Dimensions

These dimensions can transcend different types of products. They include extrinsic attributes (e.g., durability and price) and intrinsic attributes (e.g., size and weight).

Categorical Dimensions

These dimensions indicate the specific operational function attributes for a certain product category. Generally, consumers need experience using the product so that they can evaluate categorical dimensions relative to their needs. For example, dimensions such as closeness of shave, usefulness of the built-in trimmer, and freedom from noise and vibration, can be categorical dimensions for the men's electric shaver.

Survey II

This study is related to the psychological meaning of products, which investigates a person's subjective perception and affective reactions to stimuli (i.e., product quality attributes). This study also allows the subjects to recognize part of what industrial designers consider in the product design process. The questionnaire was designed using a semantic differential scale based on sets of antonyms (e.g., simple-complex, pleasing-unpleasing, masculine-feminine). In contrast, most subjects as well as consumers can not easily perceive the product samples in terms of professional jargon. The results of the survey are not convincing because of the subjects' irritated attitudes which are caused by time consuming interviews. In order to conduct further research, there is a need to improve the questionnaire content so that subjects can answer specifically and clearly about their perceptions of product characteristics.

Survey III

The proposition in this study is that the quality which a consumer perceives in a product is a function of the magnitude and direction of the gap between perceived product and expected product. The comparison of consumer preferences with perceptions was proposed from previous sur-

veys and supported in the questionnaire. Ten mechanical drawing pencils were selected as product samples. Identities of sample brands were not revealed to subjects. The statistical method of the Spearman Rank-order Coefficient (rho) was utilized.

According to the result of the computing of correlation, only shape/form and material have a reliable relationship with the result of consumer perception of samples. But they are not the most preferable product quality attributes to subjects. Thus, the result may have implied the fact that most corporate manufacturers are likely to have equal capability in engineering technology, which allows the product to be utilized functionally. Consequently, consumers compare other product quality determinants for making decisions. Other information gained from this survey is also valuable. The subjects mainly supported the notion that the key of ensuring good product quality is to meet or exceed what consumers expect from the product.

Expert Interviews

Due to the possible impact on product quality, one design-related psychologist and five professional industrial designers both in academic and practical areas were interviewed for the relative subject matter. The main insights gained from expert interviews have been summarized:

(1) It is imperative to investigate the definition of product quality. Quality is treated as value which is judged from the consumer's experience and perception toward the product.

(2) Consumers perceive the product quality attributes from the perspectives of their mental and physical needs.

(3) For establishing the conceptual product quality model by the industrial design, the determinants of product quality should be in general terms. It should avoid the mistake of getting into any particular product category.

(4) Based on the determinants of perceived product quality, the perceived value of product attributes (e.g., price, appearance, and performance) can be identified and correlated with perceived product quality.

V. RESULTS AND DISCUSSION

A Conceptual Product Quality Model

From the results of the research, the perceived product and expected product can be generated and compared based upon the product quality determinants. The industrial designer can identify the visual quality determinants including color, shape and form (dimension and proportion), size and weight, texture (visual tactile), and material as well as the functional quality determinants according to product categories. This product quality model is illustrated in Figure 1. The consumer's view of product quality is shown in the upper part of this model and further elaborated in Figure 2. Figure 2 indicates that perceived product quality is the result of the consumer's comparison of expected product with perceived product. This model is also to inspire both academic and corporate professionals to become interested in product quality and that the model serves as a framework for further empirical research in this particular area.

Guidelines for Developing a Consumer Survey that Identifies Determinants of Product Quality

It is recommended that market research should design procedures and instruments that actually identify product quality determinants in order to generate consumer information that is not misleading. Also, there should be specified guidelines for industrial designers in order to establish and incorporate the research activities and design processes. Based on this concept, these propositions should include:

(1) Classifying product attributes which can be correlated to identify product quality;

(2) The use of shorter lists of product quality dimensions with fairly broad meanings in order to reduce any difficulty between their interactions;

(3) Controlling the number of product samples in order to reduce any difficulty or confusion in the evaluative comparison process as it relates

to the consumer determing product qualities;

(4) Applying marketing techniques such as focus groups to larger subject groups in order to consider time-effects, which should be considered in the preparation of surveys and their elements;

(5) Integrating the different professional groups and relating their expertise to developing consumer group surveys that are comprehensive and informative to product development;

(6) Choosing a specific consumer segment which is decided upon according to the corporate product strategy.

