CHAPTER 139

Systematic Literature Review on Quality Function Deployment in Assessing Service Quality

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ABSTRACT

This study explores the application of Quality Function Deployment (QFD) in enhancing service quality within the construction industry, with a focus on Project Management Consultants (PMCs). The construction sector in India plays a vital role in economic development; however, it faces persistent quality management challenges. These challenges often contribute to project delays and can be broadly categorized into three areas: material deficiencies, such as substandard or delayed supplies; design-related errors stemming from inadequate planning or revisions; and poor coordination among fragmented stakeholders, which hampers communication and decision-making across project phases. Quality Function Deployment (QFD) is utilized to systematically translate client requirements into actionable quality improvements. The methodology combines Quality Function Deployment (QFD) and integrates established quality management frameworks such as Total Quality Management (TQM) and Service Quality (SERVQUAL) to prioritize critical service quality factors. Key factors identified include timeliness, accuracy, communication, and responsiveness, which are assessed at corporate, project, and product levels to create a holistic quality performance index. By aligning stakeholder expectations with technical and operational project requirements, this approach provides a structured framework for Project Management Consultancy (PMC) to benchmark service quality, increase client satisfaction, and achieve continuous improvement. The findings highlight the importance of adopting advanced quality management practices that promote collaboration, transparency, and technological innovation. This Quality Function Deployment-based model establishes new quality standards, contributing to more efficient project execution and delivering greater stakeholder value, ultimately addressing critical gaps in the construction industry's management practices.

Keywords: Quality function deployment; Project management consultant; Service quality; Construction industry; Design build.

1.0 Introduction

Overview: The construction business in India plays a crucial role in economic expansion, infrastructure advancement, and job creation.

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According to "Deloitte, India economic outlook, January 2025. Deloitte Insights", the country's Gross Domestic Product (GDP) growth is projected to range between 6.5% and 6.8% for the fiscal year, with the construction sector being one of the key contributors to this growth. However, quality assurance in building projects remains challenging. Quality in construction is determined by factors like materials, craftsmanship, adherence to standards, safety measures, and final project delivery. Ensuring quality results in reliability, safety, and long-term cost savings while enhancing a company's reputation. Despite its importance, quality management in Indian construction faces challenges such as insufficient knowledge of standards, small-scale firms, cost-cutting tendencies, inconsistency, and blame-shifting. This chapter explores the role of quality in construction, the use of Quality Function Deployment (QFD) in Total Quality Management, and solutions to quality-related issues.

Background: Quality in construction has evolved over centuries, from meticulous craftsmanship in ancient structures to standardization during the Industrial Revolution. Modern advancements emphasize sustainability, lean principles, and digital management. However, challenges like cost pressures and labor shortages persist. Unlike manufacturing, construction errors are costly and impact safety, making comprehensive quality management crucial. It involves design, materials, workmanship, and inspections to ensure safe, durable, and high-quality structures.

Role of quality in construction: Quality ensures safety by reducing the risk of accidents and structural failures. It enhances durability, minimizes maintenance costs, and promotes sustainability. Furthermore, quality workmanship contributes to client satisfaction and strengthens a company's reputation—both essential for securing future projects and maintaining competitiveness in the construction industry. However, quality-related issues such as material deficiencies, design errors, poor workmanship, and lack of customer satisfaction frequently led to project delays and inefficiencies.

Total Quality Management (TQM) offers a comprehensive approach to overcoming these challenges by promoting continuous improvement, fostering stakeholder involvement, and embedding quality into every stage of the construction process. By doing so, TQM helps reduce cost overruns, ensures regulatory compliance, and improves coordination among teams.

Within the TQM framework, specific tools are employed to translate its principles into actionable practices. One such tool is Quality Function Deployment (QFD), which plays a crucial role in aligning construction outcomes with client expectations. QFD facilitates the systematic identification and prioritization of customer requirements and integrates them into design and construction planning. This not only improves communication among project teams but also supports continuous quality enhancement throughout the project lifecycle. Implementation Challenges in Quality Management challenges include fragmented supply chains, evolving project requirements, and regulatory changes. Cultural barriers like resistance to change and hierarchical structures hinder implementation. Overcoming these requires leadership commitment, employee training, and fostering a quality-driven culture. Technologies

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like BIM, drones, and sensors improve transparency and accountability. A holistic approach addressing technical, cultural, and organizational aspects ensures high-quality project delivery.

