

EVALUATION OF QUALITY DURING EARLY DESIGN: A PREREQUISITE TO DEFINING VALUE FOR MONEY FOR THE CLIENT

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Value can be defined as quality in relation to cost. The relationship between these two dimensions, in the context of a building's design, has to be properly understood if building owners/clients are to be confident of achieving value for money in the outcome. The work as reported here describes part of a research study that aims to develop a cost-quality modelling technique for early design evaluation. Findings suggest that quality is amenable to a systematic treatment of measurement. Measurement of conformance, as opposed to measurement of non-conformance, is proposed as an approach to evaluating the quality of design options during the early design. The paper argues that the measurement of quality should be clearly understood in that it does not necessarily mean gauging 'quantity' of quality. Alternatively, the paper suggests that evaluation of quality during the early design requires the measurement of the extent to which a design satisfies the characteristics of the project, that the client requires.

Keywords: evaluation of quality, measurement of conformance, quality, value for money.

INTRODUCTION

Value for money for customers/clients is a theme that has increasingly attracted the attention of academics and practitioners and is manifest in various fields such as business process reengineering, value management/engineering and total quality management. Hammer and Stanton (1995) suggest that achieving value for money for the customer is a critical success factor for strategic planning and management in business. Studies undertaken by the Centre for Strategic Studies in Construction (1988, 1989) emphasise the need for better value for money for the industry's clients. Latham (1994) highlights that construction clients are at the core of the process of project implementation and their needs must be met by the industry. Recently, Ashworth (1996) acknowledges the changing shift in emphasis from cost to value that has occurred during the latter part of this decade in the UK construction industry. This emphasis encourages construction professionals to seek better ways of understanding and providing value for money for their clients.

In essence, value can be defined as quality in relation to cost. Value for money can be achieved when the quality acceptable to the client has been successfully balanced with the costs allowable for the project (Mathur and MacGeorge, 1991). Pursuit of value for money for the client is a widespread and implicit aim in design strategy. In order to identify a value for money solution, the process of building design involves generating and evaluating alternative design solutions. This process must ensure that

a resultant design adds value to the client's business (Atkin et al, 1996). A corollary is that quality must be evaluated or measured in association with cost so that cost and quality implications of design decisions can be examined and compared in search of a best possible design solution (Kim and Atkin, 1996)

Quality must be given special consideration from the early design stage, that is, the briefing stage. Briefing is the process that involves the identification of the client's requirements and the production and appraisal of early design options to ascertain whether the envisaged project is feasible. It is at this stage when benefits of defining value for money for the client can be maximised, and which is of primary concern to this paper with respect to the evaluation of quality.

The objective of this paper is to propose a concept of measurement of conformance as opposed to measurement of non-conformance which is traditionally adopted in the measure of quality. The paper begins by exploring the concept of quality. It then examines the modern understanding of quality in order to re-define design quality within the context. It also examines measurement approaches commonly adopted in studies relating to quality control and management in order to clarify the nature of measurement pursued in terms of evaluating quality during the early design. Finally, a concept of measurement of conformance is presented and discussed.

THE CONCEPT OF QUALITY

Quality, as a concept, has existed for centuries. It is, however, only recently that it has emerged as a formal subject of management (Barret and Holling, 1993). The concept of quality seems too elusive and complex to be considered and communicated explicitly amongst individuals. Quality is distinguished from other parameters by the elusiveness of its definition and the difficulty of establishing measures of performance (Atkin and Potheary, 1994). This often leads to the frequent but empty claim: "I cannot define it, but I know it when I see it". Such an attitude says little about how to achieve an understanding of quality and undermines its evaluation and implementation during the design process.

Definitions of quality

Many authors and organisations dedicated to quality have their own definition. In understanding the concept of quality, the problem is not so much that one definition is right and another wrong, but just that they are different. Wille (1992) stated:

"Definitions are always a problem. They usually spring from your perception, which of course is wrong, and mine which is right!" (p. 3).