Recommendations to Corporate Management

This research suggests four product quality imperatives: define the product quality role, establish product quality teams, deliver product quality with reliability, and generate guidelines for corporate management to handle product quality problems related to consumers. Especially, corporate managers should notice that the manner in which a corporation handles product quality problems tells consumers (and employees) a great deal about the corporate product values and priorities. This researcher would offer these specific prescriptions.

(1) Encourage consumers to react and make it easy for them to do so.

(2) Make timely, proper communications with consumers a key part of the strategy.

(3) Encourage employees to respond effectively to consumer problems and give them the means

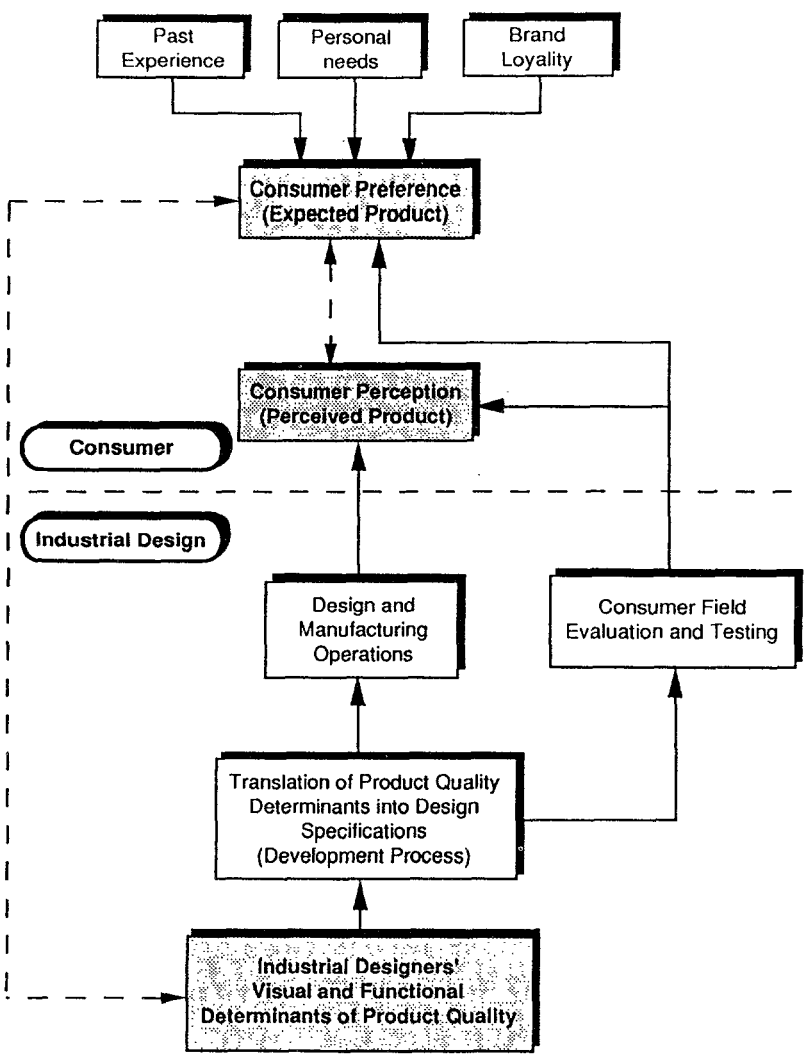

Figure 1. The Product Quality Model

to do so.

The Scope of Macro Levels of Product Quality Assessment

This research has found that it is difficult to build a body of knowledge about product quality which can be applied to practicing designers and corporate management. However, this research provided a "macro" level of product quality assessment which consists of five categories: industrial design, management, marketing, manufacturing (technology), and others (e.g., psychology and sociology) (See Figure 3). During the product development process, these five categories need to be tightly chained so that high quality products can be conveyed to consumers. Each category may create enormous impact on product quality. When reinforced with outstanding manufacturing capacities, for example, good design makes possible low manufacturing costs, high reliabilities, low life time costs, and faster time to market. Of course, industrial design is still highly required and a managerial perspective is increasingly important today.

