

Quality of Design

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Abstract: Quality of Design (QoD) is a measure of how well the product or service is designed to achieve the desired requirements. This article coalesce views of various authors about QoD. Various product features that are to be included during QoD, relationship between QoD and cost leadership, steps involved in QoD and benefits of QoD have been discussed in this article.

Keywords: Quality of Design (QoD), Cost Leadership.

I. INTRODUCTION

John S. Oakland (2003) defines QoD as a measure of how well the product or service is designed to achieve the agreed requirements. He further elaborates that QoD is also about the activities of design and development. On the other hand, Quality of conference to design is the extent to which the product or service achieves the design. QoD should focus on appropriate product features and design specification, which are obtained from market research on customers, their requirements and perceptions (S. K. Mandal, 2007).

Businessdictionary.com website states QoD as level of effectiveness of the design function in determining a product's operational requirements (and their incorporation into design requirements) that can be converted into a finished product in a production process.

M. Zairi (1991) illustrates QoD as the degree of achievement of purpose by the design itself that starts with market research, sales input analysis and continues to the development of the product/service concept which would satisfy the customer.

According to Naidu and Rajendra, QoD can be regarded as a composite of three separate terms in a common progression of activities:

1. Identification of what constitutes fitness for use to the user (Quality of market research).
2. Choice of concept of product or service to be responsible to the identified needs of the user (Quality of concept).
3. Translation of the chosen product concept into a detailed set of specifications which is faithfully executed, will then meet the user's need (Quality of specification).

Example: All automobiles provide the user with the service of transportation. The various models differ as to size, comfort, appearance, performance, economy, status conferred etc. These differences are in turn the results of intended or designed differences in the size, styling, material, tolerances, test programs etc. Higher quality of design can be attained only at increase in cost.

II. PRODUCT FEATURES INCORPORATED IN QOD

Quality is initially created by the designer in the form of product specifications and manufacturing instructions (H. Lal, 2004). The extent to which the design is inherently capable of providing user satisfaction can be termed as QoD. QoD thus should include the following features of a product:

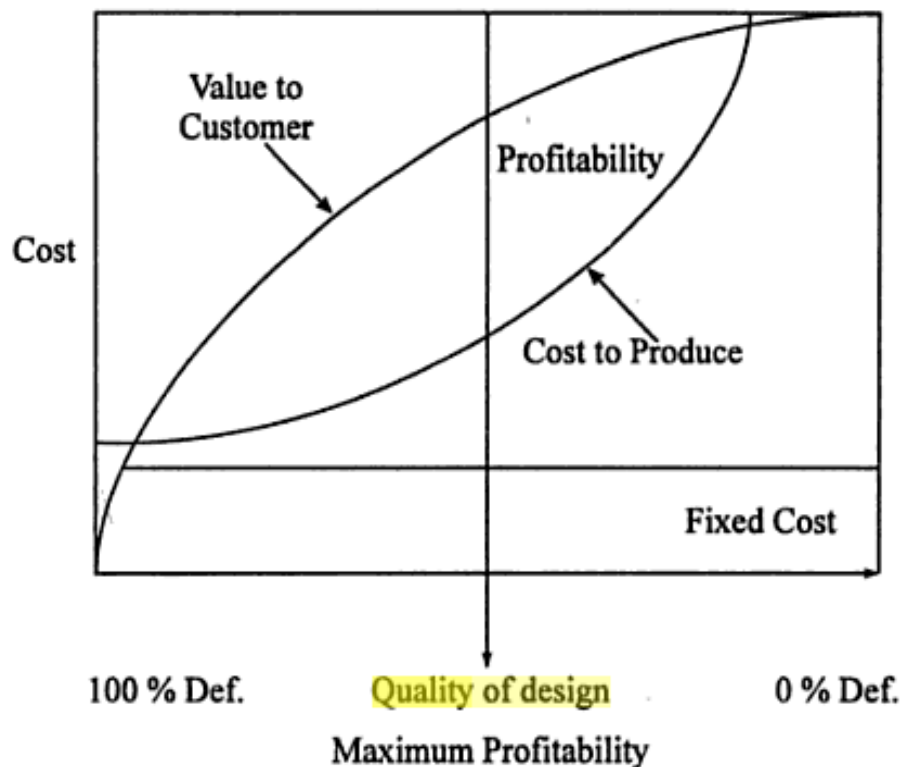
1. Appearance: The first contact of the product with the prospective customer is through its shape and finish, including that of its packing. The customer will not get impressed by a product with good functioning but rough and poor

finish. The chances are that he is not going to bother to see it work. Also, overemphasis on the shape and finish will increase the cost. Thus, the styling and finish of the product should be compatible with its function.

2. **Functional Efficiency:** Next to outward appearance, functional performance is the only characteristic which a customer looks for in a product at the time of purchase. The product should perform its intended purpose to the satisfaction of the user.
3. **Ease of installation and operation.**
4. **Safety:** Safety is the requirement of which the user is not normally aware, until the lack of it is proved to him by an accident causing damage or injury. The designer should assume that the user of the product is careless, and try to design the product to be accident-proof, as far as possible.
5. **Reliability:** Any device or equipment should continue to function satisfactorily throughout its intended life. Reliability, like safety, is not appreciated until unreliability manifests itself in the form of frequent failures. Unfortunately, reliability cannot be readily checked or measured at the time of purchase, yet nothing is more frustrating to the user than an equipment or appliance which is unreliable.
6. **Maintainability:** The equipment should be so designed that when a failure does take place it can easily be repaired and put back into service. It often happens, that the life of certain components used in the design is much less than the intended life of the equipment. It should be ensured that such components are easily accessible in the product, and their securing and positioning arrangements are such that the components can easily be replaced.
7. **Running and maintenance cost.**

The QoD is based on the use of market research to identify the product characteristics which connote quality to customers. QoD begins with consumer research and sales call analysis and is followed by the development of adequate specifications. Here, the focus is to develop products and services that can meet customer's needs at a given cost. This process of developing a product demands effective cross-pollination of ideas among the marketing, sales, services, manufacturing, and research and development departments. Consumer research indicates the customer needs, both current and future while sales call while sales call analysis investigates the problems users face with the way the product performs (Charantimath P.M., 2011).

QoD and cost leadership (Jain P.L., 2001)



III. QOD AND COST RELATIONSHIP

It can be easily inferred from the above figure that there is only one specific QoD which would give maximum profitability. Adopting quality either lower or higher than this quality would give rise to either too high cost or too low value and so lower profitability.

Steps of QoD

H. Lal lists steps of product development cycle for quality as follows:

1. Market Survey and analysis of customer's needs
2. Formulation of design specification
3. Preliminary design of a product
4. Design review
5. Manufacture and evaluation of the prototype
6. Preparation of manufacturing drawings and product specifications
7. Pilot production run and adjustment of the design
8. Release of design for bulk production

According to Sangeeta Dodrajka (Total Quality Management, Mayur Enterprises, 2007) the three stages of quality design are:

1. System/functional design in which the fundamental design and engineering concept is established.
2. Parameter/target design in which the design nominal-target dimensions and material properties are set up.
3. Allowance/tolerance design in which the tolerances are determined

As per the quality loss function approach, quality deteriorates when the final product deviates from the design target and when the costs of re-work/scrap increases. This is referred to as systems design. Parameter design implies that designing in quality is cheaper than trying to inspect and re-engineer it after a poor design or a final delivery to the customer.

Key benefits of QoD:

1. Better customer satisfaction
2. Quality can be controlled at various stages
3. Less production cost hence increased profitability

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