PRE-SELECTION OF CONSTRUCTION CONSULTANTS BASED ON ATTRIBUTES OF TRUST

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A review of construction consultants' selection identified weaknesses in the process that focused on cost and technical abilities alone. This paper presents a construction consultant pre-selection factor model based on attributes of trust, which attempts to improve consultant selection processes. A review of related literature shows that trust was found to enhance the decision making process. However, there is a knowledge gap in construction management literature as regards what constitute the attributes of trust which can be of benefit to the construction client or its agent in selecting appropriate consultants. In total 37 consultant selection trust attributes thought to potentially influence consultant pre-selection were identified from literature. Based on these attributes, a structured questionnaire survey was designed using a Likert-type scale and administered online to 189 willing construction clients. Survey responses were analysed using principal component analysis. This led to the development of an 8-factor model of consultant pre selection, namely, (1) service quality,(2) collaborative relationships, (3) qualification, (4) organisational trust, (5) personal qualities, (6) ability, (7) experience and (8) respect. The research provides the construction industry clients with a practical 8-factor pre selection model that can be effectively used by the construction clients to improve the consultant selection process.

Keywords: consultant selection, pre-selection, principal component analysis, trust.

INTRODUCTION

Clients in the UK appoint construction professionals to design, manage and control the construction process. The construction professionals according to CIB (1996) must provide 'design, cost, management and other advisory services'. Construction professionals include 'architects, engineers, project managers and surveyors' (Temple 2006). Evidence from a review of related literature shows that clients require improved performance from construction consultants (Bohn, 2004). Project performance can be enhanced by the 'recruitment, selection and training of project personnel… in so far as clients wish to appoint those who can enhance team performance and compatibility', (Rowlinson and McDermott 1999). OGC (2003) concurs, claiming that the quality of these services has a direct impact on the

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remaining 98% of the whole life cost of the construction project. A review of consultant selection methods showed weaknesses in consultant selection systems and that offered this research the opportunity to advance knowledge on improving consultant selection processes. Weaknesses in selection methods could result in clients employing "incompetent consultants which may lead to problems in design, planning, cost control and supervision, which could in turn affect the time, cost, quality and risk levels of a project' (Cooley, 1994). Although lack of trust was not mentioned as an inherent weakness in consultant selection systems, Price *et al.* (2005) identified low levels of trust that can result in problems such as low motivation, commitment and a lack of confidence in the organisation, and have resulted in the 'breakdown of relationships' (McDermott *et al.* 2004). This research aims to synthesis consultant services with attributes of trust to construct a consultant pre-selection factor model. The objective of this paper is to identify selection attributes based on trust and to understand the critical attributes associated with consultant pre-selection. It is anticipated that this study could enhance advance the rigour of the consultant selection process.

LITERATURE REVIEW

Pre-Selection

In selecting a team of construction consultants Leung (1995) found that many public and quasi-governmental clients have adopted a two stage or a 'two-tier' process for evaluating consultants in an attempt to improve the rigour and reliability of consultant selection decisions. The first stage, namely pre-selection can take many forms but the overarching aim, according to Ng and Chow (2004) is to formulate a list of equally suitable and capable consultants upon which invitations for submitting a bid for a consultancy assignment can be founded. Fundamentally this requires carefully identification of selection attributes.

Trust

Clients, according to Sharma and Patterson (1999) are in a vulnerable position which requires them to trust in the competencies and abilities of their consultants. Client vulnerability is a key element of trust in client consultant relationships. Trust can enhance cooperation between parties, improve reputations and provide the basis for the best mutual outcome. Ultimately the best outcomes of project success are achieved when there is 'a true professional relationship of absolute trust between the client and consultant', FIDIC (2003). Sahay (2003) found that trust can be used as a prediction process; therefore a selection method based on attributes of trust could enhance the client's ability to select a trustworthy consultant. Whilst previous research efforts have identified 'trust' as a key element in consultant selection, there still remains a gap in knowledge as regards the attributes of trust which helps the construction client in an objective way to make consultant selection based on trust. This research therefore explores the view that pre-selection based on attributes of trust could enhance consultant selection methods and improve client satisfaction and furthermore identifies salient pre selection attributes based on trust.