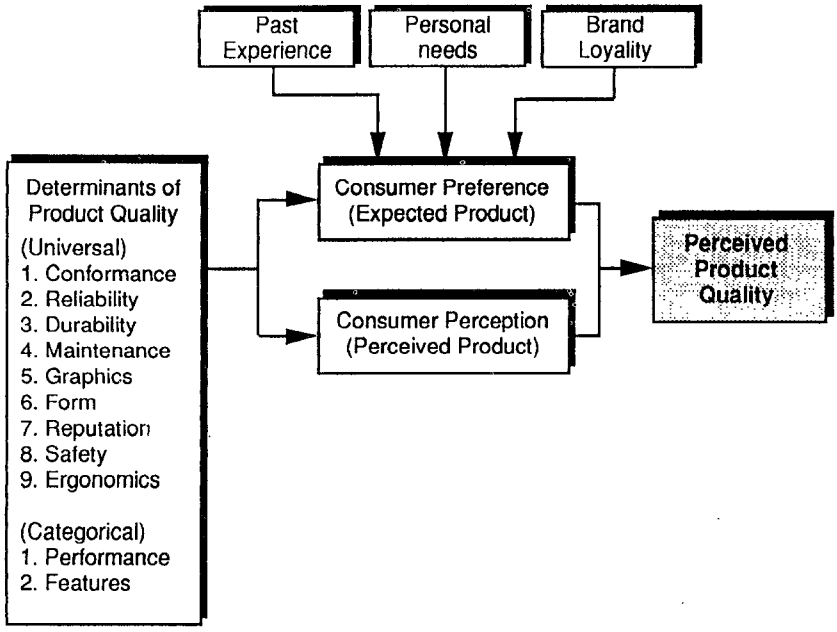

Figure 2. Determinants of Perceived Product Quality

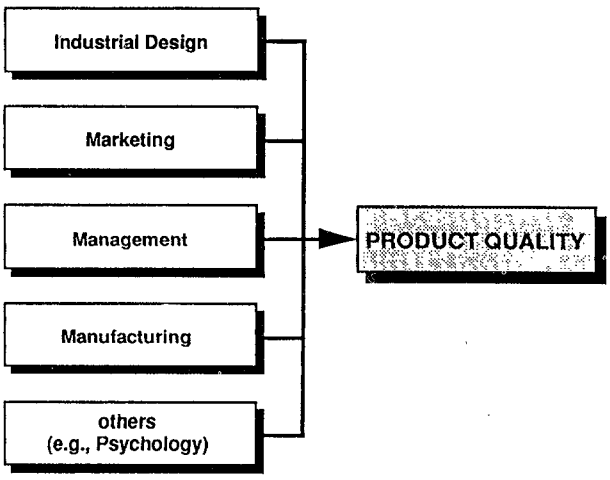

Figure 3. A Comprehensive Structure of Product Quality

VI. IMPLICATIONS

There is not one design methodology or formula which can solve all problems for designing high quality products. Industrial designers should be aware of different research techniques and adapt the information to the design process. Hence, there is a need to develop new methods to measure consumer's product quality perceptions. Several evaluating considerations such as cultural

backgrounds, past experience, family income, and so forth, exist. Yet there is a need to consider and focus on the value analysis which relates to the relationship between worth and cost (i.e., the value analysis aims to provide the user-required functions at the lowest cost), which may standardize or supply this research design. It is very important that more knowledge and courses of marketing/consumer behavior and statistical methods should be integrated with industrial design education programs.

REFERENCES

[1] Adler, Robert A. "The Value-Added Design", Business Marketing. September 1986, pp. 96-103.

[2] Alexander, Mary. "Creative Marketing and Innovative Consumer Product Design-Some case studies", Design Studies. Vol. 6, No. 1, January 1985, pp. 41-50.

[3] Bingham, Frank G. and Quigley, Charles J. "A Team Approach to New Product Development", The Journal of Consumer Marketing. Fall 1989, pp. 5-14.

