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A DEVELOPMENT OF CONCEPTUAL MODEL FOR DEFINING USERS' QUALITY PERCEPTION IN PRODUCT DESIGN

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ABSTRACT

The perception and needs of individuals are important components in relation to meeting the quality of products in the design and development process. In general, the success of many products existing in the market is often determined by designers who are able to meet or exceed customers' quality expectations and satisfaction. Due to the awareness of environmental elements, through the physical senses such as sight, hearing and touch, researchers have realized that customers' use different variables to identify the quality of consumer products, including their understanding of product use and esteem functions. A basic research questions has been to study how product designers have addressed the problems and difficulties involved in translating user perceptions and needs into sustainable product design and manufacture. This paper discusses customer perceptions in relation to aspects of quality in product design and develops a conceptual model mindful of previous work detected in the literature. The research method used in this study is basically a qualitative method based on content analysis of data obtained from previous studies. The underlying objective is to analyze relevant specific variables of customers' quality perceptions in product design and develop useful design guidelines or possible template solution tools for designers and marketers for product development and manufacture. Hence, these composite template solution tools, and associated sets of guidelines, are expected to have a positive impact on design education-primarily as valuable aids for design teachers to better explain to their students the underlying rationale and interdependent relationships in the relevant phases of the design process. It will be shown that it's important for students, i.e., neo industrial designers, to understand user perceptions on product quality as this is fundamental to achieving a great user experience in the product design and development process in practice.

1. INTRODUCTION

In general, many designed products whose roots lie in a particular visual idea also have a compatible use function. Such products may have positive and negative effects in terms of use and esteem values (Bonollo E., 2015). It's widely accepted that successful product designs in the market are derived from an analysis of ideas that arise after detecting or through creating positive a consumer's perceptions and needs. The feedback from and empathy with customer is useds as the basis for determining the design characteristics and product features as a series function (Albinana J. C. & Vila C., 2012). Product designers and the respective manufacturers are to take careful account of customer perceptions and needs as opportunities to contribute value to both parties. Besides that, customers are often influenced by their priorities and perceptions in the process of purchasing goods (Saleem et al., 2015). According to Palmer (2001) and Agyekum et al. (2015), consumers/users purchases products or services based on their recognized needs. Needs lead the consumers to buy products often in order to fulfil or exceed their growing expectations, expecting that the products work effectively to solve their problems or desires. A label named "The First Moment", by Proctor & Gamble, refers to the brief time it takes for consumers to make a purchasing decision (when assessing product choices) takes from three to seven seconds (Sundar A. & Noseworthy T. J., 2014).

As indicated by Siu K. W. M. (2003), many designers still believe, and expect to predict, how consumers operate, and decide whether they like or dislike something. The designers then, generate the what they perceive to be appropriate designs for the consumers. In addition, consumers rarely have the opportunity to participate in the product design decision process. As reported by Tschimmel K. (2011), designers tend to decides what to do and when, based on the personally perceived and re-design work tasks. Thus, to develop innovative design solutions, information on design projects and knowledge may be only partly sufficient, unless user's/consumers' perceptions are seriously considered. Users' can play an important role in product design decision processes.

According to the influential American Economist and Harvard Business School professor Theodore Levitt, the goal or purpose of all businesses is "to find, get and keep the customers". He added, without customer adjustment in some reasonable proportions, there is no business (Francis D. R., 1984). According to Azarbeygui D. (2016), designers need to design products to be more human-centric, sensitive and close to the actual experience possible (these are not new ideas but they need to be reconsidered). Thus, designers need to eliminate ego or personal taste and should work to satisfy these consumers by delivering the products or services that meets their perceptions, requirements and needs at the time the consumers want them. As stated by Farris, Paul W.; Neil T. B.; Phillip E. P.; David J. R. (2010), the main indicator of customer purchasing, and loyalty is through customer satisfaction: thus, the key to customer satisfaction is to make sure everyone feels they benefit from the exchange.

Quality is one of the critically important criteria for consideration for users to decide on buying new products or making choices in product selection. Product quality is the basic driver of buyer behavior. Moreover, the behavior of buyers who achieve the goal of meeting the stated and implied user perceptions. Garvin (1984); Reeves and Bednar (1994); Sebastianelli R. and Tamimi N. (2002) have stated (despite the quality keywords used in various fields) that there is no general agreement on the specific definition of quality. In different circumstances or situations, the measurement of perceptions will vary according to the appropriate quality. Consumer perceptions play an important role for product designers in maintaining that there will be a relationship with the

user experience that has a positive effect and hence increase the product success and wider public acceptance.

