IMPLEMENTING CONSUMER QUALITY EXPECTATIONS

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ABSTRACT

Juran defines quality as 'fitness for use'. However many products/services are being determined or redesigned based on negative consumer comments rather than specific consumer requirements. This condition can create dissatisfied customers and frustrated producers particularly when dealing with non-functional characteristics (i.e. appearance, cost trade-offs, life expectations, ...).

Meaningful consumer feedback is extremely important when allocating time and resources to particular product aspects and ultimately affect perceived quality and product cost. One way of obtaining this feedback is by utilizing survey methods.

This paper will outline survey requirements, interpretation and relevance to the organizations quality concerns.

INTRODUCTION

Consumers are the ultimate judge of product quality. From a consumer standpoint, quality is 'perceived' as the relationship between their expectations and the products/services ability to meet these expectations. Consumer satisfaction is achieved when expectations are met or favorably exceeded.

A basic step toward achieving consumer satisfaction is to properly define the product/service as relates to performance expectations. Once this has been determined, conversion to design parameters and subsequently 'quality characteristics' must be made.

The biggest problems in designing for quality are:

- The importance of identifying the customers' product/service requirements is not always recognized and sufficiently measured.
- It is not always possible to translate customer quality requirements into blueprint characteristics.
- Those customer requirements that can be translated into blueprint specifications, are not always easily measurable.

This paper examines some considerations that must be made in order to successfully define, implement, and monitor consumer concerns and their effect on product performance.

GENERAL PRODUCT DEFINITION

Typically the consumer and manufacturer use different terms to describe specific product/service characteristics. Consumers define products with effects (i.e. noisy, easy to operate, etc.) whereas manufacturers use functional or dimensional descriptions.

To resolve these differences product/services should be defined on three distinct levels:

functional -	those operations describing a products/service basic intent; i.e. an automobile's functional definition is to provide transportation.
features -	those 'optional' components that enhance a products function yet are not necessary to satisfy functional requirements – i.e. power steering, air conditioning, etc. This level also includes legally mandated requirements.
consumer concerns -	product/service attributes based on subjective interpretation of important aspects i.e. ease of handling, appearance, safety, durability, etc.

Functional items and features are generally determined by demand and can be arrived at using traditional survey methods. These items do not usually require subjective interpretation by design engineers.

It is the area of consumer concerns that is vaguely defined and requires additional interpretation. By soliciting more specific descriptions from consumers the task of achieving consumer satisfaction can begin with more appropriate designs. Improving this method of achieving consumer satisfaction is the primary goal of this paper.

INFORMATION SOURCES

Limited information regarding consumer desires is currently available in survey reports. Unfortunately the vague nature of the questions in these surveys provide little concrete information for the designer. Figure 1 is extracted from a typical new truck survey. Many of these general terms are not easily converted to design specifications since most leave a wide range of possible options to meet these requirements. What are the components that determine dependability, exterior appearance, riding, etc.?

REASONS FOR CHOOSING THE PICKUP YOU PURCHASED

Which of the following were reasons why you chose the pickup you did? *(Please check ☑ all answers that apply)*

☐ Dependability	☐ Pickup/Acceleration	☐ Handling, Maneuvering in Traffic
☐ Durability	☐ Exterior Appearance	☐ Passing on Highway
☐ Workmanship-Assembly	☐ Interior Appearance	☐ Overall Comfort
☐ Vehicle Quietness	☐ Cab Type Desired was Available	☐ Comfort of Seats
☐ Quality of Dealer Service	☐ Dealer had Vehicle Desired	☐ Roominess for Passengers
☐ Dealer Parts Availability	☐ Diesel Engine Available	☐ Special Options Available
☐ Dealer Location	☐ Full-time 4WD Available	☐ Size of Outside Dimensions
☐ Warranty/Guarantee	☐ Part-time 4WD Available	☐ Safety Features
☐ Price/Cost to Buy	☐ Cargo Area Dimensions	☐ Handling on Highway
☐ Future Resale Value	☐ Cargo Capacity-weight	☐ Handling-Rough Areas
☐ Delivery Date	☐ Trailer Towing Capability	☐ Smaller Than Competitive Makes
☐ Overall Operating Costs	☐ Ground Clearance	☐ Larger Than Competitive Makes
☐ Fuel Economy	☐ Riding (on open road)	☐ Other _____

FIGURE 1

BRIDGING THE SURVEY GAP

Far too often surveys are based on predetermined product descriptions. These descriptions can neglect important product aspects or can leave room for misinterpretation by consumers. In order to assist the design effort, surveys should be structured by:

a. constructing a list of characteristics of concern and ranking their importance based on consumer feedback

b. allowing consumers to specify tolerance thresholds—i.e. that level of performance that distinguishes between accept/reject.

c. attempting to define product characteristics in a 'measurable' form.

Personal interviews might be required to accomplish some of these survey goals. The quality of information generated by these interviews should be used to make design decisions. For example one type of interviewing method is geared at breaking information into its most specific elements:

Interviewer:	It is noted that you feel exterior appearance is important to have you accept our product. What specific characteristics do you see as affecting appearance?
Consumer:	Nice paint
Interviewer:	What about paint causes it to be 'nice'
Consumer:	No chips or scratches
Interviewer:	Would a very small chip annoy you?
Consumer:	Yes, chips always seem to lead to rust.
Interviewer:	How about scratches are they always unacceptable?
Consumer:	Very small scratches that are barely visible don't affect anything.
Interviewer:	Could you describe the dimensions of a small scratch?