[4] Blaich, Robert I. "Design as a Corporate Strategy", Adapted from a speech in the institute of Design's ID 50 Lecture Series given on the Illinois Institute of Technology campus, December 16, 1988.

[5] Box, George E.P. and others. "Quality Practices in Japan", Quality Progress. March 1988, pp. 37-41.

[6] Broh, Robert A. Managing Quality for Higher Profits. New York: McGraw-Hill Book Company, 1982.

[7] Carvens, David W. and others. "Marketing's Role in Product and Service Quality", Industiral Marketing Management. November 1988, pp. 285-304.

[8] Cary, Mark and others. "The Consumer Window", Quality Progress. June 1987, pp. 37-42.

[9] Castleberry, Stephen B. and Resurreccion, Anna V.A. "Communicating Quality to Consumers", The Journal of Consumer Marketing. Vol. 6, No. 3, Summer 1989, pp. 21-28.

[10] Chijiiwa, Hideaki. Color Harmony. Mass.; Rockport Publishers, 1988, p. 6.

[11] Choffray, Jean-Marie and Lilien, Gary L. Marketing Planning for New Industrial Products. London: John Wiley & Sons, Inc., 1980.

[12] Cole, Robert E. "Improving Product Quality through Continuous Feedback", Management Review. October 1983, pp. 8-12.

[13] Cole, Robert E. and Yakushiji, Taizo, ed. The American and Japanese Auto Industries in Transition. Michigan: Center for Japanese Studies, The University of Michigan, 1984.

[14] Crosby, Philip B. Quality Without Tears. New York: McGraw-Hill Book Company, 1984.

[15] Grosby, Philip B. Quality is Free. New York: McGraw-Hill Book Company, 1980.

[16] Curry, David J. "Measuring Price and Qauality Competition", Journal of Marketing. Spring 1985, pp. 106-117.

[17] Day, Ellen and Castleberry, Stephen B. "Definign and Evaluating Quality: The Consumer's View", Advances in Consumer Research. Vol. 13, Richard J. Lutz Provo, ed., Utah: Association for Consumer Research, 1986, pp. 94-98.

[18] Deming, W. Edward. Out of the Crisis. Cambridge, Mass.: Massachusetts Institute of Technology, 1982.

[19] DeToro, Irving J. "Strategic Planning for Quality at Xerox", Quality Progress. April 1987, pp. 16-20.

[20] Doblin, Jay. "Discrimination", Journal of Society of Typographic Arts. 1988, pp. 22-29.

[21] Doblin, Jay. "Perceptual Maps: One Aid to Product Planning", International Design. November-December, 1980, pp. 20-25.

[22] Doblin, Jay. "A Proposed Theory of Design", Design and Planning. New York: Hastings House Publishers, Inc., 1965, pp. 49-52.

[23] Donovan, Lisa and Nichols, Jeff. "Quality Control Meets Product Management", Quality Progress. June 1987, pp. 87-89.

[24] Doody, Alton F. and Brigaman, Ron. Reventing The Wheels. Cambridge, Mass.: Ballinger Publishing Company, 1988.

[25] Ealey, Lance A. Quality by Design: Taguchi

Methods and U.S. Industry. Dearbone, Michigan: ASI Press, 1988.

[26] Engel, James F., Blackwell, Roger D., and Miniard, Paul W. Consumer Behavior. Chicago, IL: The Dryden Press, 1990.

[27] Eureka, William E. and Ryan, Nancy E. The Consumer-Driven Company: Managerial Perspectives on QFD. Dearbone, Michigan: ASI Press, 1988.

[28] Evans, Bill. "Japanese-Style Management, Product Design and Corporate Strategy", Design Studies. Vol. 6, No. 1, January 1985, pp. 25-33.

[29] Flurscheim, Charles H. "Standardisation and Quality in Relation to Industrial Design', "Specification for the Development of Engineering Products", Industrial Design in Engineering. London: The Design Council, 1983, pp. 277-288 and pp. 289-296.

[30] Gardner, David M. "Is There a Generalized Price-Quality Relationship?", Journal of Marketing Research. May 1971, pp. 241-243.

[31] Gardiner, Paul and Rothwell, Roy. "Tough Customers: Goods Designs", Design Studies. Vol. 6, No. 1, Januray 1985, pp. 7-17.

