
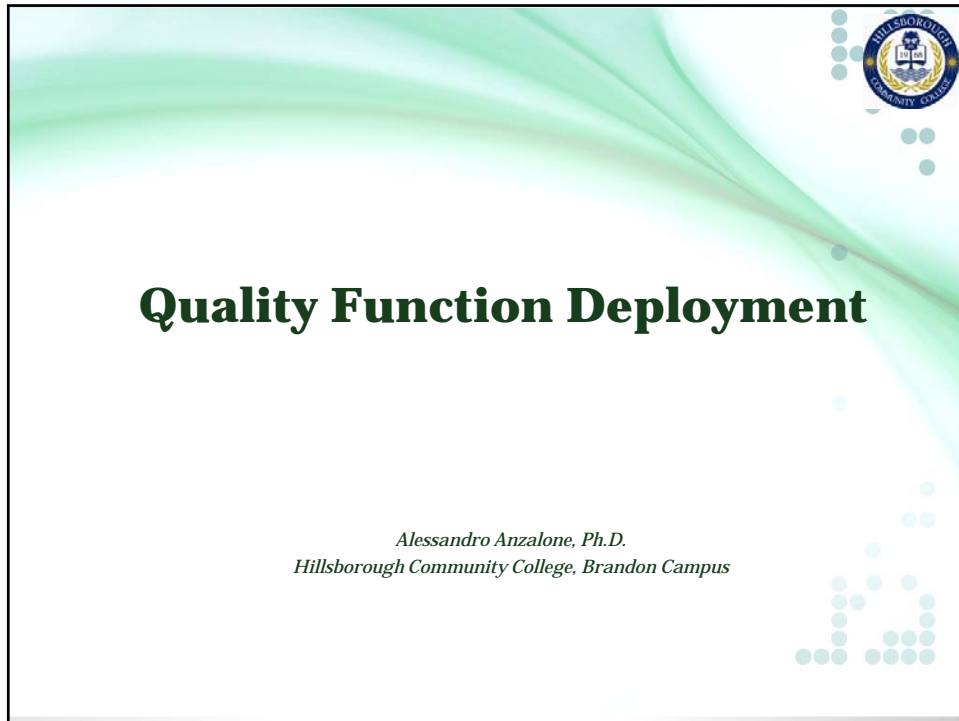


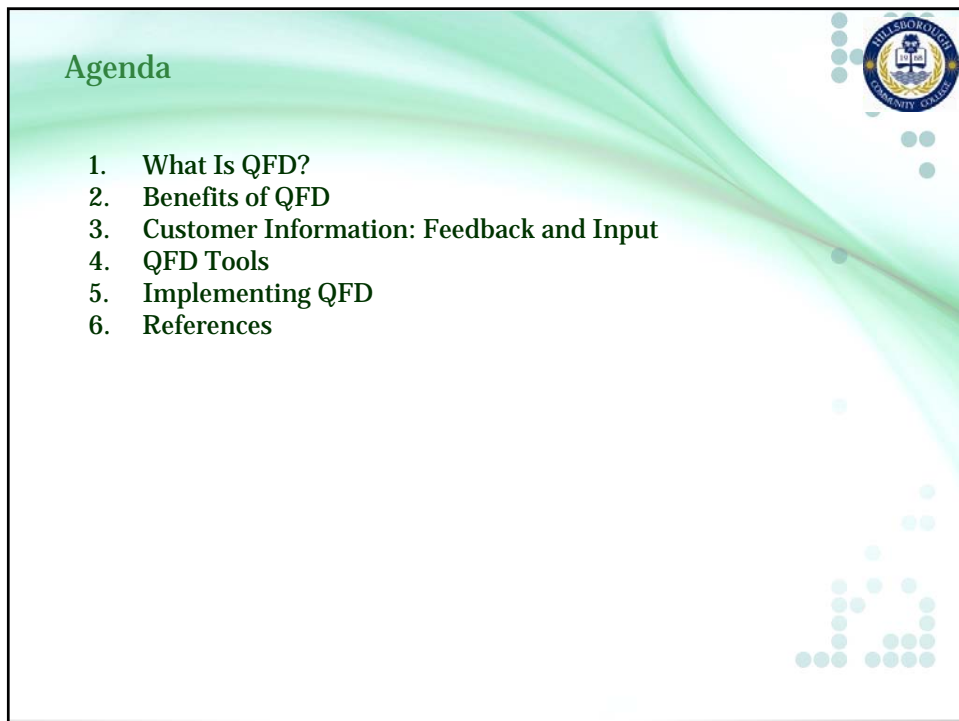
Quality Function Deployment


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Agenda




1. What Is QFD?
2. Benefits of QFD
3. Customer Information: Feedback and Input
4. QFD Tools
5. Implementing QFD
6. References






