

Quality function deployment

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Quality function deployment (QFD) is a “method to transform user demands into design quality, to deploy the functions forming quality, and to deploy methods for achieving the design quality into subsystems and component parts, and ultimately to specific elements of the manufacturing process.”^[1], as described by Dr. Yoji Akao, who originally developed QFD in Japan in 1966, when the author combined his work in quality assurance and quality control points with function deployment used in Value Engineering.

QFD is designed to help planners focus on characteristics of a new or existing product or service from the viewpoints of market segments, company, or technology-development needs. The technique yields graphs and matrices.

QFD helps transform customer needs (the voice of the customer [VOC]) into engineering characteristics (and appropriate test methods) for a product or service, prioritizing each product or service characteristic while simultaneously setting development targets for product or service.

Areas of application

QFD is applied in a wide variety of services, consumer products, military needs (such as the F-35 Joint Strike Fighter^[2]), and emerging technology products. The technique is also used to identify and document competitive marketing strategies and tactics (see example QFD House of Quality for Enterprise Product Development, at right). QFD is considered a key practice of Design for Six Sigma (DFSS - as seen in the referenced roadmap).^[3] It is also implicated in the new ISO 9000:2000 standard which focuses on customer satisfaction.

Results of QFD have been applied in Japan and elsewhere into deploying the high-impact controllable factors in Strategic planning and Strategic management (also known as Hoshin Kanri, Hoshin Planning,^[4] or Policy Deployment).

Acquiring market needs by listening to the Voice of Customer (VOC), sorting the needs, and numerically prioritizing them (using techniques such as the Analytic Hierarchy Process) are the early tasks in QFD. Traditionally, going to the Gemba (the "real place" where value is created for the customer) is where these customer needs are evidenced and compiled.

While many books and articles on "how to do QFD" are available, there is a relative paucity of example matrices available. QFD matrices become highly proprietary due to the high density of product or service information found therein.

Notable U.S. companies using QFD techniques include the U.S. automobile manufacturers (GM, Ford, Chrysler LLC) and their suppliers, IBM, Raytheon, General Electric, Boeing, Lockheed Martin, Eaton Corporation and many others.^[citation needed]

History

Dr. Yoji Akao combined QS + QC point with FD used in value engineering.

While originally developed for manufacturing industries, interest in the use of QFD-based ideas in software development commenced with work by R. J. Thackeray and G. Van Treeck,^[5] for example in Object-oriented programming^[6] and use case driven software development.^[7]

Since its early use in the United States, QFD met with initial enthusiasm then plummeting popularity when it was discovered that much time could be wasted if poor group decision making techniques were employed.^[citation needed] Organizational/corporate culture has an effect on the ability to change organizational human processes and on the sustainability of the changes. In particular, in organizations exhibiting strong cultural norms and rich sets of tacit assumptions that prevent objective discussion of historical courses of action, QFD may be resisted due to its ability to expose tacit assumptions and unspoken rules.^[citation needed] It has been suggested that a learning organization can more easily overcome these issues due to the more transparent nature of the organizational culture and to the readiness of the membership to discuss relevant cultural norms.^[citation needed]

Techniques and tools based on QFD

House of Quality

House of Quality appeared in 1972 in the design of an oil tanker by Mitsubishi Heavy Industries.^{[8][citation needed]} Akao has reiterated numerous times that a House of Quality is not QFD, it is just an example of one tool.^[9]

A Flash tutorial exists showing the build process of the traditional QFD "House of Quality" (HOQ).^[10] (Although this example may violate QFD principles, the basic sequence of HOQ building are illustrative.) There are also free QFD templates available that walk users through the process of creating a House of Quality.^[11]

Other tools extend the analysis beyond quality to cost, technology, reliability, function, parts, technology, manufacturing, and service deployments.

In addition, the same technique can extend the method into the constituent product subsystems, configuration items, assemblies, and parts. From these detail level components, fabrication and assembly process QFD charts can be developed to support statistical process control techniques.

Pugh concept selection

Pugh Concept Selection can be used in coordination with QFD to select a promising product or service configuration from among listed alternatives.

Modular Function Deployment

Modular Function Deployment uses QFD to establish customer requirements and to identify important design requirements with a special emphasis on modularity.

Relationship to other techniques

The QFD-associated "Hoshin Kanri" process somewhat resembles Management by objectives (MBO), but adds a significant element in the goal setting process, called "catchball". Use of these Hoshin techniques by U.S. companies such as Hewlett Packard have been successful in focusing and aligning company resources to follow stated strategic goals throughout an organizational hierarchy.

Since the early introduction of QFD, the technique has been developed to shorten the time span and reduce the required group efforts (such as Richard Zultner's Blitz QFD).