[32] Garvin, David A. "Competing on the Eight Dimensions of Quality", Harvard Business Review. November-December 1987, pp. 101-109.

[33] Garvin, David A. "What Does Product Quality Really Mean?", Sloan Management Review. Fall 1984, pp. 25-43.

[34] Halberstam, David. Reckoning. New York: William Morrow and Company, Inc., 1986.

[35] Harrington, H. James. The Improvement Process: How America's Leading Companies Improve Quality. New York: McGraw-Hill Book Company, 1987.

[36] Hauser, John R. and Clausing, Don. "The House of Quality", Harvard Business Review. May-June 1988, pp. 63-73.

[37] Hauser, John R., Clausing, Don. and Klein, Robert L. "Without good research, quality is shot in dark", Marketing News. January 4, 1988, pp. 1,2,43.

[38] Henry, Walter, Menasco, Michael, and Takada, Hirokazu ed. "Product Design", New-Product Development and Testing. Lexington Mass.: Lexington Books, Inc., 1985, pp. 51-75.

[39] Hisrich, Robert D. and Peters, Michael P. Research Design: Marketing Decisions for New and Mature Products. A Bell & Howell Company, 1984, pp. 194-205.

[40] Holbrook, Morris B. and Corfman, Kim P. "Quality and Value in the Consumption Experience: Phaedrus Rides Again", Perceived Quality. lexington, Mass.: Lexington Books, Inc., 1985.

[41] Huge, Ernest C. and Anderson, Alan D. The Spirit of Manufacturing Excellence. Dow Jones-Irwin, 1988.

[42] Huszenga, Thomas P., Ciepins, Kaspar and Pisano, Jr., Daniel J. "Ernaly Involvement", Quality Progress. June 1987, pp. 81-85.

[43] Ishikawa, Kaoru. "How to Apply Company-wide Quality Control in Foreign Countries", Quality Progress. September 1989, pp. 70-74.

[44] Jacoby, Jacob and Olsen, Jerry C., ed. Perceived Quality. Lexington, Mass.: Lexington Books, Inc., 1985.

[45] Juran, J.M. "Companywide Quality Management (CWQM)" and "Departmental Quality Planning", Juran on Planning for Quality. New York; The Free Press, A Division of Macmillan, Inc., 1988, pp. 244-271 and pp. 272-281.

[46] Kane, Edward J. "IBM's Quality Focus on the Business Process", Quality Progress. April 1986, pp. 24-33.

[47] Keeley, Larry. "The Road Not Taken .... Choices for the 90's", Innovation. Vol. 8, No. 3, Fall 1989, pp. 2-5.

[48] Koberg, Don and Bagnall, Jim. "The Design Process is a Problem-Solving Journey", Universal Traveler. Los Altos, CA: William Kaufmann, Inc., 1981, pp. 16-21.

[49] Kohoutek, Henry J. "Coupling Quality Assurance Program to Marketing", Industrial Makreting Management. August 1988, pp. 177-188.

[50] Kotler, Philip. "Individual Product Decision", Marketing Management. Englewood Cliffs: New Jersey, Prentice Hall, Inc., 1988, pp. 458-463.

[51] Leonard, Frank S. and Sasser, W. Earl. "The Incline of Quality", Harvard Business Review.

September-October 1982, pp. 163-171.

[52] Lewalski, Z.M. Product Ethetics. Carson City, Nevada: Design & Development Engineering Press, 1988.

[53] Lichtenstein, Donald R. and Burton, Scot. "The Relationship Between Perceived and Objective Price-Quality", Journal of Marketing Research. November 1989, pp. 429-443.

[54] McCoy, Katherine J. "Design in Japan: Two Viewpoints on Its Unique Quality", Innovation. 1985, pp. 13-16.

[55] Marr, Jeffrey W. "Letting the Consumer Be the Judge of Quality", Quality Progress. October 1986, pp. 46-49.

[56] Mayo, John S. "AT & T: Management Questions for Leadership in Quality", Quality Progress. April 1986, pp. 34-39.

[57] Moir, Peter W. "The Essentials of Industrial Survival", Profit by Quality. England: Ellis Horwood Limited, 1988.