Indeed, quality is a complex concept to share amongst differently minded people since it encapsulates many meanings. Consequently, there is some considerable divergence as to what is meant by quality, depending on the focal point and interests of the people concerned. Further refinement is, therefore, essential to avoid ambiguity and confusion.

Quality in building and architectural quality

Quality in building is a complex subject. Discussions on quality in building become even more complicated when architectural quality is brought into consideration. Authors writing on quality in building/ architecture are from many distinct, but related, fields such as architectural design, architectural theory and history, building economics, construction management, quality management and engineering.

Depending on the field and interests of authors, there is some considerable divergence in the literature as to what is meant by quality in building/architecture. It is, therefore, difficult to define a clear border where quality in building can be separated from architectural quality. It could be because, as Brawne (1992) suggested, a building is a partial or total statement about propositions relating to architecture.

The Shorter Oxford English Dictionary refers to building as "that which is built" and architecture as "the art or science of constructing edifices for human use; the action or process of building; a special method or style of structure and ornamentation". Brett (1989) defines building and architecture respectively as "a structure having an external envelope that encloses space" and "a distinctive style of building; science of building design".

In the light of the above definitions, a distinction may seem clear in that a building refers to a physically built environment and architecture to a style of it. It should be noted that the distinction is, however, rather seamless in common usage. Even many authors writing on quality in building/architecture, not to mention lay person, often use the term interchangeably. Nevertheless, the term 'building' seems more frequently used to indicate physical, functional and performance aspects of built environment, whilst the term 'architecture' seems likely to be adopted when attempts are made to convey stylistic, aesthetic, historical and symbolic tones.

In this paper, the term 'quality' is used to refer to physical, functional, performance, and aesthetic aspects of built environment. It is therefore reasonable to suggest that quality is the totality of many different attributes which a building or its design is expected to attain.

Design quality vs. quality of conformance

The use of the term 'quality' can be confusing, due to what might be characterised as context shifting. It is often the case that one switches from a particular meaning of quality to another and then back again without noticing it. People tend to take a view of quality influenced strongly by their professional or organisational interests. Consequently, the word is used in different senses from time to time depending on the context and the people concerned. Cairns (1993) noted that there is, in many cases, little sign of a clear understanding of quality whilst the word is currently utilised in many contexts and to which may be attached many definitions. It is, therefore, essential to clarify the use of the term when researching quality-related issues.

The main interest of this paper is in design quality as opposed to quality of conformance. Lochner and Matar (1990) proposed a definition of these two different types of quality. Quality of design means products are designed to meet customer's needs and expectations whilst quality of conformance refers to providing products which meet previously determined and defined requirements.

A MODERN UNDERSTANDING OF QUALITY

Approaches to defining quality can be categorised in many different ways (Garvin, 1988; Bowbrick, 1992). These various approaches suggest a complexity of the concept of quality and rightly so. However, it is interesting to note that the concept of quality has evolved over time.

In the past, quality was mainly concerned with inspection for defects. The main concern then shifted to the prevention of defects. Since the emergence of a new

consumer-oriented economy in the 1980s, the concept of quality has moved towards emphasising a (customer) value-based approach (Tenner and DeToro, 1992).

Value-based quality

Garvin (1988) describes the value-based approach as offering a product or service to a customer with certain characteristics which satisfies him/her at an acceptable cost/price. Under the notion of this approach, Harrington (1987) and Pike (1994) consider quality as meeting the customer's requirements at a price that he/she is prepared to pay. This modern understanding basically suggests that quality is about meeting the client's requirements and therefore satisfying him/her at a price that represents value to him/her.

Despite the diversity of definitions of quality, there are two key issues running through the modern understanding of quality. These are: (a) quality can be achieved by assuring that the voice of the client is not lost; (b) quality relates to the extent of the client's satisfaction as to his/her requirements are being met. The importance of satisfying the client is highlighted by many authors such as Horovitz and Panak (1992), McNealy (1994) and Barsky (1995). Quality should therefore be considered more from the point view of the recipient of products or services, that is, the client, rather than the providers such as designers or contractors.

