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An Assessment Model for Quality Performance Control in Residential Construction

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This paper is concerned with two important aspects of the home-building segment of construction: quality performance of homebuilders and homebuyer satisfaction. A model for assessing a homebuilder's quality performance is presented. It is argued that customer satisfaction can provide the strategic intelligence needed to direct the quality improvement effort.

Key Words: Quality Improvement, Customer Satisfaction, Homebuilding

Background

Observers close to the construction industry have expressed great concerns over the problems facing the industry. The industry has been criticized for common cost overruns, expensive delays, high-accident rates, ever-increasing litigation costs, and declining international competitiveness. There is a consensus among professionals and researchers that the solution to the problem lies in formal quality management at all levels of design, procurement and construction. As Tucker puts it: "The future advancement and accomplishments of our industry will depend upon our acceptance of the quest for quality much more than reaching any specific milestones" (Tucker 1990, p.152). Providing superior quality is rapidly becoming the way for companies to differentiate themselves from competitors and win more projects. To meet this quality challenge, many companies are adopting new management practices that focus on the continuous improvement of product and service quality.

Companies need assurance that their improvement efforts are organized and that their priorities are on the right track (Kelvin and Lynch 1992). Quality improvement is difficult to achieve unless quality is accurately and periodically measured. One reason for that difficulty is the lack of good overall measures of quality in its broadest sense. Companies say they have difficulty even making a baseline assessment of their quality (ENR 1995). Before one can define methods for improving and maintaining the quality of construction, two fundamental questions need to be answered: Who sets the quality standards and what is high quality in construction?

Objective

The objective of this paper is to define quality in the home building industry and to present a tool for measuring that quality.

Quality in Construction

There are, generally, two approaches to quality in construction, conformance to requirements approach and customer satisfaction approach.

Conformance to Requirements Definition of Quality

Traditionally, the construction industry has preferred the conformance-to-requirements definition of quality where the major concern has been how well the constructed facility conforms to design specifications. According to this approach, excellence is equated with meeting specifications and with "making it right the first time."

The conformance-to-requirements definition of quality demonstrates a number of very important attributes and strengths. Measuring quality by using this definition is relatively straightforward and easy (Reeves and Bednar 1994) for it is readily translatable into operational criteria (Seymour and Low 1990). This approach, however meaningful, also possesses some inherent limitations. A serious weakness is that its primary focus is internal; it assumes that providing a facility, which satisfies the design and specifications, as, developed by a designer and interpreted and implemented by a constructor, it is of high quality. In many cases this quality paradigm has been proven inadequate. There is ample evidence that construction is not immune of technically incomplete and unsound designs and specifications (see for example Burati et al. 1992). The issue becomes the quality of design and specifications, since they come to be viewed as a neutral touchstone against which quality in implementation is assessed.

Another limitation of the conformance-to-requirements definition of quality is that it assumes that we can get stable and complete requirements; it ignores the potential mismatch between what is specified and what the customer needs or wants. In fact, customers may not know or care about how well the constructed facility conforms to specifications; they want their needs and expectations to be met. The crucial task is how to establish design requirements and specifications that best reflect their needs and expectations. This is a particularly problematic 0step for non-technical requirements, such as aesthetics, comfort, and convenience, which usually are not completely addressed by specifications (Kenny 1988).

While the conformance-to-requirements definition is appropriate for the construction phase of a project, it is more problematic for the design phase, which, by its nature, requires much judgment, discretion and creativity (Davis et al. 1989). There is also questionable usability of the definition for evaluation of service quality for it fails to address the unique characteristics of service (Reeves and Bednar 1994). This is especially true when a high degree of human contact is involved.

Considering limitations in the development, interpretation and implementation of design requirements and specifications, it is obvious that the conformance-to-requirements approach should not be used as the exclusive criterion for defining quality. As Seymour and Low (1990) pointed out, the conformance-to-requirements definition is far too limiting and provides an incomplete vocabulary of quality. In summary, there is a need for a more robust view of quality.