[58] Mixon, Frank. Managing to Achieve Quality and Reliability. New York: McGraw-Hill Book Company, 1971.

[59] Nussbaum, Bruce and others. "Smart Design: Quality is the new style", Businessweek. New York: McGraw-Hill, Inc., April 11, 1988, pp. 102-117.

[60] Olshavsky, Richard W. and Miller, John A. "Consumer Expectations, Product Perforance, and Perceived Product Quality", Journal of Makreting Research. February 1972, pp. 19-21.

[61] Osgood, Charles E., Suci, George J., and Tannenbaum, Percy H. The Measurement of Meaning. Urbana: University of Illinois Press, 1957.

[62] O'Shaughnessy, John. Why People Buy. New York: Oxford University Press, Inc., 1987.

[63] Ouchi, William. Theory Z. Reading, Mass.: Addison-Wesley Publishing Company, Inc., 1981.

[64] Owen, Charles L. "Design Education in the Information Age", Design Processes Newsletter. Chicago: Design Processes Laboratory of the Institute of Design at Illinois Institute of Technology, Vol. 3, No. 3, 1989, p. 2.

[65] Parasuraman, A., Zeithamal, Valarie A., and Berry, Leonard L. "A Conceptual Model of Service Quality and Its Implications for Future Research", Journal of Marketing. Fall 1985, pp. 41-50.

[66] Peterson, Robert A. "Managing the Marketing Research Process: Research Design", Marketing Research. Plano, Texas: Business Publication, Inc., 1982, pp. 74-104.

[67] Pirkl, James J. "A Focus on Form", IDSA Paper. Industrial Design Society of America, 1981, pp. 51-54.

[68] Plsek, Paul E. "Defining Quality at the Marketing/Development Interface", Quality Progress. June 1987, pp. 28-36.

[69] Reynolds, Fred D. and Wells, William D. Consumer Behavior. New York: McGraw-Hill Book Company, 1977.

[70] Roy, Robin. "Design, Innovation and Competitiveness: from Awareness to Action", Design Studies. Vol. 6, No. 1, January 1985, pp. 4-6.

[71] Sarnules, Allen. "The Dynamics of Interdisciplinary Design", Innovation. 1990, pp. 33-37.

[72] Schutles, Herbert H. "The Two-Edged Soward of a National Design Image: A German Perspective", Innovation. 1985, pp. 11-12.

[73] Sears, Ronald J. "Market Value Innovation", Innovation. Fall 1986, pp. 2-8.

[74] Shetty, Y.K. "Product Quality and Competitive Strategy", Business Horizon. May-June 1987, pp. 46-52.

[75] Steers, Richard M. "Introduction to Organizational Behavior. Glenview, Illinois: Scott, Foreman and Company, 1988.

[76] Stowell, Daniel M. "Quality in the Marketing Process", Quality Process. October 1989, pp. 57-62.

[77] Sullivan, L.P. "Quality Function Deployment", Quality Progress. June 1986, pp. 39-50.

[78] Taguchi, Genichi and Clausing Don. "Robust Quality", Harvard Business Review. January-February 1990, pp. 65-75.

[79] Takeuchi, Hirotaka and Quelch, Hohn A. "Quality Is More Than Making a Good Product", Harvard Business Review. July-August 1983, pp. 139-145.

[80] Tellis, Gernard J. and Fornell, Claes. "The

Relationship Between Advertising and Product Quality Over the Product Life Cycle: A Contingency Theory", Journal of Marketing Research. February 1988, pp. 64-71.

[81] TRIAD Design Project Exhibit. Designing for Product Success. Boston, Mass.: Design Management Institute, 1989.

[82] Turner, Barry T. "Managing Design in the New Product Development Process-Methods for Company Executives", Design Studies. Vol. 6, No. 1, January 1985, pp. 51-56.

[83] Zeithaml, Valarie A. "Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence", Journal of Marketing. July 1988, pp. 2-21.

[84] Zeithaml, Valarie A. Defining and Relating Price, Perceived Quality, and Perceived Value. (Working Paper) Cambridge, Mass.: Marketing Science Institute, June 1987.