Identification of Attributes

By conducting a systematic review of trust and consultant selection, 37 pre-selection attributes based on trust were identified. The attributes and descriptions are presented in Table 1. The attributes were gathered into a quantitative analysis to determine salient pre-selection attributes based on trust.

RESEARCH METHODS

The research method adopted in this study is the questionnaire survey. In total 37 consultant selection attributes based on trust were identified from literature. Based on these attributes, a structured questionnaire was designed using a Likert-type scale in order to evaluate salient pre selection attributes based on trust. A purposive sample of the client population in the UK construction industry was identified in the 'Top 100 UK Construction Industry Clients', (2004 – 2009), as published in Building Magazine. In total 189 clients agreed to take part in the survey. The survey was issued using LimeSurveyTM 1.9. Table 2 identifies the actual number of clients who completed the survey, and the demographic information about the clients surveyed.

The literature review showed that 30-40% of UK construction industry clients are, and historically have been, public sector clients (ONS, 2008). The survey results show that 14% of the clients who participated in this survey were private sector. Table 3 identifies the combined spend of the clients used in this survey represents 60% of the UK construction total spend, 2004-2009, and therefore the sample is representative of UK construction clients.

Data from the client survey was analysed and found that all 37 attributes were considered important in consultant pre-selection. The focus of this paper is on the application and identification of Principal Components of consultant pre-selection.

Attribute	Description
Character	Character is a requirement for trust, the 'can- do', with the 'will-do'.
Benevolence	The extent to which a trustee is believed to want to do good for the trustor.
Acting with integrity	Integrity is the extent to which a trustee is believed to adhere to sound moral and ethical principles.
Honourable	Honour is an attribute of mutual trust, requiring the consultant to protect the rights of the client throughout the construction process
Cooperation	Cooperation requires a willingness to share risks.
Commitment	In terms of a construction project, individuals are expected to commit to the shared goals and values of the project and the teams.
Confidence	Confidence has been identified as a key attribute of trust, as confidence in another's actions/ words.
Effective Communication	Effective communication requires the 'the accurate passing of information'.
Professionalism	Professionalism if the utilisation and quality of knowledge rather than the acquisition of knowledge
Membership of a Professional organisation	Initially trust consultants on the basis of the consultant's membership of a professional institution and its perceived level of trustworthiness.
Expert Knowledge	Clients require construction consultant to have expert knowledge, knowledge which is deemed competent
Education	The attainment of expert knowledge derived from education
Experience	Clients out of necessity require construction consultants to apply their expertise to the successful delivery of a project. This expertise is a culmination of the consultants education, experience and professional training, that furthermore is required to be applied competently
Professional Training	Professionalism has been defined as the attainment of expert knowledge derived from education, experience and professional training
Skills	The ability of a trustee as having specific domain of group of skills
Qualifications – academic Qualification - Professional	Qualification refers to both an academic qualification and a professional qualification and is the crucial threshold in the career progression
Ethically motivated	The degree of trustworthiness and integrity with which companies and individuals conduct their business
Specific Competence	A key area in which competency based trust can be assessed.
Quality of Technical Service	Technical quality (the core service or "what" is delivered).
Quality of Functional Service	Functional quality, is concerned with how" the core or technical service is delivered.
Interpersonal Competence	Interpersonal competence is based on a person's ability to engage with others effectively

Business Sense	Business sense is based on an individual's experience, wisdom, and common sense.
Wisdom	Wisdom is a core attribute of competence based trust
Common Sense	Common sense is
Business Experience	Trust that depends on past experience has been described as 'dispositional trust' and 'trust propensity'.
Reputation	To have a good reputation requires individuals to be accountable and responsible for their actions and to accept and manage the risk and vulnerability of placing another's requirements before their own
Achieving Results	Trust cannot develop unless consistently positive results are produced
Value Added Services	Value added services have derived partly from the increase in client knowledge and expectation and also due to the increase in alternative types of supplier.
Reliability	Professionals must demonstrate high levels of reliability so that the client can transfer risk to the consultant
Predictability	Predictability is a measure of cognitive trust, and is based on assumptions for future behavior
Perceived Capabilities	This requires clients to make an assessment of consultant's capabilities at the selection stage, which results in the achievement of project targets.
Leadership with Organisations	Trust can be enhanced be setting an example in the workplace
Personal Motives of Managers	The personal motives of managers within organisation are one base upon which trust in a manager can be placed
Supportive Leadership	Supportive leadership was indicative of trust in a manager
Emphasizing a collective identity	Emphasizing a collective identity is indicative of trust in the leader and thus the level of trust expected by the client.
Levels of Managerial trust	Levels of trust placed in managers by their employers was found to be significant indicator of levels of trust a client could expect from the organisation.

