Analysis of factors that drive brief development in construction

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Abstract

Purpose – The purpose of this paper is to analyse the factors that drive changes to the construction project brief and the background to those factors. The founding argument, that incorporating these changes is paramount for achieving client satisfaction, introduces the concept of dynamic brief development (DBP), which permits changes throughout the project life cycle. The understanding and attitude of the major construction project stakeholders towards DBP are investigated along with identifying the originators of brief development and the value and risk sources.

Design/methodology/approach – A threefold method was used comprising a comprehensive questionnaire survey followed by structured interviews. The results of these were further investigated though a brainstorming session with major construction project stakeholders. A total population of 266,434 units for the survey was identified, reduced to a random stratified sample of 530. The response rate was 49.2 per cent and the responses were analysed using a weighted relative importance index. A total of 88 interviews were carried out and 12 client organisations participated in the brainstorming session.

Findings – The findings lead to the conclusion that there is a need to set out a detailed brief development management system that incorporates both value management and risk management. This system should enable the appropriate project participant to make informed decisions at the right time for the benefit of the client. The system must facilitate feedback to both client organisations and construction professionals to enable lessons to be learned. Understanding the relationship between the factors that drive brief development and the various project team members will facilitate managing brief development in a way that increases client satisfaction and enhances the performance of the project.

Originality/value – The paper identifies deficiencies in current practices and techniques and presents a system which overcomes them.

Keywords Dynamic audit, Construction industry, Customer satisfaction

Paper type Research paper

Introduction

Achieving client satisfaction has been identified as one of the most important challenges facing the construction industry in the 1990s (Torbica and Stroh, 2001), with Latham (1994) emphasising achieving client need and Egan (1998) focusing on the customer as a driver for enhancing performance. Clients are likely to be satisfied when the final product matches or exceeds their expectations (Ahmed and Kangari, 1995; Hudson, 1999). The need to achieve client satisfaction coupled with the dynamic, changing and fragmented environment of the construction industry (Bowen and Edwards, 1996; Kamara, 1999) results in the need to investigate the factors that drive the development of the brief. The research work presented in this paper aims to:

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(1) Investigate the brief developing drivers listed in Table I, determining their relative importance and establishing the correlation between them. This investigation intends to direct the attention and raise the awareness of clients' organisations and construction professionals to the most influential drivers of brief development.

(2) Investigate the understanding of design firms, constructors and funding bodies of the concept of brief development and identify the different techniques adopted to manage it.

(3) Establish the relationship between the brief developing drivers and the project team members in order to identify the originators of brief development and the value and the risk sources to the project brief from the client's point of view.

This paper presents the empirical findings from an unusually large sample and high participation rate that measures the behaviour of factors that drive changes which have hitherto only been partially or intuitively identified. Privileged access was available to the total population of construction project data within a single city

No.	Brief developing drivers
1	Unclear and incomplete project brief
2	Improper feasibility studies
3	Inappropriate communication between the client and the designer
4	Lack of understanding of the client organisations
5	Stakeholders change project requirements and have second thoughts at later stages
6	Initiating value engineering changes
7	Project users are not involved in the briefing process
8	Project users appear at later stages
9	Users exaggerate their needs
10	Lack of understanding different users' culture and traditions
11	Designers ignore the client role and behave unilaterally
12	Uncoordinated and incorrect construction documents
13	Brief information is still being given during later design and construction stages
14	Lack of design experience
15	Lack of presentation and visualisation of design
16	Lack of regulatory up-dating
17	Lack of functional, aesthetic, safety requirements and constructability
18	Whole project life not considered
19	Lack of consideration of environmental requirements
20	Inadequate available design time
21	Restricted design fees
22	Unforeseen conditions
23	Changing government regulation and codes
24	Lack of information provision
25	Lack of communication and co-ordination between government authorities and design firms over planning and approvals
26	Meeting new technology changes
27	Responding to market demand
28	Upgrade project facilities
29	Materials are no longer available in market and use better substitute materials
30	Eliminate proven poor quality materials and equipment

Table I.
List of brief developing drivers

(Abu Dhabi, United Arab Emirates) but as the quantity of data was too large for analysis, a rigorous method of sampling was applied. The objective of the sampling methods used was to represent the total population as closely as possible and give authority to the findings.

Methodology

Survey questionnaire, relative importance index and bivariate analysis were used to achieve aim (1), where structured interviews and a brainstorming session were used to achieve aims (2) and (3), respectively.