Customer Satisfaction Definition of Quality

For a company to compete effectively on the quality of its products and services "a deeper understanding to the customer's perspective is a necessary first step" (Garvin 1984, p.43). A more robust view of quality comes with the customer satisfaction approach, which places the emphasis upon the customer. It demands an entirely new perspective--one that calls for viewing quality externally, from the customer's perspective, rather than internally, from a quality-assurance point of view. According to that approach, quality is the extent to which a product or service meets a customer's expectations. The serious limitation of this definition is its complexity; it is the most complex definition of quality and the most difficult to measure for different customers place different weights on the various attributes of a product and service.

Apparently, both approaches to quality have strengths and limitations in relation to measurement, generalizability, and practical usefulness. They should not be seen as mutually exclusive; rather they should be viewed as complementary to each other. The main premise of this paper is that in the marketplace, quality must ultimately be evaluated from the customer's perspective. Consequently, we define quality as customer satisfaction with a product and service received.

Customer Satisfaction as a Performance Criterion

Recently a number of companies have begun to create new performance measurement systems that supplement and extend the more traditional financial measures of company performance. In response to changing markets, and concerns about a "short-term orientation," these firms have begun to use, so called, nonfinancial measures, such as quality and customer satisfaction (Eccles and Pyburn 1992).

The use of "soft" performance criteria, such as customer satisfaction, in construction is at an early evolutionary stage. Companies still track customer satisfaction less than they do individual project performance, overall company performance, or safety and estimating, for example (ENR 1995). In this paper we argue that customer satisfaction can be used for evaluation of quality and ultimately for assessment of success of a company's quality improvement program.

A Model for Evaluation of Homebuilder Quality Improvement Effort

In this section we present a model in which customer satisfaction is utilized for evaluation of a homebuilder's quality improvement effort. Before we can elaborate on the model, it is necessary to provide simple, conceptually sound definitions of a customer. The simplest available definition of a customer is "one who pays the bill" (Austin and Peters 1985)-- a "paying" customer. Within the construction context, it is the owner or client. Another type of customer, equally important, is one who uses a product or service-- a "user" customer. Most facilities have been designed and built for a client other than the user--the designer and contractor, paid by one client, design and build for another, the user. It is very important to make the distinction between the two types of customers for they use different sets of criteria against which they

judge their satisfaction. The unique characteristic of the homebuyer population is that it represents both types of customers, paying and user customers.

Figure 1 shows a model depicting the relationships between a homebuilder's quality improvement program, product and service quality, and customer satisfaction. According to the model, a quality improvement effort, if observed and managed in an organized fashion, will lead to achieving higher product and service quality, which will eventually lead to improved customer satisfaction.

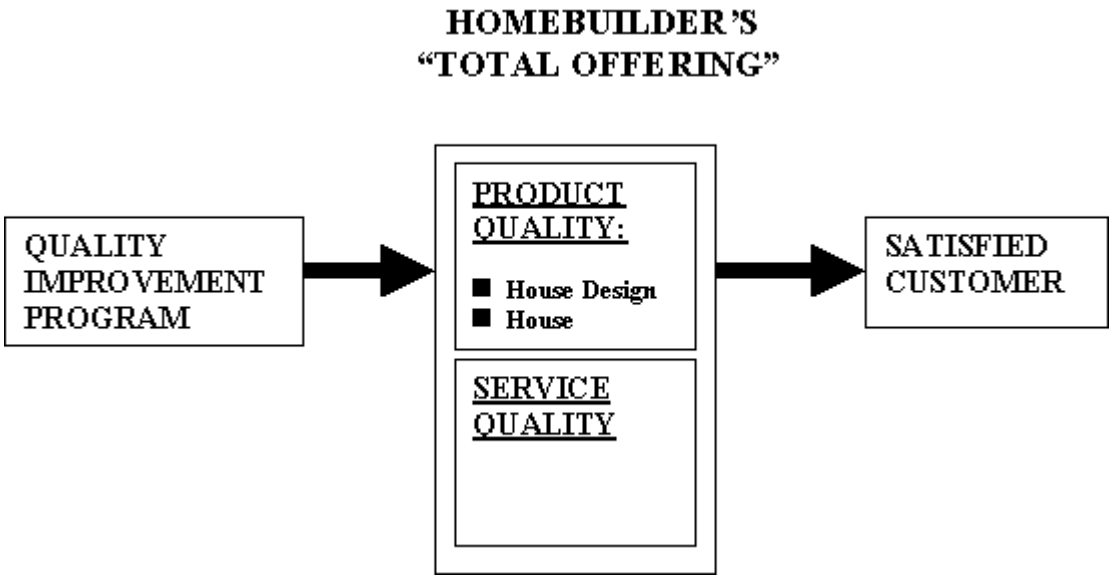

Figure 1. The relationship between quality improvement program, product and service quality and customer satisfaction.

