

# Applicability of Quality Function Deployment - QFD in the Service Sectors

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**Abstract:** Quality Function Deployment (QFD) is a customer-driven planning methodology that systematically translates customer needs into specific service or product characteristics. Initially developed in the manufacturing sector to improve product development cycles, QFD has evolved to encompass service industries, where the nature of output is intangible, perishable, and highly variable. This paper presents an in-depth examination of QFD's applicability in various service domains, including healthcare, hospitality, education, banking, information technology, logistics, e-commerce, and public services. By analyzing the historical evolution of QFD, its theoretical underpinnings, sector-specific adaptations, and emerging integration with digital tools, the paper offers a practical guide for service organizations aiming to adopt QFD. A series of detailed, editable House of Quality (HOQ) examples for different service sectors are presented, along with frameworks for implementation. The findings demonstrate that QFD, when adapted appropriately, not only aligns services with customer expectations but also reduces service delivery gaps, improves process efficiency, and fosters innovation.

**Keywords - Quality Function Deployment, Service Quality, House of Quality, Customer Satisfaction, Service Design**

## I. INTRODUCTION

The global economy has seen a significant shift from manufacturing-oriented industries to service-oriented industries over the past few decades. Services now contribute a major portion to GDP in most developed and developing economies. In such competitive environments, ensuring customer satisfaction and service quality has become a top priority for organizations [1].

Unlike tangible goods, services are characterized by:

- **Intangibility** — Services cannot be physically touched or stored.
- **Inseparability** — Production and consumption occur simultaneously.
- **Heterogeneity** — Service outcomes vary by provider, customer, and context.
- **Perishability** — Unused service capacity cannot be stored for future use.

Quality Function Deployment (QFD) offers a systematic approach to integrating customer requirements into every stage of service design and delivery. Originally developed for manufacturing applications in Japan by Yoji Akao in the late 1960s, QFD has evolved into a universal methodology applicable to services [2]. Its structured approach, often visualized through the “House of Quality” (HOQ) matrix, helps bridge the gap between customer needs and operational execution.

QFD offers such a framework by ensuring that the *Voice of the Customer* (VOC) is captured, prioritized, and systematically translated into service design specifications.

The purpose of this paper is to explore how QFD can be effectively implemented in service sectors, present examples, and propose a framework suited for service-oriented organizations.

## II. LITERATURE REVIEW

QFD has been extensively documented in manufacturing, but fewer studies address its application in services. Chan and Wu [3] reviewed 650 QFD-related articles, finding that less than 20% focused on services. This gap is gradually closing as service quality becomes a differentiator in industries such as banking, healthcare, and hospitality.

Parasuraman, Zeithaml, and Berry [4] introduced the SERVQUAL model to assess service quality, which, when combined with QFD, enables organizations to align customer perceptions with operational goals. King [5] and others have modified QFD to accommodate intangible service features, suggesting additional steps to capture customer emotions and expectations.

Early QFD literature focused heavily on tangible product attributes. Researchers like Mazur (1993) and Chan & Wu (2002) expanded its application to intangible service processes, introducing modifications such as:

- Replacing “engineering characteristics” with “service delivery features.”

- Emphasizing service encounters and process flows instead of product components.

### III. OVERVIEW OF QUALITY FUNCTION DEPLOYMENT (QFD)

QFD is a customer-driven planning process that uses structured methods to translate “Voice of the Customer” (VOC) into design parameters. Its main components include:

1. **Customer Requirements (WHATs)** – Captured through surveys, interviews, focus groups.
2. **Technical Requirements (HOWs)** – Service processes, policies, and operational measures.
3. **Relationship Matrix** – Mapping WHATs to HOWs to assess influence strength.
4. **Prioritization** – Ranking based on customer importance and competitive benchmarking.

In services, the complexity arises because many customer needs are qualitative (e.g., “friendly staff”) and require operationalization into measurable terms (e.g., “customer satisfaction score  $\geq 90\%$ ”).

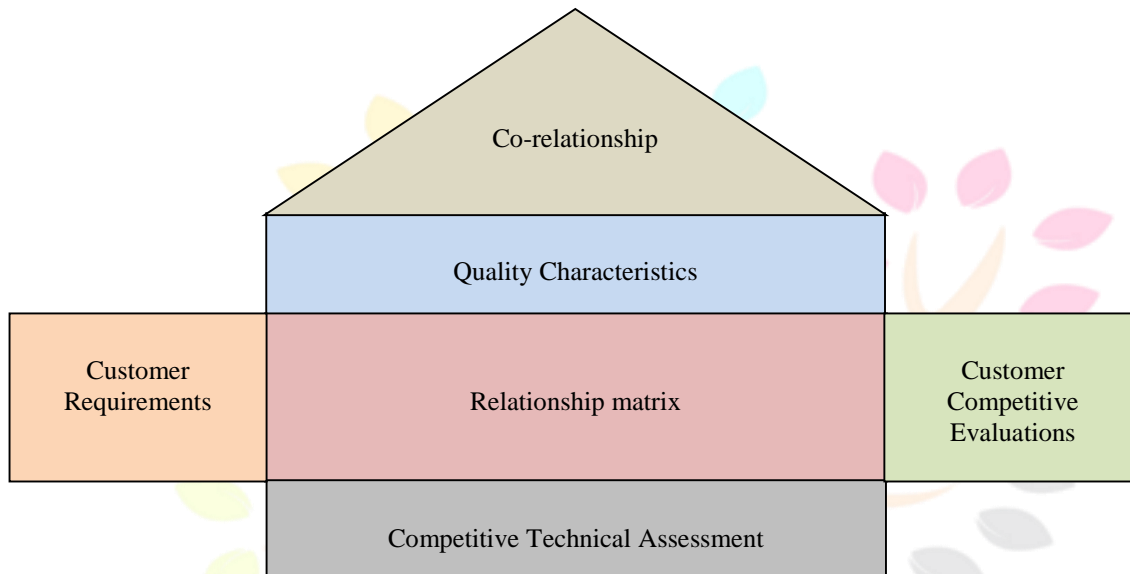


Fig. 1: The House of Quality

### IV. IMPORTANCE OF QFD IN SERVICE SECTORS

Applying QFD in service sectors offers several advantages:

