

AN APPROACH FOR EVALUATING THE SATISFACTION OF A CONSTRUCTION PROJECT TEAM

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Several researchers have identified satisfaction as a subject of concern that requires improvement in the construction sector. Client and stakeholder satisfaction is a catalyst for retention and loyalty, which are success strategies for any industry. Satisfaction is affected and influenced by the participants or partners of construction projects. However, satisfaction can be assessed or evaluated based on defined parameters and attributes. In addition, satisfaction attributes form a frame of reference through which satisfaction measures and strategies are created for the project participants. This paper presents an approach for evaluating and assessing the satisfaction attributes and levels of members of a construction project team. The study explores the attributes that motivate the construction project participants in terms of improving their satisfaction level. Relationships of the members and their satisfaction parameters or attributes, and how these affect the satisfaction levels of the members are examined and discussed based on existing practices on client and project participant's satisfaction.

Keywords: client, construction, project management, quality.

INTRODUCTION

In view of the need for client satisfaction in the construction industry as emphasised by Egan (1998), satisfaction has been identified and recognised by researchers as one of the key challenges facing the industry (Torbica and Stroh 2000; Kärnä 2004; Constructech 2005). The sustainability and success of the construction industry depends greatly on the clients' and users' continuous usage of its services, which is highly dependent on their satisfaction. Satisfaction is a measure, or the extent to which the needs, requirements and expectations of clients or customers for a product or service are met. The client's intention and decision to continually invest in the construction sector is correspondent to having his/ her needs (or satisfaction attributes) met. In order to attain high client and/ or participant satisfaction, it is vital that the construction industry maintains a long-lasting commitment of the criticality of satisfaction from the highest (top) to the lowest (bottom) level. Adequate knowledge of the project participant's requirements and expectations is essential to the success of any project. This is because construction project participants express dissatisfaction when their satisfaction attributes are not recognised. Liu *et al.* (1998) and Mbachu *et al.* (2006) state that the reason for client dissatisfaction in construction is as a result of insufficient research into client requirements and satisfaction attributes.

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In an overview of research issues relating to client satisfaction in the construction industry, Wilemon and Baker (1983) identified cost, time, quality, customer orientation, communication skills and response to complaints as parameters for client satisfaction. Kometa *et al.* (1995) recognised four vital clients' needs in the built environment, which are Functionality, Safety, Quality, and Completion Time. Hence, Chinyo *et al.* (1998) assert that a comprehensive analysis of clients' needs will facilitate greater clients' satisfaction. Here, 34 clients' needs grouped into eight main classes of needs: Aesthetics, Economy, Functionality, Quality, Working Relationships, Safety, Surprises (i.e. lack of) and Time were identified. The issue of quality evaluation for assessing customer satisfaction in the construction industry has been identified by researchers (Barrett 2000; Maloney, 2002; Yasamis *et al.*, 2002).

Research so far on satisfaction in the construction sector have clearly highlighted detailed requirements of the client or project owner, with little emphasis being placed on the requirements of other members of the construction project team. In view of this, this study has been driven to solicit information from the industry's project participants. The study aims to highlight the satisfaction attributes of key construction project participants, with the quest to improve the satisfaction of not just the main client or project owner for a construction project, but also the entire project team. This paper presents the results of a questionnaire-based study, which was designed to investigate the attributes that affect satisfaction levels of other construction participants. It presents the perceptions of engineers, designers, and main contractors on satisfaction, considering that they occupy a pivotal position in the construction project team upstream with the client group and downstream with the suppliers, distributors and manufacturers. It starts by presenting the survey structure, the process adopted in developing the questionnaire, and satisfaction attributes of the target respondents. It then presents a discussion on the data analyses adopted in evaluating the generated data, as well as the survey findings and results based on the responses of the respondents. Finally, conclusions are drawn from the findings.

SURVEY STRUCTURE

Target Respondents

This paper centres its discussion on the responses of members of the project management group comprising the main contractors, designers, and engineers.