Our model assumes that the relevant elements of a homebuilder's market offering extend beyond the core offering, namely, building the house itself. In fact, the quality of service may be the only factor that sets a homebuilder apart from other homebuilders who are offering similar homes for similar market segments (NAHB 1988). As Brown and Fern (1981) pointed out, rarely are market offerings all products or all services but most often they are a blend of the two. Consequently, every product and service must be designed, produced, and delivered in the context of a total package of products and services -- it is the "total offering" that generates the total degree of customer satisfaction.

HOMBSAT--An Instrument for Measuring Homebuyer Satisfaction

Although the construction industry has recognized quality and client satisfaction as decisive business factors, it is still unknown how well the industry is meeting client expectations. There are no commonly accepted methods of measuring customer satisfaction in the construction industry. One reason for this is the existence of a wide variety of customers that can be found across the spectrum of construction projects. Customers encountered in a typical highway construction project, for example, use a different set of criteria against which they judge their satisfaction, from, for example, that used by a purchaser of a single-family house. Consequently,

measuring customer satisfaction in different segments of construction requires different "custom-designed" methods and instruments. The absence of a generally acceptable operational definition of customer satisfaction in construction appears to result in neglected implementation of this critical concept.

In order to measure the extent of homebuyer satisfaction we need an instrument to enable structured observation and measurement of the concept. Based on an exhaustive review of the literature, an instrument for measuring homebuyer satisfaction, called HOMBSAT (**HOM**e-**B**uyer **SAT**isfaction), was developed (Torbica 1997). To test HOMBSAT instrument data were collected from homebuyers regarding their level of satisfaction with design, house, and service. The measures proposed were tested and shown to be reliable and valid, and it was concluded that the HOMBSAT represents a credible instrument to measure homebuyer satisfaction. More detailed discussion on the development and testing of the HOMBSAT can be found in Torbica (1997). The instrument consists of 51 items-14 items representing the DESIGN dimension, 16 items representing the HOUSE dimension, and 21 items representing the SERVICE dimension of homebuilder's total offering. A complete list of 51 items is shown in Appendix. To measure homebuyer's perception about design/house/service quality, a seven point Likert-type scale, like one shown in Table 1, is used.

Table 1

A Typical Item from HOMBSAT: How satisfied are you with illumination level or quantity of light in your house?

Very Dissatisfied	**Dissatisfied**	**Somewhat Dissatisfied**	**Neither Dissatisfied Nor Satisfied**	**Somewhat Satisfied**	**Satisfied**	**Very Satisfied**
1 1	2	3	4	5	6	

Home Buyer Satisfaction Scores

Operationally, customer satisfaction is a complex and elusive phenomenon (Peterson and Wilson 1992) that is not directly measurable by any observable variable. It is, however, indirectly measurable via a multiple-indicators approach (Johnson and Fornell 1991). Typically, a concept is rated on several scales representing items, or statements associated with a single dimension, and the results are averaged to provide a single score for each dimension. The summed scale score serves as an index of attitudes towards the concept.

Homebuilder's quality performance can be indirectly inferred from scores on each of the three HOMBSAT dimensions. The scores for DESIGN, HOUSE, and SERVICE for a company are obtained by averaging the individual homebuyer scores. The individual homebuyer scores are the mean of the individual's responses for the items within each dimension. The scores can be used independently, or in combination. For example, if homebuilder itself does not provide the design, it can be excluded from consideration. On the other hand, a total company score for homebuyer satisfaction can be calculated by adding up the average score on each of the three dimensions and then dividing by three.