Data sampling

The sampling plan using a random probability sampling method was applied across all population categories so every unit had an equal chance of being included in the sample (Hannagan, 1986; De Vaus, 1990). This selected a representative and non-biased sample that was used to serve three different, but complementary, objectives. Firstly, to identify the questionnaire respondents' sample, then from the questionnaire responses, the second stage identified the parties who most influenced the brief development for interview. Finally, the client organisations that responded to the survey questionnaire were selected to attend a brainstorming session.

Questionnaire survey sample

The total population of 266,434 units was classified into seven different strata including client organisations, end-users, design firms, constructors, suppliers, government authorities and funding bodies. Stratified random sampling was adopted to ensure that the resulting sample would be distributed in the same way as the population in terms of the stratifying criteria (Bernard, 2000; Bryman, 2001). The units of the stratified random sample were chosen from a list of client organisations (DSSCB, 2000), the yellow pages directory (ETC, 2001) and the chamber of commerce and industry directory (ADCCI, 2000) using a sampling factor of 1:20 applied to each stratum resulting in the numbers shown in Table II. In order to select a more reasonable sample for end-users and government authorities, a sampling factor of 1:2000 was used for end-users sample to produce 131 units and 1:1 for government authorities, which means that all seven government authorities were chosen (Barnett, 1991). Table III shows a sample size of 329 with the total stratified sample of 530 units used for the questionnaire survey shown in Table IV. The sample size suits the population taking into account a 95 per cent confidence interval and 4.25 sampling error (De Vaus, 1990).

Stratum	No. of units	Stratum type	Sampling factor	Stratified sample
Client	1,390	Individual	1:20	69.5
End-user	261,298	Individual	1:20	13064.9
Design firm	175	Organisation	1:20	8.75
Constructor	315	Organisation	1:20	15.75
Suppliers	147	Organisation	1:20	7.35
Government authority	7	Organisation	1:20	0.35
Funding body	45	Organisation	1:20	2.25

Table II. Initial stratified sample size

Interview sample

The questionnaire responses showed the parties that most influenced brief development were client organisations, design firms, constructors and funding bodies. As client organisations were to participate in a brainstorming session, interrogation of the other three parties would be through interview. A total of 88 interviews were conducted with the interviewees all being either managers of design firms, heads of architectural, civil, structural, electrical and mechanical sections, managers of construction companies, senior project managers or heads of engineering sections in funding bodies.

Likert scale

It would have been possible to make a long list of relevant questions, particularly when asking about attitudes and opinions. To contain the length of the list, scaling methods were used as an alternative to asking questions, by utilising simultaneously a number of observations on each respondent (Hannagan, 1986). The Likert scale of 1 to 5 was employed to measure respondents' attitudes to the questions. Although there are many forms of scaling, the Likert scale was adopted because it is commonly used (Bernard, 2000), simple to construct, permits the use of latent attitudes and it is likely to produce a highly reliable scale (Baker, 1997).

Data analysis

A three-stage approach was adopted for the data analysis. The first stage was simply to measure the central tendency and dispersion of the questionnaire and interview responses. The measure of central tendency was used to get an overview of the typical value for each variable by calculating the mean, median and mode. The measure of dispersion was used to assess the homogenous or heterogeneous nature of the collected data by calculating the variance and the standard deviation (Bernard, 2000). Secondly, since not all-brief developing drivers have the same influence on brief development, a

Table III.
The average numbers of employees in construction and engineering departments

Category	Design firms	Constructor	Suppliers	Government authority	Funding body
Average no. of employees	6	6	3	20	9
No. of organisations	9	16	7	7	2
Sample size	54	96	21	140	18

Table IV.
The numbers of planned and returned questionnaires with their response rates

Surveyed category	Questionnaire planned	Questionnaire returned	Response rate (%)
Client organisation	70	38	54.28
End users	131	85	64.88
Design firms	54	35	64.81
Constructor	96	48	50
Suppliers	21	14	66.67
Government authorities	140	71	50.71
Funding body	18	8	44.44
Total	530	261	49.25

relative importance index was used to differentiate between drivers (Olomolaiye *et al.*, 1987; Shash, 1993). In order to investigate the correlation between the brief developing drivers, the third stage established the linear relationship between the drivers using bivariate analysis. The data were analysed with the aid of Microsoft Excel spreadsheet and the Statistical Package for Social Sciences (SPSS) computer software (Kirkpatrick and Feeney, 2001). Analysis of the collected data showed close values of means, medians and modes, indicated typical central values and showed also low values of variance and standard deviation. This confirmed the quality and the homogeneity of the collected data as well as a low degree of dispersion resulting in reliable findings.