Questionnaire

A satisfaction-focussed questionnaire was designed to seek information from the target respondents. A pre-test of the questionnaire was conducted using experts with a minimum of ten years experience in the construction industry who are part of construction best-practice events. This was done to measure the questionnaire's coherence and structure and its relevance to the context of the study. The responses gathered from the experts led to some modifications of the questionnaire. The questionnaire was then administered to 30 participants of the survey sample, who reside within the West Midland regions of the United Kingdom. The stratified sampling approach was adopted where the study divided the sample population into three strata or groups (target respondents) and then an investigation was carried out on the three strata.

Through the questionnaire, the study evaluated the perceived or rated importance of the satisfaction attributes. These attributes were identified from previous research on satisfaction. A likert scale of 1-5 was provided for each attribute to note down the

respondents' level of importance where 5 is 'strongly agree', 4 is 'agree', 3 is 'somewhat agree', 2 is 'disagree', 1 is 'strongly disagree'.

The questionnaire was preceded by a covering letter, which explained the study's objectives and requested that the respondents indicate what role they occupy in the construction project team. Three roles were listed: main contractor, designer, and engineer. This helped to carefully analyse the satisfaction attributes, and opinions of the respondents so as to determine whether their responses varied with the roles they occupy. The questionnaire design was based on a combination of an extensive and thorough review on satisfaction in the construction industry, construction best practice events organised by the West Midlands Centre for Constructing Excellence, detailed information as identified by the Construction Strategic Forum (www.strategicform.org.uk), Constructing Excellence (www.constructingexcellence.co.uk) and Construction Online (www.constructionline.org)

Satisfaction Attributes of the Target Respondents

To create a balance in the four most identified satisfaction requirements of construction clients and project participants, which are cost, quality, safety, and time, the study embraces these four categories or classes distinguished by their elements. Their elements are called the satisfaction attributes, in the context of this study.

The following 16 attributes are the satisfaction attributes of the respondents.

Cost:

- Project is paid for as agreed – 'csa1'
- Changes are fairly introduced – 'csa2'
- Supplier cost estimates are in accordance with my requirements – 'csa3'
- Flexibility for changes or modifications – 'csa4'

Quality:

- Project design contains sufficient details – 'qsa1'
- Project consultants are responsive to questions & changes – 'qsa2'
- Open and friendly communication – 'qsa3'
- Client interactions are open & friendly – 'qsa4'
- Minimal defects in supply – 'qsa5'

Safety:

- Project schedules are detailed & easy to understand – 'ssa1'
- Health, safety, & risk procedures are with no incidents – 'ssa2'

Time:

- Project is completed on time – 'tsa1'
- Communication flow is consistent – 'tsa2'
- Response to complaints is quick & productive – 'tsa3'
- Ensures that changes are introduced as early as possible – 'tsa4'
- Supplier's ability to meet my deadlines – 'tsa5'

where :

csa1, csa2, csa3, csa4, are the satisfaction attributes that fall into the cost class;

qsa1, qsa2, qsa3, qsa4, qsa5, are the satisfaction attributes that fall into the quality class;

ssa1, ssa2, are the satisfaction attributes that fall into the safety class;

tsa1, tsa2, tsa3, tsa4, tsa5, are the satisfaction attributes that fall into the time class;

DATA ANALYSIS AND SURVEY FINDINGS

The data analyses, survey findings and results of this paper are discussed and presented as follows:

Preliminary Analysis: Frequency Distribution

The first stage of the analysis explored the frequency for each satisfaction attribute so as to determine the percentage of respondents that strongly agree, agree, somewhat agree or disagree with each attribute based on their ratings. Scores were allocated to the respondents' choices as 5 for 'strongly agree', 4 for 'agree', 3 for 'somewhat agree', 2 for 'disagree', and 1 for 'strongly disagree'.

Figure 1 illustrates the satisfaction attributes of the respondents comprising engineers, designers, and main contractors. The results reveal that more than half (over 60%) of the respondents perceived 'csa1', 'csa2', 'qsa3', 'qsa4', 'ssa2', 'tsa2', and 'tsa4' as their most important satisfaction attributes indicated by their recordings for 'strongly agree' for the afore-mentioned requirements. A small percentage (less than 5%) of the respondents disagree that 'csa4', 'qsa3', 'qsa4', 'ssa1', 'ssa2', and 'tsa4' are attributes for their satisfaction. However, in general, more than 60% of the respondents strongly agree that all the listed 16 attributes are required for their satisfaction.