This small encounter has:

- determined that chips and scratches detract from appearance.
- established 'perceived' rust/chipping relationships:
- judged 'small' scratches as acceptable.
- included lack of chips and small scratches as defined in 'nice exterior appearance'

Follow-up surveys could then be constructed that break 'exterior appearance' into its major elements paint, fit styling, etc., ranking major categories as to their importance and establishing the specific problems (chips, scratches) and the extent (size, number) which they are present in newly purchased products.

PERCEPTUAL ABILITIES

In product areas where sensory skills are required it is important that distinctions be made between consumer preferences and their ability to distinguish product differences. Designed experiments should be conducted that:

- establish ranges on perceptual judgements (i.e. when can squeaks be heard and by whom?).
- study interrelationships between several factors (i.e. effects of combinations of chips and scratches) and their rating.

RANKING AND REFINING CONSUMER REQUIREMENTS

Manufacturers should aim at defining their products based on an optimal bundle of product/service characteristics. Here optimal means that combination which provides an acceptable profit for the manufacturer while satisfying the consumers perceived needs.

When considering preferences it can be assumed that consumers have a limited number of resources ($) available. Consequently decisions must be made to establish:

- the maximum amount willing to spend per item;
- the relative importance of characteristics (ranking);
- choices of one item over another.

A strategy to combine this multiple faceted information can be based on work done in economic theory. One such method is utility theory.

Utility functions assign numerical values to preference situations. Thus comfort may have a utility of 1.2 whereas dependability rates a 2.74 given choices of characteristics. These numerical assignments generally correlate with a dollar amount per characteristic.

In order to achieve maximum consumer satisfaction it is desirable to design products to contain an optimal number of those characteristics deemed important by consumers at a price they (and the manufacturers) are willing to pay.

Two techniques used to derive these optimal product combinations are MAUT (multiple attribute utility theory) and MOOT (multiple objective optimization theory).

Both MAUT and MOOT provide the maximum number of individual characteristics given price constraints.

JUDGEMENT AND DECISION-MAKING

Nobel prize winner H.A. Simon contends that: 'Homo sapiens is not as clever as homo economicus. His psycho-physical limitations, if nothing else, prevent him from clearly ordering his preferences, from constructing his decision trees, and from tracing them out to the correct conclusion in any case. Man, in other words, is error-prone. His errors are partly due to the fact that in practice he rarely has the time to arrive at the optimal responses, and partly also because he lacks the necessary reasoning capacity even when he has all the time in the world.'

In order to emulate this notion we can assume that consumers generally judge the quality of a product in terms of a relatively small number of relevant characteristics.

By establishing primary focus points toward which a product is defined consumers can be satisfied based on the fulfillment of the important product characteristics they desire along with meeting functional requirements.

DESIGNING FOR CONSUMER SATISFACTION

Once a product's primary characteristics have been determined it is necessary to convert them into design goals and specifications. Table 1 shows results of survey items and their utilities as communicated to designer. As shown in this example, given choices, consumers prefer dependability to all other desirable product attributes. More design effort should be placed on product dependability than the other attributes if the consumer is to be satisfied.

SURVEY CHARACTERISTICS	UTILITY	
Dependable	2.74	
Reliable	1.98	
Fuel Economy	1.79	
Roominess	•	
Comfort	•	
Exterior Appearance	•	
•	•	
•		
•		

TABLE 1

Each survey characteristic can then be broken down into the component elements that fulfill each characteristic (TABLE 2).

SURVEY CHARAC-TERISTICS	CONSUMER RANKED	COMPONENTS	MEASURABLE INFORMATION	DESIGN RESPON-SIBILITY
Exterior Appearance	6	Paint • absence of chips • absence of scratches • free of orange peel • corrosion free	no chips no scratches not applicable 5 years without occurrence	
		Fits well • no large gaps	no gaps greater than 2mm	

TABLE 2

It is then the task of the design responsible (Column V) individual to see that realistic consumer concerns, along with the associated perceptual abilities are incorporated into product design. Subjective product decisions can be minimized using actual consumer rankings.

UTILIZING SURVEY INFORMATION FOR QUALITY IMPROVEMENTS

Through the proper collection and use of consumer surveys the following potential quality gains can occur:

- designs that are closer to expectations generate more consumer satisfaction.
- consumer information can be used in quality auditing to measure severity of defects (i.e. number of demerits assigned).
- cost savings effected by not over-designing (consumer expectations did not include characteristic) products.
- reduction in specified limits due to perceptual abilities.
- competitor comparisions based on most important consumer concerns – (establishes competitive edges or gains)

SUMMARY

Although companies expend large amounts of money generating consumer data far too often this information cannot significantly impact product design. Substantial gains in consumer satisfaction can occur if surveys are structured to derive the specific product characteristics of most concern to consumers.

This type of survey approach requires a more thorough review of product definition and a greater amount of feedback from consumers.

By properly understanding consumer desires it is easier to design, manufacture, and assure product quality.

In order to acquire these gains it is essential that new lines of communication be established between design, marketing, and quality staffs.

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