“The business process starts with the customer. In fact, if it is not started with the customer, it all too many times abruptly ends with the customer.”

William W. Scherkenbach



What Is QFD?

Quality function deployment (QFD) is a specialized method for making customers part of the product development cycle. One of the keys to achieving continual improvement is getting customers involved as early in the product development process as possible. This is the main focus of QFD. QFD was originally developed by Japanese quality expert Yoji Akao in 1966. Akao developed the concept by combining quality strategies and function deployment from the field of value engineering. The purpose of QFD is to identify customer needs and ensure that they are effectively accommodated in product design. In a sense, with QFD the customer—the potential user of the product— becomes part of the team that designs the product.



What Is QFD?



It is a system that allows designers and planners to focus on the attributes of a product from the perspective of customers. It involves:

1. Identifying customer needs (known as or the voice of the customer, or VOC)
2. Identifying the product attributes that will most satisfy the VOC
3. Establishing product development and testing targets and priorities. The process involves the development of various matrices that are explained in this presentation



What Is QFD?



Structure of QFD

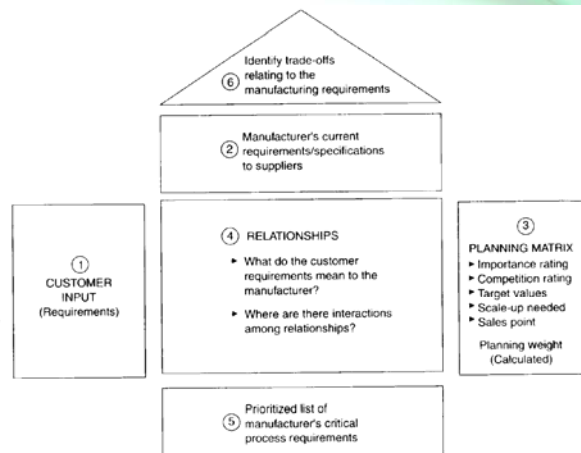


Figure 17-1
QFD Matrix Structure



What Is QFD?

QFD Process

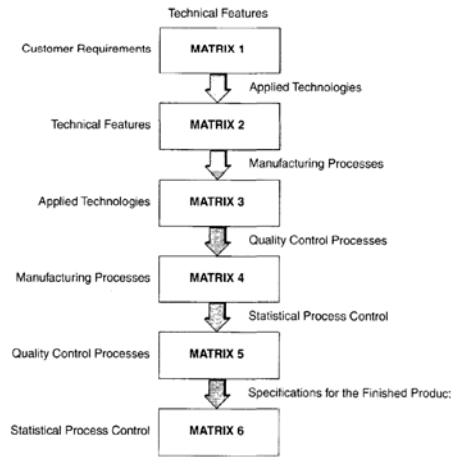


Figure 17-2
QFD Process: One Complete Cycle

Benefits of QFD

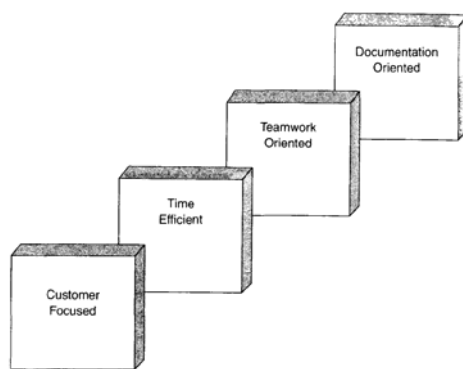


Figure 17-3
Benefits of QFD

Customer Information: Feedback and Input



Customer information falls into two broad categories: feedback and input. *Feedback is given after the fact.* In a manufacturing setting, this means after a product has been developed, produced, and marketed. Feedback is valuable and should be collected. However, it comes too late in the process to help ensure that customer requirements are met. At best, it can help improve the product when the next batch is produced.