2.0 Literature Review

2.1 Introduction to literature review

The reviewed documents explore the application of Quality Function Deployment (QFD) in construction and design/build projects, highlighting its effectiveness in translating client expectations into technical solutions. Researchers have proposed enhanced QFD methodologies that integrate stakeholder theory, allowing for a more structured approach to identifying, categorizing, and prioritizing the diverse needs of stakeholders. This approach is particularly relevant for Project Management Consultants (PMCs), who are responsible for aligning the interests of clients, contractors, designers, and end-users throughout the project lifecycle. Furthermore, the integration of QFD with utility theory—especially through advanced weighting systems—has shown promise in improving occupant satisfaction in office environments. PMCs can leverage utility theory to objectively evaluate and balance competing stakeholder priorities, ensuring design and construction decisions are aligned with overall project value and user satisfaction.

Models developed for evaluating service quality in design/build projects employ QFD at both corporate and project levels. These models link customer requirements to technical attributes and quality management practices, supporting PMCs in monitoring and enhancing service delivery. At the project level, ten key service quality factors are identified, with importance weights transferred from the corporate model. These are closely tied to the three core quality management components—planning, assurance, and control—which PMCs are often tasked with implementing and overseeing.

By analyzing the relationships between service factors and quality system processes, these models generate a quality performance index that PMCs can use for performance tracking and continuous improvement. At the product level, users' needs (performance, usability, aesthetics) are mapped to functional, technical, and behavioral attributes, resulting in a total quality performance index. This enables construction firms, under the guidance of PMCs, to conduct self-evaluations and benchmark their performance against industry standards.

2.2 Literature survey using preferred reporting items for systematic reviews and meta-analyses (PRISMA) approach

A Scopus search was conducted using the keywords: "Quality," "Quality Function Deployment," "QFD," "Construction," and "Construction Industry" within the subject areas of Engineering, Business Management, and Accounting.

The initial search yielded 1,236 results from various disciplines. Irrelevant articles were screened out based on the above criteria.

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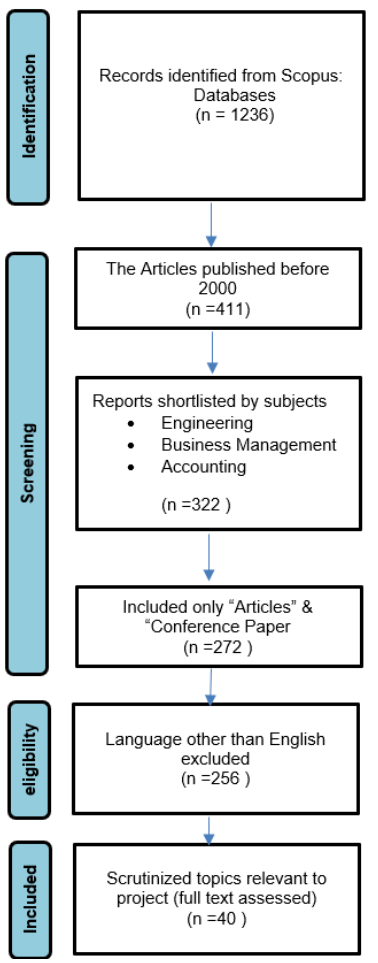
Table 1: Criteria for Screening Literature for Quality Function Deployment

Sr. No	Criteria	Rationale
1	Language	Only English articles were selected.
2	Publication Year (2000-2023)	Articles before 2000 were excluded as QFD research gained momentum after 2001.
3	Publication Source	Only peer-reviewed journal articles were considered.
4	Repetitions	Duplicate articles were screened out.
5	Title and Abstract Screening	Articles focusing on Quality, Quality Management, and QFD were included.
6	Full-Content Analysis	Articles unrelated to QFD were excluded after full-text analysis.