Therefore, to be able to develop good quality or services and to market them, it is important to understand what consumers want and what they deem to be valuable (Grönroos, C., 1997). As mentioned in The Good Design Plan by United Kingdom Design Council 2008, good design connects ideas to market, shaping them to be a practical and attractive proposition for users/consumers. Users' expect that product designers will deliver quality products. In fact, studies have shown that users will pay more for a product that they think is made well or exceeds the standard, needs and perceptions.

In this paper, the writers begin with a review on the concept of quality from different perspectives, noting key dimensions of product quality which are often used in measuring users' perception of quality in the literature, and develop a novel model for the product design industry, to enable a better engagement with users' quality perceptions. In addition, this model may be used to provide guidelines for both industry and designers in the design development and manufacture of quality products. Moreover, this model may be used to develop quality guidelines for industrial design education and related fields.

2. LITERATURE REVIEW

2.1 Describing the Concept of Quality

Quality is a compelling word. As mentioned above, quality has become the subject of many and varied definitions. Different people interpret quality differently. According to Garvin D. A. (2007), in his book "Managing Quality", quality has its own interpretation in five principal approaches. The five approaches are transcendent, product-based, user-based, manufacturing-based, and value-based. The "transcendental view" of quality is hard to define, interpreted or determined. Those who are involved with this view will say, "I can't define it, but I know when I see it", which is feeling about something largely based on tacit knowledge and an emotional response. The "product-based view" approach is about defining quality as in detail as possible to be measure and expressed as numbers, attributes or variables (Fields et al., 2014). Moreover, "user-based view of quality" is the case whereby the product fulfills the consumers' needs, wants, preferences and expectations.

To continue, the "manufacturing-based view" relates to manufacturing, production and engineering requirements and practices. Basically, it is concerned that the product designs meet engineering standards and do not require the fulfillment of user requirements and wants. Finally, the "value-based" quality principle approaches are defined primarily in terms of costs and price. This indicates that consumers may decide to purchase or buy a products based on products price. Garvin has suggested that it is difficult to, define or determine the quality based on just one perspective (Garvin D. A., 2007).

Crosby P. B. (1979) defines quality as the producer's capabilities that will meet expectations. As stated by Suchánek et al. (2014), this is the core quality definition contained in ISO 9001 standards. According to ISO 9000:2000 (EN ISO 9000, 2000), quality represents the characteristics that exists to meet the requirements (Mândru et al., (2019). Deming W. E. (1982), a United States Business Consultant and an American Statistician known as Father of Modern Quality Management, has stated that quality is about people and product and is defined by the satisfaction of the customers, makes the customers lofty and

encourage their friends to try. According to Juran J.; Grimsley S. (2015), quality is to ensure the product meets customer needs or requirements that leading to customer satisfaction. The concept of quality is defined as the overall characteristics of a product that indicate and reflect consistently the product's ability to meet or exceed users' expectations (Heazer & Render; Heyl J., 2014) Quality means the reliable level and degree of excellence that can be measured and predicted with respect to the appropriate quality standards in meeting the perceptions, expectations, customer needs and satisfying the customer. It is important to note that meeting user needs, perceptions, expectations and satisfying the customers' is a key factor in all these definitions.

2.2 Key Dimensions/Criteria of Product Quality

Quality needs to be measured from several perspectives (Fisher, 1998). Barr S. (2018) has stated, "Quality is too vague to measure directly, but we can unpack quality into attributes that can be directly measured". Garvin D. A. (1987), has proposed eight (8) dimensions of product quality. The 8 dimensions of product quality can be used as a basic construct to propose a graphic model to analyze product quality characteristics-these 8 dimensions of product quality are as follows:

a. Performance: Performance refers to the primary operating characteristics of the product (Hoe L. C. & Mansori S., 2018). How well the product functions or performs when in use. The measurable attributes are easy to operate, easy to conduct, maintenance of product, products that use energy efficiently, products giving specific benefits (Halim et al., 2014) and product brands can usually be objectively arranged on individual performance aspects. 'Performance' also implies that the product must be safe under all conditions of operation and storage. FAIL URE TO MEET THE SAFETY criterion disqualifies a product with respect to the quality criterion and it must be withdrawn from or not put into service.