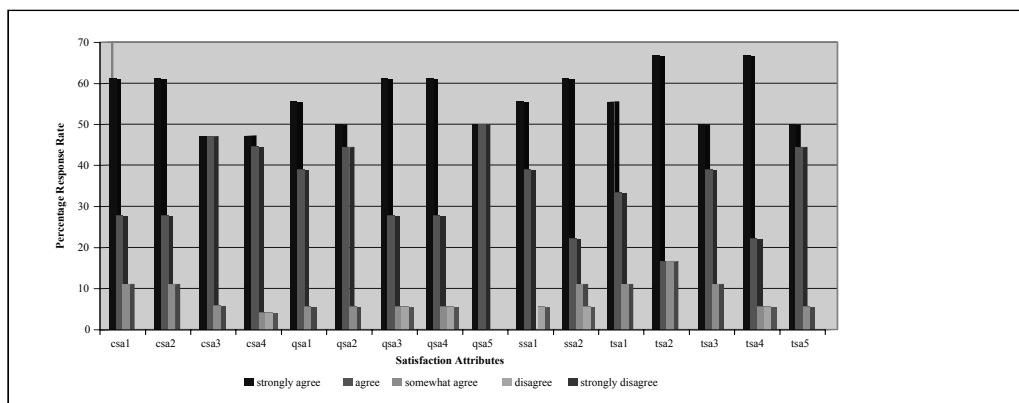


Figure 1: Percentage Response Rate of Respondents for their Satisfaction Attributes

Analysis/ Assessment of Importance of Satisfaction Attribute

The multi-attribute approach was employed to compute the importance values for the satisfaction attributes based on the studies and recommendations by Love *et al.* (1998); and Chang *et al.* (2002). This was done by defining weighted values for the attributes, after which they were ranked based on their values. The weighted value known as the importance value of a satisfaction attribute is based on the attribute's satisfaction score and weighted factor.

$$I \quad \text{Satisfaction Score}$$

The satisfaction score of a given attribute is defined as the product of the rating score or point and the percentage of the rating point of the attribute. It is also known as the mean value of the attribute. This is mathematically represented as:

$$SS_{sai} = \sum Ra * PRa / 100 \quad (1.0)$$

where SS_{sai} = satisfaction/ assessment score of attribute; Ra = rating score of attribute

PRa = percentage rating point of attribute

II Weighted Factor

The weighted factor for a given attribute is defined as the satisfaction score of the attribute over the sum or total of the attributes required by the respondent. This is mathematically represented as:

$$WF_{sai} = SS_{sai} / \sum SS_{sai} \quad (2.0)$$

III Weighted Value

The weighted value for an attribute is defined as the product of the weighted factor and the satisfaction score of the attribute. It is mathematically represented as:

$$WV_{sai} = WF_{sai} * SS_{sai} \quad (3.0)$$

Assessment of Importance of Attributes

The important value of an attribute is the weighted value of the attribute, which is computed using the multi-attribute method of analysis as discussed earlier. Table 1 illustrates the importance values of the attributes required by the main contractors, designers, and engineers as a group. The attribute with the highest satisfaction score and weighted value is perceived to receive the highest priority or ranking from the respondents.

Table 1: Importance Values of Satisfaction Attributes of Respondents (Engineers, Designers, Main Contractors)

Satisfaction Attribute	Satisfaction Score	Weighted Factor	Weighted/Importance Value	Ranking for Attributes
csa1	25.583	0.063	1.612	4
csa2	25.583	0.063	1.612	4
csa3	24.778	0.061	1.512	16
csa4	25.036	0.062	1.544	14
qsa1	25.446	0.063	1.595	7
qsa2	25.139	0.062	1.556	12
qsa3	25.870	0.064	1.648	1
qsa4	25.556	0.063	1.608	6
qsa5	25.309	0.062	1.577	10
ssa1	25.417	0.063	1.591	8
ssa2	25.387	0.063	1.587	9
tsa1	25.278	0.063	1.574	11
tsa2	25.720	0.063	1.629	3
tsa3	24.965	0.061	1.535	15
tsa4	25.857	0.064	1.647	2
tsa5	25.139	0.062	1.556	12

The above results reveal that the combined opinions of 30 project participants with an average of 24 years experience in the construction industry highlight ‘open & friendly communication (qsa3)’, ‘changes introduced as early as possible (tsa4)’, and ‘communication flow is consistent (tsa2)’ as their three most important satisfaction attributes shown by their high importance values of 1.648, 1.647, 1.629 respectively.