Figure 1: PRISMA Approach Followed for Literature Survey



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Chang-His *et al.* (2012) proposed an enhanced QFD methodology incorporating stakeholder theory. A case study on Taiwan's No. 5 National Highway demonstrated its effectiveness in prioritizing project designs based on stakeholder concerns. Mostavi *et al.* (2019) integrated QFD with utility theory weighting systems to improve occupants' satisfaction in office environments. A structured three-phase approach was used to gather occupant requirements, evaluate utility functions, and rank strategies for workplace enhancements. Pheng *et al.* (2001) studied QFD in design/build projects, emphasizing customer satisfaction and competitive benchmarking. The research highlighted the industry's limited awareness of QFD benefits and advocated for structured implementation. Arditi *et al.* (2010) developed a QFD-based model to assess the service quality performance of design/build contractors. The model integrates corporate and project-level quality performance indices to benchmark firms and rank them based on service quality.

Lee *et al.* (2010) implemented a database system for QFD using Excel-based process matrices to evaluate quality performance. The study introduced a structured methodology for ranking design/build firms based on customer-driven metrics. Lee *et al.* (2006) expanded on QFD's role in total quality performance assessment in design/build projects. The model integrates corporate, project, and product-level indices to evaluate construction quality comprehensively. Parasuraman *et al.* (1988) developed the SERVQUAL model to measure service quality based on five dimensions: reliability, responsiveness, tangibles, assurance, and empathy. The framework assesses service gaps and provides diagnostic insights for improvements. Zeithaml *et al.* (1985) conceptualized service quality as the gap between customer expectations and perceptions, identifying five critical service quality gaps and their impact on customer satisfaction. Prakash *et al.* (2017) empirically validated a service quality framework for the Indian architectural sector, identifying five key dimensions: design quality, project administration, communication, relationship management, and dependability.

Numerous studies have examined the application of Quality Function Deployment (QFD) in various settings, particularly within the construction industry and design/build projects. Researchers have advanced QFD methodologies by integrating stakeholder theory to classify and rank stakeholder groups, as well as incorporating utility theory weighting systems to enhance occupant satisfaction. Various models have been developed to assess service quality at corporate, project, and product levels, leveraging QFD to align customer expectations with technical attributes and quality management strategies. Research has demonstrated QFD's capability in addressing diverse customer requirements, guiding decision-making, and improving workspace conditions. The integration of quality indices across different levels has led to the development of a total quality performance index, enabling construction owners to objectively evaluate design/build firms.

To further refine the identification and measurement of customer expectations, many studies have incorporated the SERVQUAL model alongside QFD. SERVQUAL, which assesses service quality based on five key dimensions—tangibles, reliability, responsiveness, assurance,

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and empathy—provides a structured approach for capturing perceived service gaps. When integrated with QFD, SERVQUAL helps define and quantify customer requirements more precisely, ensuring they are effectively translated into technical specifications and service improvements. This synergy enhances the responsiveness of design and construction processes to client needs, particularly in areas such as architectural service quality, project management, and communication. The structured application of QFD in these studies, supported by tools like SERVQUAL, reinforces its effectiveness in prioritizing customer needs, ensuring quality planning, and promoting continuous improvement across all phases of construction.