b. Features: According to Garvin (1987, 1988) and Atiyah L. (2016), 'features' are secondary aspects or characteristics of performance that complement the main traits and enhance the appeal and attractiveness of the product interior and exterior. Halim et al. (2014) has discussed examples of product features which have contrastive and new technological individuality, own additional functions and have more specifications compared with other brands.

c. Reliability: Zhang Q. (2001) has reported on the probability of a product malfunctioning, failing or incurring damage within a specified time period. This means that during the lifespan of a product it should perform consistently well in specified time and basically function better in the long term.

d. Conformance: Quality of conformance means the product characteristics, and precision meet standards which have been specified in established regulations (Rosenthal et al., 2012). It is a measure about how close the products meet the planned criteria once the products produced or delivered.

e. Durability: According to Management Technology Policy from the University of Cam bridge, durability can be measures by the product life. It also related with economic and technical dimensions. It has been identified that durability can be defined through technical dimensions and the life span of the product before it declines in performance. In economics, the product with a useful life is referred to as a durable product, which is not easily damaged, although often used. Sustainability is a closely related if not an overriding criterion since and

designed product should have positive effects in environmental and climate change implications, or at least a minimal negative impact on these issues which is compensated by other social and/or environmental benefits

f. Serviceability: The serviceability dimension is closely related human resources related to servicing the product (Halim et al., 2014). Serviceability is the speed, courtesy, ease, competence of repair, comfort, handling problems and costs with which the product can be put into service when it breaks down, included the efficiency and behaviour of the service person.

g. Aesthetics/Semantics: Aesthetics dimensions are more subjective and depends on how the product is presented to consumers. Konstantinos et al. (2015) has stated that, aesthetics refers to "fits and finishes". In other words, the attractiveness of product through five senses such as the look, feel, taste, smell, and sound of the products. It is a matter of personal judgment and a reflection of individual personal preferences to the products. However, this dimension of quality may be difficult to please everyone, because everyone who uses the product has different perceptions. Aspects of aesthetics will be noticeable in a product which has an interesting/novel design, including innovative external appearance, location of arranged components and elegantly presents a diversified product model to consumers and prospective buyers (Halim et al., 2014).

h. Perceived quality: Perceived quality is about image and product reputation attributed by the customers themselves (Garvin, 1987, 1988; Atiyah L., 2016). This perceived quality dimension closely may also be related with the brand name or, company image, and advertising.

2.3 Users' Perception of Quality

Perception of quality is a critical element for consumers' decision making. According to Schacter D. (2011), perception is the psychological behaviour through organization, identification and interpretation of information from the various stimuli provoked or suggested by the experiences situation in question. Perception defined by the Oxford Learner's Dictionary is a way from notice things with the senses. In addition, Edward Prince said, "Perception lies at the root of all creativity, learning how to see is the start of creativity" (Zalla M., 2014). Similarly, the perception of quality, or perceived quality, may be defined as the consumers' opinion of excellence with respect to the overall product advantage (Lewin K., 1936). In this respect, customers are very aware and always use the "customer is always right" mantra, which means that they perceive their experience more than other stakeholders and indirectly fulfil their own satisfaction. Thus, consumers want a good quality product, but they also want a good product value.

Nelson P. (1974) has stated, from the consumer's quality perceptions view, it is often related to their own experiences with a products performance, benefit or service. As another approach, Darby M. and Karni E. (1973) have reported the consumers' perception of product quality can be combined with the search (before purchase), the experience (after purchase and when using the product) and credence properties-a credence property is a product characteristic that users' cannot evaluate the quality of even after purchase such as insurance and automobile maintenance work (Kenyon G. N. & Sen K. C., 2011).

According to Takeuchi H. and Quelch J. (1983), there are various factors at buying stages that influence users' perceptions of product quality, namely before users' purchase the product, at point of purchase, at point of users' using the product and after users' using the product. "Before purchase" includes the company's brand and image, previous experience, friend's opinions, store reputations, published test results and advertised prices for a given performance.