In addition, the extent of the client's satisfaction should be examined in order to consider whether building or its design provides the quality that the client expects. An important implication is that quality can be evaluated by measuring the extent to which client requirements are satisfied as perceived by the client. In essence, quality in its modern understanding is a key part or even the whole part of a value for money equation. This signifies the need for the evaluation of quality in a way the client can define and understand.

QUALITY OF DESIGN REDEFINED

Quality as an abstract concept is difficult to act upon. However, the client nowadays asks more and more for proof and the assurance of quality (Cnudde, 1991). An effective way of overcoming this difficulty could be to adopt an operational definition. According to Deming (1986), operational definitions are, in principle, those which "people can do business with". It is important to address quality in this manner in order to put planning and management actions into practice. Based on the modern understanding of quality as discussed in the previous sub-section, quality of building design can be redefined as:

A measure of the extent to which a design exhibits the characteristics of the project that a client requires, and thus provides the measure of satisfaction as perceived by him/her.

An important implication of defining quality as above is that the evaluation of design quality should consider the client's satisfaction which reflects his/her judgements on the conformance of design to the project characteristics he/she requires.

Therefore, evaluating the quality of a design option requires some kind of assessment or measurement in order to determine the extent to which the characteristics of the option are being satisfied, as perceived by the client. By reiterating this evaluation process, a large number of design options can be systematically compared as to the extent to which each design option satisfies the client's requirements.

CLIENTS AS KEY JUDGES IN THE EVALUATION OF QUALITY

A client in construction industry can be defined as the individual or organisation commissioning the building project whilst this definition can be extended to include other parties with a vested interest in its performance. The type of clients in construction industry varies greatly. According to MacPherson et al (1992), the client type can be categorised according to three parameters: size (large or small), sector (public or private) and project interest (development or owner occupation).

Due to this diversity of clients, their objectives are likely to be considerably different. However, the result of a recent client survey suggests that most of the clients hold a common view that they want greater value from their buildings by achieving a clearer focus on meeting their business needs (Bennett et al, 1996).

Judgement is a most common activity in human behaviour. People make judgements reflecting what they prefer and expect to happen. To do so, they perform evaluations and predictions. Human judgement is by its nature subjective, depending upon the interests, goals and objectives of the beholder. As a consequence, a design option that can be considered *good* quality for a design participant does not necessarily appeal to the same degree of goodness to other participants. This subjective nature makes it difficult to evaluate the quality of design options during the design process.

Traditionally, it is the architect's job to ensure that a design meets the client's needs and requirements. In this sense, architects are important judges in the evaluation process. The role of other design professionals such as specialist engineers and quantity surveyors is nowadays increasingly important during the early stages of design and thus they are also important judges. However, the client is the most important player during the briefing stage not only because he/she is the person who dominates and leads the process, but because design should be directed towards achieving his/her objectives.

Therefore, it should be stressed that the client is the one who must be considered the key judge in evaluating design quality. This is not to say that the quality of building design should be limited only to what the client believes to be good or excellent. It still remains the designer's professional privilege and responsibility to create a design which satisfies or delights him/her as well as the client.

However, quality should, at least, be evaluated against what the client considers important rather than what designers consider to be so because it is ultimately up to the client to determine the basis for measuring quality. Emphasis on the evaluation of design quality by the client is, therefore, necessary and this is the very central theme of the modern understanding of quality.

EVALUATION OF DESIGN QUALITY

It was discussed that evaluating the quality of a design option requires some kind of measurement in order to determine the extent to which the characteristics of the option are being satisfied as perceived by the client. Oakland (1993) stresses the needs for the measurement of quality. These include (a) to provide standards for establishing comparisons and (b) to provide visibility or a 'score-board'. Many other authors such as Bendell (1993) and Formoso et al (1994) also acknowledge the importance of measuring quality. However, due to its perceived elusiveness and complexity, quality has often been considered as unmeasurable. Herbsman and Ellis (1991) acknowledge

the difficulty of quantifying quality parameters. Gray and Tippett (1993) argue that the prevailing and pervasive notion of quality as an unmeasurable entity undermines its implementation for economic analysis during design.