HOMBSAT instrument has been successfully used in a study of Total Quality Management (TQM) practice employed by 16 medium to large Florida homebuilders (see Torbica 1997). The study has confirmed that implementation of TQM is positively associated with homebuyer satisfaction.

Conclusion

Organizational efforts towards continuous improvement should be focused on creating performance measurement systems that provide relevant, factual information on core business processes and key activities (Miller 1992). We have shown that customer satisfaction, as an external measure, can provide the strategic intelligence needed to direct the quality improvement effort. We have also pointed out that in the home building industry the homebuyer represents both the "paying" customer and the "using" customer. This situation requires that the tool for measuring quality address the needs and wants of both customer types.

HOMBSAT, the measurement tool proposed, is most valuable when it is used periodically to track homebuyer satisfaction trends. It allows homebuilders to track their improvement in providing quality homes and services over the coming years. Also, HOMBSAT can be used by homebuilders to track and make comparisons among the company's quality performance provided by different divisions, projects, or in different geographic locations.

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Appendix
HOMBSAT Questionnaire:

	DESIGN:
1	How satisfied are you with your house floor plan?
2	How satisfied are you with the scale and proportion of floor plan?
3	How satisfied are you with the number of rooms in your house?
4	How satisfied are you with the size of the rooms in your house?
5	How satisfied are you with the layout of the rooms, that is, the design in relation to your daily life?
6	How satisfied are you with the location of the different rooms?
7	How satisfied are you with individual space for each member of your household?
8	How satisfied are you with your kitchen design?
9	How satisfied are you with bathroom(s) design?
10	How satisfied are you with the number of bathrooms in your dwelling unit?
11	How satisfied are you with ceiling height?
12	How satisfied are you with the amount of privacy available in your house?
13	How satisfied are you with the number and placement of electrical outlets?
14	How satisfied are you with the brightness or light in your house during the daytime?

	HOUSE:
15	How satisfied are you with the energy-efficient features in your house?
16	How satisfied are you with utility cost?
17	How satisfied are you with low-cost maintenance features in your house?
18	How satisfied are you with easiness of maintenance of your house?
19	How satisfied are you with the cost and effort needed to keep the house up?
20	How satisfied are you with the operation of Heating/Air Conditioning?
21	How satisfied are you with the quality of building materials used in your house?
22	How satisfied are you with the quality of materials used in floors?
23	How satisfied are you with the quality of materials used in walls?
24	How satisfied are you with the operation of windows?
25	How satisfied are you with the operation of doors?
26	How satisfied are you with the operation of electrical features?
27	How satisfied were you with quality of finish workmanship?
28	How satisfied are you with the quality of workmanship of painting (free of nail pops, free of shrinkage cracks, etc)?
29	How satisfied are you with the roof performance?
30	How satisfied are you with the performance of foundation?

	SERVICE:
31	Extent to which home builder set your expectations early.
32	Extent to which home builder personnel were available during evening and weekend hours.
33	Extent to which you were welcomed enthusiastically.
34	Extent to which home builder presented the basic advantages of their home.
35	Extent to which home builder pointed out some hidden values of the home.
36	Extent to which you were treated like a person, not a number.
37	Extent to which home builder personnel showed interest in you as a customer.
38	Extent to which you were given a quiet place to make decisions.
39	Extent to which home builder explained every step of home buying and building process to you.
40	Extent to which it was made clear to you whom you should contact during construction.
41	Extent to which home builder explained to you warranty coverage.
42	Extent to which homebuilder explained to you your responsibilities for maintenance and upkeep.
43	Extent to which homebuilder explained to you the way the various items in your home operate.
44	How satisfied were you with professionalism of home builder personnel?
45	How satisfied were you with competence (skills and knowledge) of home builder personnel?
46	How satisfied were you with responsiveness (willingness to help and provide prompt service) of homebuilder personnel?
47	How satisfied were you with reliability (ability to perform the promised service dependably and accurately) of homebuilder personnel?
48	How satisfied were you with courteousness of homebuilder personnel?
49	How satisfied were you with communication with builder's construction personnel?
50	How satisfied were you with builder's responsiveness to questions/ concerns?
51	How would you rate your satisfaction with your builder's attitude about customer service (i.e. after move-in)?