Input is obtained before the fact. In a manufacturing setting, this means during product development. Collecting customer input during product development allows changes to be made before producing, marketing, and distributing large quantities of a product. Collecting input is more valuable than collecting feedback. However, both input and feedback have value. Ideally, broad-based feedback should be used to verify input, which is necessarily more narrow. Both types of information can be categorized further according to several characteristics.

Customer Information: Feedback and Input

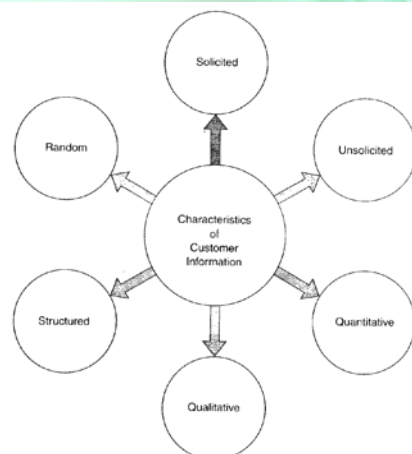
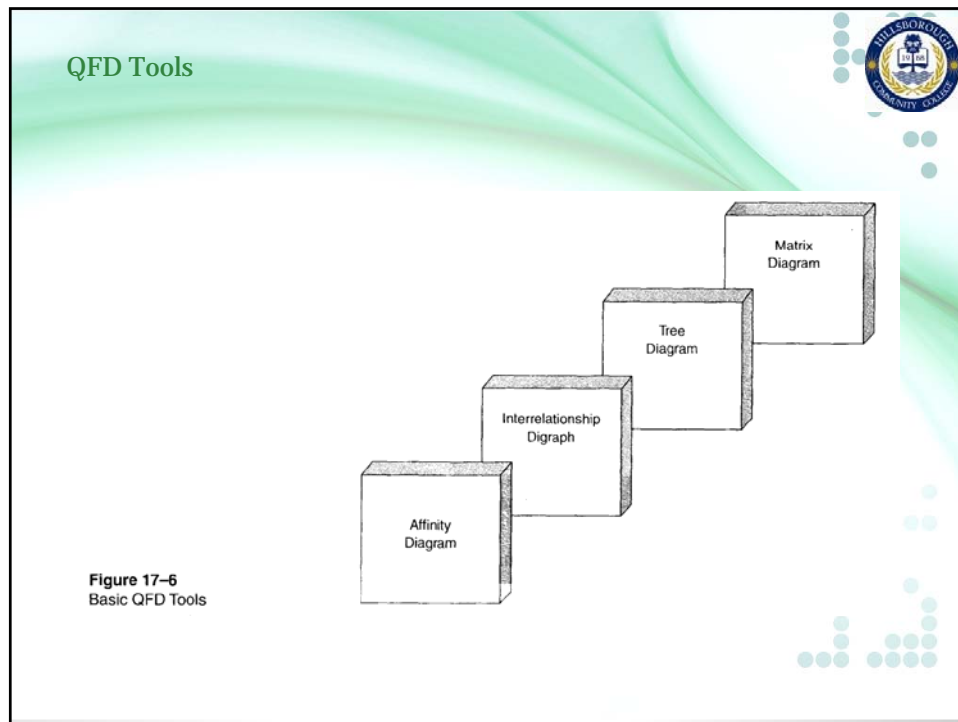


Figure 17-4
Characteristics of Customer Information



QFD Tools

Affinity Diagram

Affinity diagrams are used to promote creative thinking. They can be very helpful in breaking down barriers created by past failures and in getting people to give up ingrained paradigms that mitigate against finding new and different approaches. This is a critical element in achieving continual improvement. Affinity diagrams give structure to the creative process by organizing ideas in a way that allows them to be discussed, improved, and interacted with by all participants. affinity diagrams are used most appropriately when the following conditions exist:

- ✓ When the issue in question is so complex and the known facts so disorganized that people can't quite "get their arms around" the situation
- ✓ When it is necessary to shake up thought processes, get past ingrained paradigms, and get rid of mental baggage relating to past solutions that failed
- ✓ When it is important to build a consensus for a proposed solution