Table 2 Client survey demographics

Client Sector	Number of clients who completed survey
Central Government	10
Private	14
Local Government	61
Housing	8
Universities	7
Total number of responses	100 (53% response rate)

Table 3 UK Construction Client Total Construction Spend

Client	Total Spend (£M) 2004-2009	Percentage of UK Construction Client by Spend %
Client Sample	131,843.37	60%
Client Population	219,746.81*	100%

APPLICATION OF PCA

Lingard and Rowlinson (2011) define Principal Component Analysis (PCA) as a 'statistical technique which is used to replace a large set of variables by a smaller set of variables which is the best representation of the larger set. The application of Principal Component Analysis was required to reduce the 37 pre selection attributes into few more meaningful principal components. The first step in conducting principal component analysis was to determine the adequacy of the survey data. In relation to sample size for PCA the most common measure of sample size is the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1974). The KMO measure calculates variables by identifying the squared correlation between variables to the squared partial correlation between variables. Kaiser (1974) recommended accepting sampling scores between 0.8 and 0.9 as great. Based on these guidelines the KMO value for the attributes was 0.84 and therefore falls into the range of being good. In addition, the Bartlett's test of sphericity was used to indicate if there is sufficient correlation between the variables to facilitate PCA. Bartlett (1954) suggested that significance should be less than 0.05. The Bartlett test was highly significant (p <.000) for the attributes, therefore indicating that application of PCA was appropriate for this data.

Components Extraction

Following the recommendation of Norusis (2006) on the process of PCA, a correlation matrix for all variables R = {R[Rmm]}, was identified. The extraction of components was done using SPSS version 17 software package. The results of the PCA identified 8 individual components representing 69.998% of variance, each with eigenvalues greater than 1, and satisfied the recommendations of Kaiser (1974). The components were rotated using the orthologonal method of rotation utilising the Varimax solution, which are applied to components that are considered independent. Rotation maximises the loading of each variables on one of the extracted components whilst minimising the loading on all other components. Attributes with loadings greater than 0.45 were identified by the SPSS programme, thus ensuring that component loadings were of sufficient strength.

The process of naming the 8 principal components involved structured interviews with industry experts. Clients were identified from the four UK regions (England, Northern Ireland, Scotland and Wales). Three expert interviews were conducted (England, Northern Ireland and Scotland). A number of unsuccessful attempts were made to secure an interview with a client representative in Wales. Consensual agreement was achieved, between the industry experts, on the naming of the 8 principal components, and is presented in Table 4.

Table 4 Pre selection principal components

Principal Component	Attributes and Component loadings	Base of Trust	% of Total Variance
1 Service Quality	Quality of technical service (0.84), Quality of functional service (0.79), Specific competence (0.79), Skills (0.62), Expert knowledge (0.61), Experience (0.57) and Professionalism (0.47)	Competence	31.79%
2 Collaborative Relationships	Cooperation (0.84), Achieving results (0.72), Commitment (0.68), Effective communication (0.62), Value added service (0.61) and Confidence (0.45).	Mutual and Competence	10.00%
3 Qualifications	Academic qualification (0.84), Professional qualification (0.82), Membership of a professional body (0.75), Professional training (0.69) and Education (0.67).	Competence	7.00%
4 Organisational Trust	Emphasizing a collective identity (0.73), Levels of trust placed in managers by employee's (0.73), Supportive leadership (0.70), Leadership within organisations (0.70) and Personal motives of managers within organisations (0.67).	Affective	5.20%
5 Personal Qualities	Honourable (0.72) and Acting with integrity (0.68)	Mutual	4.73%
6 Ability	Reliability (0.71), perceived capabilities (0.68) and Reputation (0.54)	Cognitive and Competence	4.19%
7 Experience	Business experience (0.73), Wisdom (0.61), Common sense (0.61) and Business sense (0.53)	Competence	4.00%
8 Respect	Benevolence (0.76), Character (0.69) and Ethically motivated (0.57).	Mutual and Competence	3.01%

RESULTS AND DISCUSSION ON THE PRINCIPAL COMPONENT ANALYSIS.