Having ‘communication’ as the most important satisfaction attribute to the respondents would possibly mean that the project participants would need to communicate more in order to meet their other satisfaction attributes, help to clarify issues, understand each other’s and overall project’s requirements. This can be seen in Cheng *et al.* (2001)’s view where the authors state that communication generates benefits in the performance of the construction project in areas relating to reduced cost, reduced re-work and quality time. Consistent communication is the binding force, link or relationship between the different and several project participants. Jonsson and Zinedin (2003) state that the essence of any relationship is the communication or interaction between the people or groups. The record for ‘changes introduced early’ as the second most important satisfaction attribute for the respondents could be because where changes, change orders and cost of changes are declared or introduced late in the project process, they have a significant effect on the schedule and delivery of the project. The survey conducted by Al-Momani (2000) identified change orders, amongst other issues as factors that cause delays in construction projects. This is to say that when the change orders are positively impacted upon and introduced early in the project as a result of involving the client group (Love *et al.* 1998), this has an effect on the satisfaction of the contractor for example.

Respondent’s Characteristics and Perceptions:

Figure 2 present an illustration of a construction project team comprising the survey respondents or project participants (engineers, designers, and main contractors). The figure indicates that there is a relationship between the participants. This is to say that the outcome of a particular project phase has an effect on the succeeding phase.

Therefore adequate understanding of the requirements of the participants in a given phase is critical because where there is a ‘flaw’ in meeting these requirements, it affects the satisfaction of the participants, which afterwards inhibits the possibility of meeting the requirements of or satisfying the participants in the succeeding phase. For instance, problems such as late delivery, poor quality that arise due to inadequate design do so because focus is not placed on the requirements of the designers (Smith *et al.*, 1998).

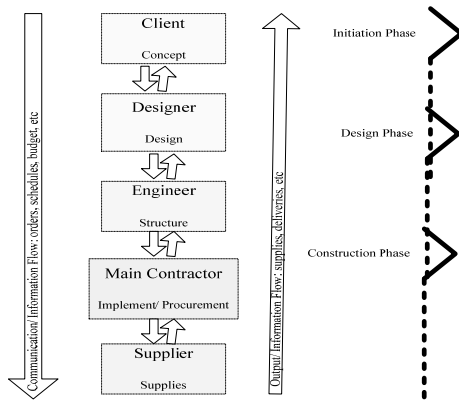


Figure 2: Generic Configuration of a Traditional Construction Project Team

Figure 3 presents the percentage of respondents that were engineers (33%), designers (45%), and main contractors (22%). The respondents’ characteristics such as the role they occupy have a significant influence on their satisfaction levels. This is to say that the respondents’ recordings for their satisfaction attributes vary based on their roles in the project team. Also, some of the satisfaction attributes required by one project participant could also be required by another participant, hence the need for the recognition and adequate understanding of one another’s satisfaction attributes.