QFD Tools

Affinity Diagram

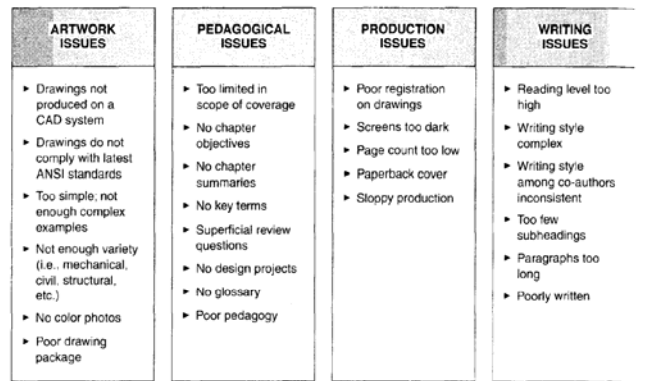


Figure 17-7
Affinity Diagram: Poor Sales Figures for an Engineering Textbook

QFD Tools

Interrelationship Digraph

The affinity diagram records the creative process. In doing so, it identifies issues and ideas relating to a specific goal or problem. The interrelationship digraph is used to bring logic to the process of identifying relationships among the various ideas recorded on the affinity diagram.

To develop an interrelationship digraph, follow these steps:

1. Write the problem statement on a 3 x 5 card. Continuing the example in the previous figure, the problem is poor sales figures. Write this on a card and designate it as the problem statement by enclosing it in a double line.

QFD Tools



Interrelationship Digraph

2. Place the problem statement card in the upper left-hand corner of a table. Then take out all of the cards used to develop the affinity diagram and lay them on a table. Use the following order: the card most closely associated with the problem (most prominent cause) is placed closest to the problem card. The farther away a card is from the problem card, the less prominent it is as a cause. Discussion takes place as the cards are placed in their relative positions.

3. When the cards are all laid out in their relative positions, recreate them on paper, showing each card as a small rectangle. Distribute copies of the paper version to all participants for final revisions. Do this in a group setting so that discussion can occur. Consensus as to the final arrangement of causes is important.

QFD Tools



Interrelationship Digraph

4. Distribute the final version to all participants and ask them to draw causal arrows showing what contributes to what. This is the step in which relationships between and among causes are established. The following figure is a partially completed interrelationship digraph built from the issues identified in the affinity diagram. By examining the completed digraph, you can learn a lot. For example the box containing the statement “poor drawing package” has four causal lines drawn to it. Based on this digraph, the poor drawing package is the result of the following factors: sloppy production, insufficient variety, failure to comply with ANSI standards, and failure to use a CAD system to produce the drawings.

QFD Tools

Interrelationship Digraph

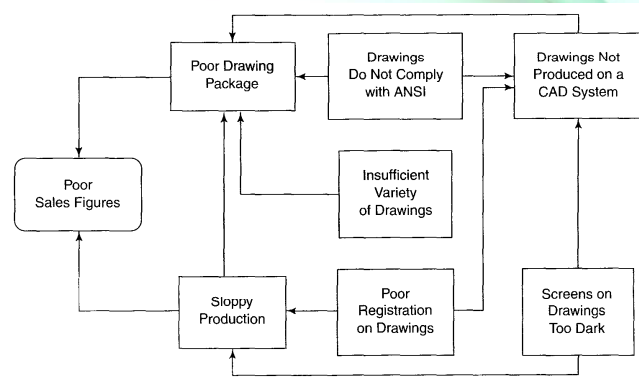


Figure 17-9
Interrelationship Digraph (Partial): Poor Sales Figures for an Engineering Textbook

QFD Tools

Tree Diagram

The affinity diagram and the interrelationship digraph identify the issues or problems and how they interrelate. The tree diagram shows the tasks that must be accomplished to solve the problem in question. To develop a tree diagram, follow these steps:

1. Clearly identify the problem to be solved. It can be taken from the affinity diagram or from the interrelationship digraph. It can also be a problem that was identified without the use of either of these tools. Write it on a card and place the card on the left side of a large table.
2. Conduct a brainstorming session in which participants record on 3 x 5 cards all possible tasks, methods, and activities relating to the problem. Use the affinity diagram and interrelationship digraph as references, but don't allow participants to be limited or stymied by them. Continually repeat the following question: "For this to happen, what must happen first?" Continue this until all ideas have been exhausted.

