Quality Function Deployment

ME – 2110
Creative Decisions and Design

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Quality Function Deployment (QFD)

- Questions to ask
- Where can I sell it?
- How can I sell it?
- Why will people buy it?
- Why is it important?
QFD History

- The article that started it all.
- Harvard Business Review
- Developed from a study in the Kobe shipyards

**The House of Quality**

by JOHN R. HAUSER and DON CLAUSING

Digital Equipment, Hewlett-Packard, AT&T, and ITT are getting started with it. Ford and General Motors use it—Ford alone there are more than 50 applications. The “house of quality” is a major strategic tool of the management approach known as quality function deployment (QFD), originated in 1972 at Mitsubishi’s Kobe shipyard site. Toyota and its suppliers have adopted it in numerous ways. The house of quality has been used successfully by Japanese manufacturers of consumer electronics, home appliances, clothing, integrated circuits, synthetic rubber, construction equipment, and agricultural engines. Japanese designers use it for services like swimming pools and retail outlets and even for planning apartment layouts.

A set of planning and communication routines, quality function deployment focuses and coordinates skills within an organization, links to design, then to manufacture and market goods that customers want to purchase and will continue to purchase. The foundation of the house of quality is the belief that products should be designed to reflect customers’ desires and tastes, so marketing people, design engineers, and manufacturing staff must work closely together from the time a product is first conceived.

The house of quality is a kind of conceptual map that provides the means for interfunctional planning and communications. People with different problems work together on a house of quality.
Quality Function Deployment (QFD)

- QFD is not
  - a control strategy
  - an approach to begin optimization for quality engineering

- QFD is a planning tool
  - for translating customer needs into appropriate product development requirements
  - that identifies the significant item on which to focus time, product improvement efforts and other resources

- QFD enables
  - the identification of important issues and items
  - the identification of trade-offs
QFD

- Can be an aid to achieving our goals of
  - Quality
  - Cost
  - Timeliness

- QFD is customer driven product development
Change Comparison

- Changes = Money
- Earlier Changes = Less Money Spent

Diagram showing design changes in progress over time, with "Good" and "Bad" company curves, indicating earlier completion and lower costs for the "Good" company.
Basic Business Transaction

- **Customer**
  - Wants
  - Needs
  - Desires

- **Supplier (products or services)**
  - Features
  - Advantages
  - Benefits
Marketing

- Mismatch ☒ Supplier must pull the levers of marketing
  - adjust price
  - increase sales commissions
  - carry inventory
  - advertise
  - public relations
Results of Being Customer Driven

- Total Quality Excellence
- Greater customer satisfaction
- Increased market share
The House of Quality

- Example: Part of a car door
- Blank row
  - you do not have a how or what
- Blank column
  - customer does not care
# Crane – Problem Understanding Form

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House of Quality Revealed

- Relationship matrix
  - qualitative
- Importance
  - to customer
- Definition of What is Important
  - Example: Appearance
    - not important for engine
    - not important for A-10 (Thunderbolt II / Warthog)
Correlation Matrix

- Correlation
  - Strong - 9
  - Medium - 3
  - Weak - 1
  - Blank - No - 0

- Not always intuitive

- Example: Japanese truck perceived better than US truck. Technically, this was not true, Why? The US truck
  - was quieter
  - had a slight delay
  - was sturdier / stiffer
A Cup of Coffee

- **What**
  - Hot
  - Taste
  - Smell
  - Stimulating
  - Aesthetics
    - cup
    - brand name
  - Color
  - Cost
  - Grounds
  - Not poisonous (assumed)

- **How**
  - Serving temperature (Hot)
  - Taste jury (Taste)
  - Smell jury (Smell)
  - Measure caffeine level (Stimulating)
  - Jury (Aesthetics)
  - Color standard (Color)
  - Price (Cost)
  - Filter & weigh (Grounds)
  - Lethal Dose LD 50 (Not poisonous)
Cup of Coffee House of Quality
Matrix Weights
- Strong, $\bigcirc = 9$
- Medium, $\bigcirc = 3$
- Weak, $\bigtriangledown = 1$

The 181 from column 1 comes from:
\[(8)(9) + (6)(3) + (9)(9) + (10)(1) = 181\]

The sum of the Absolute Importance row is:
\[181 + 132 + 54 + 99 + 18 + 108 + 90 = 682\]

The 0.27 in the first column of the Relative Importance row comes from:
\[
\frac{181}{682} = 0.2654 \approx 0.27
\]
Grounds Quality Chart

Figure 13.9  Coffee quality chart. (Adapted from American Coffee Brewing Institute and reproduced by courtesy of Van Nostrand Reinhold.)
Expectations are Important

- Standards are
  - Set
  - Change

- Examples
  - Sun visor mirrors
  - Cargo net

- Benchmarking is important
  - Compare to your competition
  - What if you have no competition?
Three Types of Quality/Features

- **Basic**
  - Expected of assumed
  - Typical of “invisible” products
  - Functions of products

- **Performance**
  - One dimensional
  - Most market research

- **Excitement**
  - Pleasant surprises or customer delights
  - Unexpected

Adapted From the Kano Model
Analyzing and Diagnosing the Product Planning Matrix

Look for

- Blank rows
- Blank columns
- Conflicts in the customer vs. technical (engineering) survey.
- Communication opportunities
- Sales Points.
  - Incorporate competitors features
- Determining Planned Quality
- Resolve Negative Correlations
- Final Targets Correct
- What design requirements to be deployed to Phase II (Parts Deployment)?
Using the House of Quality

- What (Market / Need)
- How (Manufacture)
- Relationships
- Conflicts
  - Customer
  - Producer
- Competition
Back to the Car Door

- What (Market / Need)
- How (Manufacture)
- Relationships
- Conflicts
  - Customer
  - Producer
- Competition
4 Phases of QFD

- **Product planning**
  - What will it do?
  - What will it look like?

- **Part deployment**
  - How will it do it?

- **Process planning**
  - How will we make it?

- **Production planning**
  - Develop details in how to make it.
4 Phases of QFD (Car Door Example)

- Product planning
  - Close door easily
  - Close fit
- Part deployment
  - Weather strip
  - Latch
- Process planning (W. Strip)
  - Extrude
- Production planning
  - Temperature
  - Pressure
  - Speed
Weather Strip

- Temperature
- Pressure
- Speed

www.infobarrel.com/Media/The_hanging_car_door_seal

www.china-hongan.com/
Steps in QFD

- What
- How
- How Much
- Relationship Matrix
- Correlation Matrix
- Competitive Analysis
- Analyze
- Deploy
Remember!!!!

- **QFD**
  - is a planning tool
  - is one of many planning tools

- **Charts**
  - are the means
  - are not the ends