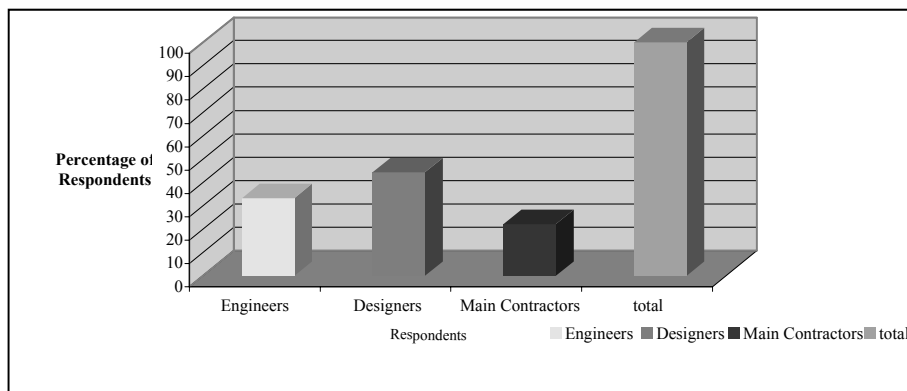


Figure 3: Percentage Response Rate of Engineers, Designers, and Main Contractors

For instance, as can be seen in table 2, engineers recorded ‘changes are fairly introduced (csa2)’, ‘communication flow is consistent (tsa2)’, and ‘client interactions are open and friendly (qsa4)’ as their three most important satisfaction attributes. It was observed from the survey that designers stated ‘project is paid for as agreed (csa1)’, ‘project is completed on time (tsa1)’, and ‘changes are introduced as early as possible (tsa4)’ as their three most important satisfaction attributes. Main contractors, on the other hand, recorded ‘project is paid for as agreed (csa1)’, ‘health, safety, and risk procedures are with no incidents (ssa2)’, ‘changes are introduced as early as

possible (tsa4)', and 'supplier's ability to meet deadlines (tsa5)' as their most important satisfaction attributes. The importance values for the satisfaction attributes as rated by the engineers, designers, and main contractors (table 2) have high discrepancy. This is to say that for instance, the importance value of 'csa1' as recorded by the engineers (4.242) is much higher than the value recorded by the designers (3.716), and much lower than the value recorded by the main contractors (8.118). This is because the percentages of the role of the respondents also vary significantly as shown in figure 3.

Table 2: Importance Values of Attributes as recorded by Engineers, Designers and Main Contractors

Attribute/ Respondent	Engineers	Designers	Main Contractors
Csa1	4.242	3.716	8.118
Csa2	5.789	3.191	6.739
Csa3	4.806	3.314	6.684
Csa4	4.491	3.404	7.449
Qsa1	4.806	3.517	7.449
Qsa2	4.452	3.517	7.449
Qsa3	5.107	3.494	7.449
Qsa4	5.139	3.374	7.449
Qsa5	4.452	3.627	7.449
Ssa1	4.806	3.493	7.449
Ssa2	4.565	3.402	8.118
Tsa1	4.242	3.716	7.449
Tsa2	5.304	3.402	7.449
Tsa3	4.242	3.517	7.449
Tsa4	4.609	3.698	8.118
Tsa5	4.085	3.517	8.118

The results show that the three groups of respondents (engineers, designers, main contractors) require both cost and time related satisfaction attributes most (csa1, csa2, tsa1, tsa2, tsa4, and tsa5). It is therefore necessary for the project participants to recognise and understand each other's satisfaction attributes (requirements). For instance, with respect to figure 2, where the main contractor's attribute for 'supplier ability to meet deadlines (tsa5)' is not met (by the supplier), this affects the contractor's ability to meet the engineer's satisfaction attribute for 'changes introduced fairly or even early (csa2)'. This subsequently affects the engineer's ability to meet the designer's satisfaction attributes for 'changes introduced early (tsa4)' and 'project completed on time (tsa1)'. This infers that the satisfaction level of the project participants is affected by the satisfaction levels of the participants that link or report to them.

CONCLUSION

Satisfaction can be achieved, and improved upon in the construction sector when emphasis is placed on the satisfaction attributes defined by the project participants.

This paper has shown that satisfaction is an issue that is not just required by construction clients but also by the project participants. The study highlighted the satisfaction attributes required by the engineers, designers and main contractors, generated from the literature review and survey exercise of the study. It further defined the level of importance of each attribute based on their weighted values, which were computed from the data (results) generated from the survey using the multi-attribute method of analysis. The findings from the study show that the

satisfaction level of the construction project team is influenced by the satisfaction attributes of the project participants. For example, where the satisfaction attributes of an engineer is not met by the main contractor, it affects the ability of the engineer meeting the satisfaction attributes of the designer. Therefore, it is necessary for clients and members of a construction project team to have adequate understanding of one another's satisfaction attributes, with focus placed on the participants they directly report to and vice versa.

The results and findings of this paper form part of a wider investigation on satisfaction assessment in the construction sector undertaken as a PhD thesis.

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