QFD Tools



Tree Diagram

3. Lay all the cards on the table to the right of the problem card. Put them in order based on what must happen first, working from left to right. As this task progresses, it will probably be necessary to add task cards that were overlooked during the brainstorming session.

4. Duplicate the cards on the table on paper and distribute copies to all participants. allow participants to revise and correct the document. The following figure is a partial tree diagram that was developed to address the problem identified in the affinity diagram.

QFD Tools



Tree Diagram

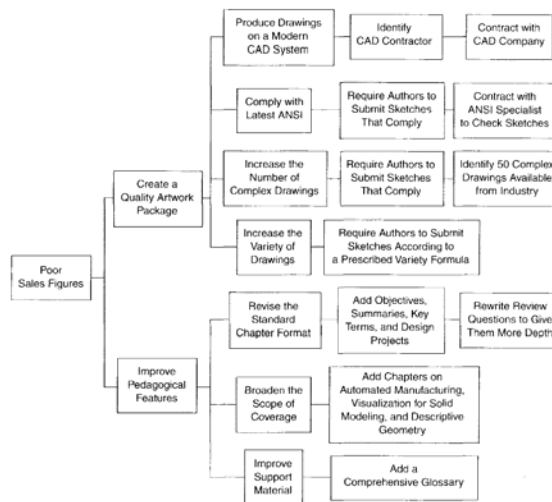


Figure 17-10 Tree Diagram

QFD Tools



Matrix Diagram

The matrix diagram is the most widely used of the QFD tools. It is a helpful tool for identifying and graphically displaying connections (seen as intersections on the diagram) among responsibilities, tasks, functions, and so forth. There are several different types of matrix diagrams. The format for the most widely used of these, the L-shaped matrix, is shown in following figure. This type of matrix can be used in numerous ways. To continue the example of the publisher trying to produce an engineering book that will sell better than the current product, an L-shaped matrix could be developed.

Such a diagram is produced by listing one set of elements vertically and the other set horizontally. In this case, the tasks to be accomplished are listed vertically, and the responsible departments/units are listed horizontally. Each intersection between the horizontal and vertical elements is coded using numbers, letters, or graphic symbols.

QFD Tools



Matrix Diagram

L-Shaped Matrix		Horizontal Entries				
		H1	H2	H3	H4	H5
Vertical Entries	V1					
	V2					
	V3					
	V4					
	V5					
	V6					
	V7					

Figure 17-11
L-Shaped Matrix

QFD Tools

Matrix Diagram

Department/ Unit	Editorial	Art	Production
Produce New Drawings on a CAD System	-	1	2
Bring Drawings into ANSI Compliance	1	2	-
Add Color Photos	3	1	2
Add Chapter Objectives, Summaries, Key Terms	1	-	2
Correct Registration on Drawings	-	2	1
Lighten Screens on Drawings	-	2	1
Lower the Reading Level	1	2	3
Add Design Projects	1	2	3

LEGEND
 1 = Primary Responsibility
 2 = Secondary Responsibility
 3 = Tertiary Responsibility

Figure 17-12
L-Shaped Matrix: Improving Poor Sales Figures for an Engineering Textbook

Implementing QFD

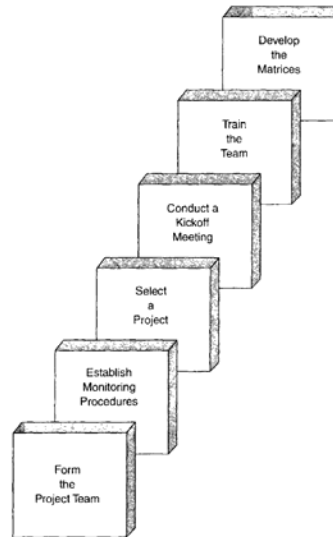


Figure 17-13
Steps in Implementing QFD

References

Quality Management for Organizational Excellence: Introduction to Total Quality, 6th Edition, David Goetsch and Stanley Davis, copyright 2010, Pearson, ISBN: 978-0-13-501967-2.



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