- **Customer-Centricity:** Focuses on customer needs from the design stage.
- **Improved Communication:** Aligns various departments towards a common goal.
- **Quality Consistency:** Ensures standardized service delivery.
- **Competitive Advantage:** Enables differentiation in crowded markets.

In services, QFD is particularly valuable because the “product” is intangible, and service quality depends on both process and human interaction.

### V. METHODOLOGY FOR APPLYING QFD IN SERVICES

The process of applying QFD in services generally follows these steps:

1. **Identify Customer Segments** – Segment by demographics, psychographics, or usage behavior.
2. **Collect Customer Requirements** – Use qualitative and quantitative research tools.
3. **Convert Requirements into Measurable Attributes** – Example: “short waiting time” → “average waiting time in minutes.”
4. **Develop House of Quality (HOQ)** – Map requirements to service features.
5. **Benchmark Competitors** – Compare with industry leaders.

6. **Deploy Across Functions** – Ensure marketing, operations, HR, and IT collaborate.
7. **Review and Improve** – Continuous monitoring and updates.

## VI. SECTOR-WISE APPLICATIONS OF QFD

### A. Healthcare

In healthcare, patient satisfaction is influenced by waiting times, staff behavior, treatment effectiveness, and cleanliness. QFD helps hospitals map these needs to operational improvements like staff training, scheduling systems, and facility upgrades [6].

### B. Hospitality

Hotels use QFD to improve guest experiences by linking customer needs such as “fast check-in” and “room cleanliness” to process improvements like automated check-in kiosks and advanced housekeeping schedules.

### C. Banking and Financial Services

Banks implement QFD to align services like loan processing, customer support, and mobile banking with customer expectations on speed, transparency, and security.

### D. Information Technology Services

In IT, QFD ensures that software services match user expectations in usability, reliability, and security. Agile-QFD hybrids are used in software development for better requirement prioritization [7].

### E. Education

Universities apply QFD to improve curriculum design, faculty quality, and campus facilities, mapping student feedback to measurable institutional improvements.

### F. Transportation & Logistics

Transport operators use QFD to improve passenger comfort, reduce delays, and enhance digital booking experiences.

### G. E-Commerce Services

E-commerce platforms rely on fast delivery, accurate product descriptions, and secure transactions to retain customers.

### H. Public Administration Services

Government services like passport issuance and tax filing can benefit from QFD to reduce wait times and improve transparency.

## VII. EXAMPLES (DESCRIPTIVE)

### Case 1: Healthcare Sector

Example Scenario:

Patients expect minimal wait times, accurate diagnosis, and compassionate treatment.

- Customer Needs: Empathy, Reliability, Efficiency.
- Service Attributes: Staff-patient ratio, diagnostic accuracy, appointment system speed.

### Case 2: Education Sector

Example Scenario:

Students expect updated curricula, skilled faculty, and good facilities.

- Customer Needs: Knowledge relevance, Accessibility, Academic support.
- Service Attributes: Industry-linked syllabus, faculty training hours, digital resources.

### Case 3: Banking Sector

Example Scenario:

Customers expect security, speed, and transparency.

- Customer Needs: Transaction safety, Promptness, Clear communication.
- Service Attributes: Cybersecurity measures, average transaction processing time, customer service scripts.

### Case 4: Hospitality Sector

Example Scenario:

Guests expect comfort, personalized service, and value for money.

- Customer Needs: Comfort, Personalization, Affordability.
- Service Attributes: Room quality, staff training in personalization, flexible pricing plans.

## VIII. BENEFITS OF QFD IN SERVICE SECTORS

- Systematic approach to service improvement.
- Enhanced cross-functional collaboration.
- Reduction in service failures.
- Higher customer retention rates.
- Aligns services with customer expectations
- Reduces service delivery gaps

## IX. CHALLENGES & LIMITATIONS

- Difficulty in quantifying intangible requirements.
- Need for extensive data collection.
- Possible resistance to change among employees.
- Time-consuming HOQ development process.
- Requires cultural shift within the organization
- Requires accurate and representative VOC data

## X. PROPOSED FRAMEWORK FOR QFD IMPLEMENTATION IN SERVICES

The proposed model integrates:

- Customer Voice Capture via Multiple Channels
- Service Attribute Mapping using Modified HOQ
- Cross-functional Deployment Teams
- Continuous Feedback Loops

## XI. DISCUSSION

The study highlights that QFD is adaptable to services if modified to capture intangibles and human factors. Integrating QFD with service quality models like SERVQUAL yields better outcomes.

## XII. CONCLUSION

QFD offers a powerful methodology for translating customer requirements into actionable service improvements. While challenges exist, especially in handling intangible elements, the benefits outweigh the difficulties. Service organizations that adopt QFD stand to improve customer satisfaction, operational efficiency, and competitive positioning.

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