

# Strategic use of quality function deployment (QFD) in the construction industry

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## Abstract

In this paper, an attempt has been made to examine the applicability of QFD as a strategic decision-making tool after the construction stage of a housing project to determine the best marketing strategy, to make a comparison between the performances of different competitors and to transfer the experience gained from the current project to the forthcoming projects. For this purpose, a QFD team has been formed to collect and verify the expectations of the customer profile of the sample project, which was a high-rise building project located in Ankara, Turkey. The case study findings demonstrated that QFD could be successfully applied in the housing projects as a strategic tool to facilitate marketing decisions. As a result of extensive literature review and the case study observations; the paper also points out the limitations and breakthroughs of the QFD methodology. Finally, critical success factors are proposed to improve the performance of the QFD methodology in construction projects.

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## 1. Introduction

Long-term viability of an organization mainly depends on how effectively the organization utilizes its resources for satisfying its stakeholders. For the organizations operating in the construction industry, one of the most privileged stakeholders are the clients (end users or customers depending on the project type; therefore, in the rest of this paper, client, customer and end user will be used interchangeably). Satisfying their needs and expectations is of the uttermost importance for the companies because quality is in the eye of the beholder and whatever they demand and expect from a product/project defines the quality characteristics of an entity. The unique nature of the industry necessitates the understanding of client needs and expectations for each project carefully for increasing their satisfaction level.

Over the past decades, quality has been a differentiating factor within the construction industry. It has been demonstrated that despite the constraints on quality differentiation efforts (like project budget, rules and regulations, etc.), many companies are competing using quality differentiation strategy and sustaining their competitiveness in the long run [1]. Achievement of client satisfaction, however, necessitates the management of quality systematically, which further necessitates utilization of quality tools and techniques for this purpose. Quality function deployment (QFD) is one of these techniques to deal with customer needs and expectations more systematically for achieving the most important objective of a construction company, satisfaction of clients. QFD is broadly a total quality management (TQM) implementation technique requiring clear assessment of client/end-user expectations apart from the basic needs of a project to convert them into design targets. Within the context of this paper, an attempt has been made to discuss QFD as a strategic tool to increase client satisfaction with a step-by-step implementation of

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the methodology to a high-rise housing project and to depict limitations and challenges of QFD implementations in construction industry as a result of extensive literature survey. For this purpose, the previous works on the subject area have been categorized to find out the limitations reducing the applicability of QFD in construction. By considering these limitations, critical success factors (CSFs) for increasing the applicability in construction projects are proposed.

## 2. QFD and its major benefits

As Preece et al. [2] stated “rewards go to those who can best understand customer needs and deliver the greatest value to their clients”. Hence, companies serving the quality expected by their clients using quality tools and techniques will receive the awards. Being one of these quality tools, QFD has been defined by its originator Yoji Akao [3] as “a method for developing a design quality aimed at satisfying the customer and then translating the customer’s demands into design targets and major quality assurance points to be used throughout the production phase”. It is a highly effective and structured planning tool to deal with client demands more systematically and defining what they want precisely to do it right in the first time. QFD is produced to be used at early stages of a project in order to produce more accurate decisions by focusing on project budgets in terms of quality and client’s needs [4]. However, using the same methodology as a decision-making tool at later stages also may be beneficial.

In the construction industry, usually the client needs and requirements are not treated systematically. Even if they are collected before the design phase, they tend to be disregarded and finally vanish as the construction phase goes on. Usually, the client needs/expectations together with quality standards are defined during the project requirement and feasibility stages. Due to the lack of integration between the parties involved in a project and lack of attention given to collection of client needs at these stages, problems in terms of buildability, delays due to incomplete designs, misunderstanding of client expectations, rework, etc. are observed. QFD applications have many benefits in reducing the quality related problems. These benefits have been observed to concentrate on the following headings; identification of client needs and expectations, planning, communication and concurrency; and uncertainty reduction [5–9].

- *Precise collection and identification of client needs/expectations:* The methodology provides a systematic way to collect and identify client needs. Client expectations are collected at earlier stages and used to provide the correct design solutions. Usually in construction projects, design solutions are decided by

designers and this gives way to observation of designer selections in the final facility rather than the client expectations, leading to reduced satisfaction. QFD is proved to be helpful in both collecting and transferring client expectations into design solutions without them diminishing as the project goes on when used parallel to the traditional design process.

- *Better planning:* QFD helps to track client expectations from the start till the end of the project and any possible distortions can be checked in time.
- *Enhanced communication and concurrency:* QFD necessitates cross functional team formations so that client needs are collected and converted accurately into design targets without sacrificing any of them. Therefore, it forces the parties to integrate their work through the use of concurrent procedures and processes.
- *Reduced uncertainty:* Early identification of client expectations minimizes uncertainty as the project phases develop. Reduced cycle time and redesigns are observed with QFD since, project teams thoroughly know what to produce from the beginning.

Accordingly, both clients and contractors would benefit from QFD usage during different phases of a project. Clients would obtain optimum definition of project requirements and a higher conformance of the project to preset targets, whereas contractors would experience fewer conflicts with owners due to better definition of their demands, minimal rework and fewer abortive cost increases during project execution.

## 3. QFD applications in construction literature review

Although the interests in QFD applications in construction are growing slowly, there are only a small number of QFD implementation examples in the construction management literature. Various applications within the literature can be grouped under three categories as: QFD implementations before the design stage; QFD implementations during the design stage and QFD implementations after the design stage.

### 3.1. QFD implementations before the design stage

The construction literature is quite limited in terms of the number of QFD applications and the number of examples in this category is even fewer due to the unawareness of the sector participants about this technique. As demonstrated by Pheng and Yeap [1], 14 out of 15 respondents in the construction sector were unaware of the QFD tool. The unique application of QFD in this category is used for the assessment of corporate service quality performance of design/build

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