Figure 2: Bibliometric Network Visualization

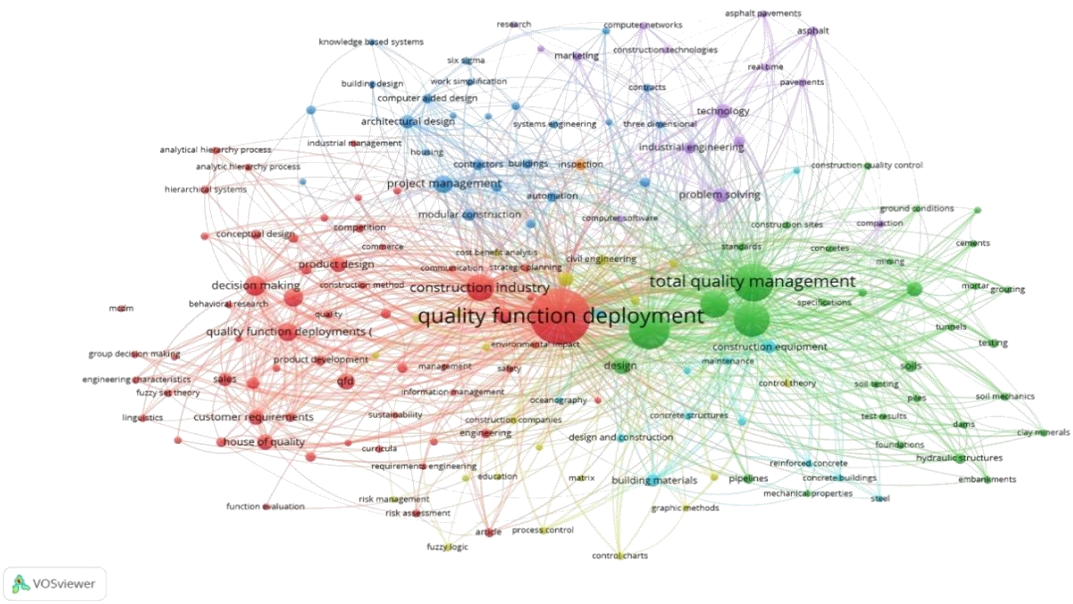

Table 2: Themes Identified

Sr. No.	Themes	No. of Research Paper
01	Contractor Selection	03
02	Delay Mitigation	02
03	Risk Management	03
04	Customer Satisfaction or requirements	03
05	Green Construction	02
06	Sustainable construction	01
07	QFD in design or build project	04
08	Project Communication	02
09	Improvement in design	03
10	After Sales	01

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The thematic analysis in Table 2 shows that research has predominantly focused on areas such as contractor selection, customer satisfaction, risk management, and QFD in design/build projects. These reflect the industry's efforts to enhance efficiency, meet client expectations, and manage uncertainties. Emerging themes like green and sustainable construction highlight a growing interest in environmental responsibility. However, topics like after-sales service, project communication, and sustainability are noticeably underexplored, despite their importance in ensuring long-term project success and client satisfaction.

These gaps suggest potential directions for future research. Limited studies on post-construction performance, evolving stakeholder needs, and integration of digital tools like Building information modeling (BIM) or Artificial intelligence (AI) with QFD models reveal opportunities for more comprehensive and adaptive quality frameworks. Further exploration of these areas could improve real-time decision-making, client engagement, and overall service quality across the construction lifecycle.

3.0 Conclusion and Future Research Directions

Evaluating service quality in Project Management Consultants (PMCs) remains a crucial aspect of construction management, with research emphasizing the need for structured frameworks to assess and enhance service performance. The literature review confirms the effectiveness of Quality Function Deployment (QFD) in prioritizing service quality factors, improving stakeholder engagement, and systematically aligning client expectations with technical and managerial outcomes. Studies have demonstrated successful applications of QFD in diverse domains such as design/build projects, renewable energy product development, and corporate service quality evaluation, showcasing its versatility.

However, analysis of recent literature also reveals that while QFD has been effectively utilized across various construction contexts, a dedicated and specialized model tailored specifically for PMCs is yet to be fully realized. Additionally, the integration of QFD with established service evaluation frameworks like SERVQUAL has reinforced the importance of structured, multi-level service quality analysis across corporate, project, and product levels. Despite these advancements, key areas remain underexplored, particularly in benchmarking tools and client feedback systems tailored to PMCs.

The identified research gaps point to the necessity for a comprehensive and context-specific service quality model for design/build projects, a robust QFD-based assessment framework focused on PMC operations, and deeper analysis of QFD's role in renewable energy product development. Addressing these gaps could lead to more effective and scalable models for service quality measurement, contributing to improved project outcomes and stronger client relationships in PMC-led projects. Future research should focus on developing an integrated QFD-based assessment model that incorporates critical service quality parameters, dynamic client feedback mechanisms, and performance benchmarking tools. However, implementation

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may face practical challenges such as resistance to change, lack of awareness, limited technical expertise, cultural misalignment, and poor integration with existing digital tools. Recognizing and addressing these barriers through leadership support, capacity building, and adaptive frameworks will be essential to ensure successful adoption. A structured yet flexible approach to quality evaluation would ultimately enable PMCs to enhance service delivery, increase client satisfaction, and drive long-term efficiency in construction project management.

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