While, "at point of purchase" perceptions may be related to performance specifications, it may happen that comments from salespeople, warranty provisions, service and repair policies, provide support programs and quoted prices for performance. Furthermore, "after purchase" includes ease of installation and use, handling of repairs, claims and warranty, spare parts availability, service effectiveness, reliability and comparative performance.

To conclude the above review, it is apparent that the perception of quality, as part of gaining a deeper and more workable understanding of quality issues, is a complex and ill- defined problem area requiring further investigation. It is clear that consumers' perceptions of product quality are clearly influenced by a variety of factors experienced at before buying a product, at the point of buying, at the point of use and the after the intended and unintended uses of the products. As shown by the above review, it follows that many factors and variables affect the product quality perceptions of consumers and these may result in positive, negative and indifferent reactions to products. It is found that quality, as a set of product design features and characteristics, is challenging research area which requires further investigation.

In the work that follows, an attempt has been made to develop a preliminary model which sums up the important factors affecting the consumer perceptions of designed product quality. As show in Figure 1, the quality dimensions/criteria described above have been summarized graphically to aid understanding and possible application of the model in design education or in designed product evaluation.

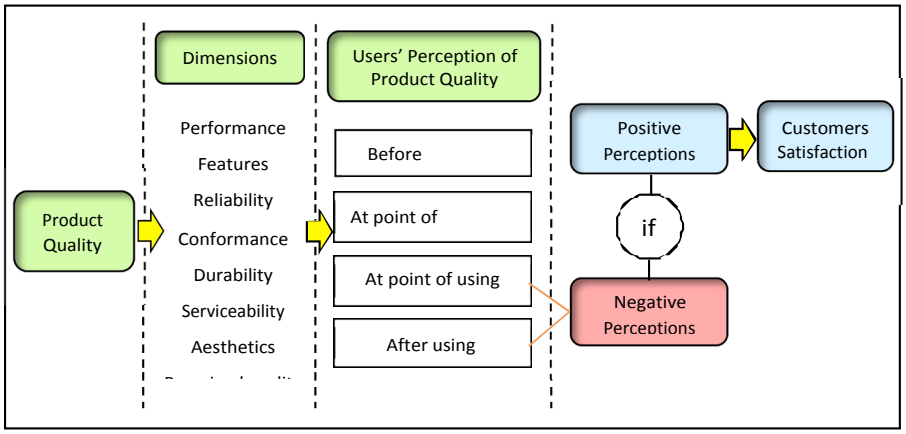

Figure 1: Conceptual Model of Consumers' Product Quality Perception

2.5 Overview of the Conceptual Model

The conceptual model shown above in Figure 1, is proposed mindful of previous work reported on in the literature review. It consists of two main approaches have been combined to take into

account the perceptions of consumers as well as a set of tangible dimensions/criteria that may be used to describe aspects of product quality-the two approaches are as follows:

a. The dimensions of product quality
b. The consumers' perception of product quality

Recall that the first 8 dimensions (criteria) of product quality proposed by Garvin D. A. (1987), were: of performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality.

Similarly, recall that the users'/consumers' perceptions on product quality relate to "before they purchase a product", "at point of purchase", "at point of using" and "after using the products". The implied assumption is that consumers will be satisfied when the products they evaluate meet their perceptions.

3. CONCLUDING REMARKS

In sum, it is found that the perceived quality characteristics of product designs need to be integrated into the product development process in a well-organized and systematic manner, especially when considered in an educational context. Various attempts to develop guidelines for assessing and developing quality guidelines have been made by a number of workers, and product designers can employ these approaches in order to incorporate the issues involved in the perception of designed product quality from both consumer and designer point of view. The quality characteristics of products have a reflective consequence in the way that the products are perceived and sustained in the market place.

The novel model developed above represents an important first step in attempting to arrive at a pragmatic and useful tool for assessing and for formulating designed product quality criteria. However, more research is required to apply and test this model in education and practice and, hence, refine the model to incorporate more inclusive issues which take into consideration of important social, environment and economic factors, including issues of sustainability. In this respect, it is realized that, apart from the published work reviewed above, various National and International bodies have developed approached for evaluating product quality, across various categories of products, especially as part of Good Design Award programs. These developments will be considered as part of further detailed theoretical and empirical research which investigates quality issues in design education and practice.

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