Despite the potential benefits of evaluating quality, it is often argued that it is extremely difficult, if not impossible, to measure quality due to its complexity and subjectivity. This attitude often leads to reluctance or even disapproval of the measurement of quality. Recognition of the complex nature of quality means that evaluating design quality may seem to be an illusion, but its role in helping to enlighten and organise choices among design options is important. In other words, the measurement of design quality can play an important role because it assists the client and design team in analysing the level of quality of design options and identifying opportunities for improvement.

The meaning of measurement

At a glance, quality may seem unmeasurable. It might be argued that quality is the antithesis of quantity and, therefore, quantity is measurable whereas quality is not. It is often the case that measurement is mistaken merely as gauging quantity. A reason for this could be a misunderstanding or narrow understanding of the meaning of measurement.

Kerlinger (1986) notes that measurement has no quantitative meaning unless we give it such a meaning. It is simply a symbol of a special kind. Measurement is the assignment of numerals to objects or events according to rules. The measurement of quality, therefore, does not necessarily mean gauging the 'quantity' of quality. In certain cases, representing some kind of order or grade would be sufficient enough to serve as a goal for measurement.

Measurement of non-conformance

The measurement of quality is treated as one of the key subjects in studies relating to quality management such as quality control (QC), quality assurance (QA), and total quality management (TQM). In these studies, much attention on the measurement of quality is given to non-conformance, which means the failure to meet pre-defined specifications or requirements.

An approach used for the measurement of non-conformance is the analysis of discrepancies between a finished product and pre-defined requirements or specifications. Such discrepancies can be recorded and/or counted as the number of defects recognised, number of items found to be defective, and measured deviation from the standard (Fox, 1993). Another approach, which is very closely related to the above approach, is the analysis of the costs of (poor) quality which are caused by such discrepancies (Oakland, 1993). Items which contribute to the costs of quality include repair of defective work, purchase of replacement materials and components, delay or disruption with repairs, legal costs and compensation costs (Ashford, 1989).

The measurement of non-conformance is basically based on the notion of quality of conformance. It assumes that pre-defined requirements or specifications are available for measurement, so that measuring quality means analysing deviations from these requirements.

Measurement of design conformance

In order to evaluate the quality of design options during the briefing stage, the measurement of non-conformance is not appropriate. This is mainly because there is

no clearly pre-defined requirements or specifications from which deviations can be measured during the briefing stage. In other words, briefing is a process for establishing these requirements by comparing various design options or combinations of possible project characteristics and examining their implications.

It might seem impossible to measure quality, let alone determining what and how to measure, when it remains an abstract condition. However, within the proposed definition, it is clear that quality is a measurable entity, in that a level of quality can be measured by assessing how well each design option conforms or satisfies the project characteristics the client requires. Gunning and Lewis (1996) suggest that (client's) satisfaction is a very important measure of quality. This measurement emphasises the importance of the client's judgements on quality.

A common shortcoming of studies relating to the measurement of quality is that they tend to focus on technical or performance properties, ignoring aspects of subjective judgements of quality. Pointing out this shortcoming, Gray and Tippett (1993) use a "fruit salad" analogy where the quality of salad should be assessed by using people's judgements rather than measuring individual content of fruits and their mixture.

Quality of design options might be 'objectively' evaluated by measuring technical or performance properties but this ignores the subjective nature of quality judgement. In order to overcome this shortcoming, it is necessary to reflect the client's judgement on conformance of design options to his/her requirements.

CONCLUSION

Successful design evaluation depends on the realistic evaluation of the cost and quality dimensions of design options and their relationship. In particular, the evaluation of the quality dimension is both important and challenging, which has also been considered complex and elusive. A building design cannot be validly assessed without taking into account the quality dimension and, by definition, value for money cannot be understood and achieved without an explicit understanding of the relationship between cost and quality. Evaluating or measuring design quality could not guarantee correct design decisions, but it improves the basis upon which those decisions are made. Consequently, the chance of ensuring the client's satisfaction improves and so does the chance of achieving value for money for the client.

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