The results of the PCA identified an 8-factor pre-selection model for consultant pre-selection based on attributes of trust. The first principal component is service quality, representing 31.79% of the variance with the pre selection component matrix and represented 4.55% of the variance within the selection matrix component. This research has shown that clients can effectively predict consultants' quality of service through the application of trust in the selection process.

The second principal component was collaborative relationships, representing 9.998% of the variance within the pre selection component matrix. This research has shown that commitment underpins collaborative relationships, thereby enhancing the

relationship and promoting the chances of a successful relationship. Consequently without trust there is no commitment to the relationship. Collaborative relationships require a commitment to sustain long-term cooperation, together with a willingness share risks (Sahay, 2003). Commitment also requires the effective communication between the client and consultant that can increase the effectiveness of the relationship. Furthermore commitment can lead to the development of trust by increasing the certainty of the outcome. This research found that certainty of outcome could be measured as achieving results was essential in the development of trust on client consultant relationships and in turn increases confidence in the consultants' ability to deliver a high quality service.

The third principal component, qualification, represented 6.998% of the total variance within the pre selection component matrix and 10.393% of the total variance within the selection component matrix. Qualification refers to both academic qualification and professional training. Professional qualification is the crucial threshold of construction consultants in order to gain professional recognition and membership of a professional organisation. This research has shown that consultant's qualification should be considered in consultant selection processes, whilst Bohn (2004) further adds that qualification should drive the selection process.

The fourth principal component, organisational trust, represented 5.199% of the total variance within the pre selection components matrix and 6.441% of the total variance within the selection components matrix. Shamir et. al. (1998) research concluded that supportive leadership was indicative of trust in a manager, that the levels of trust placed in managers by their employers was a significant indicator of levels of trust a client could expect from the organisation; while Rogers (1995) concluded that unethical leadership behaviour eroded trust placed in an organisation

The fifth principal component, ethics, represented 4.731% of the total variance within the pre selection components matrix and 3.348% of the total variance within the selection components matrix. Specifically this research found that consultant's character insofar as the consultant is required to be benevolent, and is honourable are indicative of trust in the client consultant relationship.

The sixth principal component, ability, represented 4.185% of the total variance within the pre selection components matrix. This research has shown that selection processed focus on the consultant's professional ability. Furthermore ability is often expressed as credentials and merits of an individual, thus the reputation of the consultant's ability can enhance trust in the client consultant relationship. According to Price et. al. (2005) without a reputation for trustworthiness, possible partners are unlikely to enter into the first steps of a partnership. Furthermore reputation can be obtained by personal experience or by previous experience.

The seventh principal component, experience, represented 3.996% of the total variance within the pre selection components matrix and 4.002% of the total variance within the selection components matrix. This research has shown that fundamentally clients appoint construction consultant for their expert knowledge, knowledge which is deemed competent and can only be derived from education and experience. Successive iterations or experience was identified by Bohn (2004) who adds that experience is essential in providing realising client satisfaction. In addition positive experiences promote positive perceptions and client ability to predict the quality of service delivered by a consultant. The eighth principal component, respect, represented 3.009% of the total variance within the pre selection components matrix.

Respect requires consultants to be benevolent and behave ethically towards the client and supply team members. Character, benevolence and ethically motivated are attributes of mutual trust. Jaggar et. al. (2001) writes that mutual trust is a to requirement for stimulating the transfer of information between organisations in the construction procurement process, which is essential to the success of a construction project.

LIMITATIONS

Whilst the findings of this research are significant this research is not without limitations. The survey responses were predominately local authority clients and did not include other members of the supply chain who may be involved in consultant selection.

CONCLUSIONS

The literature review identified 37 consultant selection attributes based on trust and through the application of a quantitative methodological design using a questionnaire survey and the application of principal component analysis, and has led to the development of an 8-factor model of consultant pre selection and provide the construction client with a tool to aid consultant selection decision making.

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