Questionnaire survey responses

The response rate was 49.2 per cent and is illustrated in Table IV. The questionnaire was aimed to quantify the brief developing drivers in order identify the most influential ones. The questionnaire was designed to be answered by:

- client organisations;
- end-users;
- design firms;
- constructors;
- suppliers;
- government authorities; and
- funding bodies; and
- consisted of three sections.

Firstly, general information on the respondent, e.g. organisation name and address, contact phone number, contact fax number, the respondent designation, and the organisation e-mail address. Secondly, the investigation of the respondents' perception of the brief development concept. Finally, to quantify the 30 brief developing drivers. The questions asked and the analysis of the responses are discussed in the following sections.

The probability of brief development occurring during construction

All respondents claimed brief development occurs during the construction process as a result of change orders. Brief development which occurs within the control of client organisations and construction professionals was rated 4.82 out of 5 with median of 4.5, mode of 5, variance of 0.355 and standard deviation (SD) of 0.596. Brief development that occurs outside the control of client organisations and construction professionals was rated 2.3 out of 5 with median of 2, mode of 2, variance of 1.137 and SD of 1.067. These figures show that brief development occurs and is mostly within the control of client organisations and construction professionals. This reinforces the need argued by Othman *et al.* (2004) to adopt a dynamic brief development concept.

The stages where brief development takes place

The calculations of the measures of central tendency and dispersion are shown in Table V. The rate of development reduces as the project information becomes clearer and more concrete. The results also show that the rate of brief development increases again during construction. This could be attributed to drivers such as:

Table V.
The stages of brief development against their measures of central tendency and dispersion

Brief developing stage (1)	Mean (2)	Median (3)	Mode (4)	Variance (5)	Standard deviation (6)
Appraisal	4.09	4	4	1.012	1.006
Strategic briefing	4.05	4	4	1.004	1.002
Outline proposals	3.92	4	4	1.01	1.005
Detailed proposals	3.87	4	4	1.027	1.013
Final proposals	3.25	3	3	1.0393	1.045
Production information	3.13	3	3	1.027	1.013
Tender documentation	2.19	2	3	1.053	1.026
Tender action	2	2	2	1	1
Mobilisation	1.69	2	2	1.144	1.07
Construction to practical completion	3.6	4	3	1.243	1.115
After practical completion	2.39	2	2	1.225	1.107

- stakeholders changing the project requirements and having second thought at later stages;
- uncoordinated and incorrect construction documents;
- brief information is still being given during later design and construction stages;
- lack of consideration of environmental requirements; and
- unforeseen conditions.

This emphasises the importance of evaluating and managing the brief development throughout the project life cycle (Othman *et al.*, 2004).

The parties responsible for brief development

Analysis of the questionnaire responses illustrated in Table VI shows client organisations are the party perceived to have the most influence on brief development. The roles of the most influential parties need to be understood and managed for the achievement of the project objectives. For example, clients have to provide the architect with all the information required to achieve their requirements; design firms should not ignore the role of the client and behave unilaterally, they should devote effort to enable clients, particularly naive ones, to understand project design; project users should be engaged in the briefing process. Understanding the role of each party will facilitate managing brief development, eliminate project contradictions, managing change orders and contribute to client satisfaction.

Table VI.
Brief developing parties against their measures of central tendency and dispersion

Brief developing party (1)	Mean (2)	Median (3)	Mode (4)	Variance (5)	Standard deviation (6)
Client organisations	4.44	4.00	5	1.296	1.139
End users	2.91	3.00	3	1.013	1.006
Design firms	3.47	4.00	3	1.419	1.191
Constructors	3.12	3	3	1.023	1.011
Suppliers	2.97	3	3	1.002	1.001
Government authorities	2.93	3	2	1.008	1.004
Funding bodies	3.19	3	3	1.005	1.027

The impact of brief development on project cost, duration, quality, value and risk

Brief development has varying impacts on project cost, time, quality, value and risk. The responses (see Table VII), show that brief development has a high impact on cost, time and risk, largely because of reworking construction documents and the implementation of additional work. These, coupled with the effect of development in one discipline on other disciplines as well as the consequences of unexpected events, are risks that may lead to project failure and client dissatisfaction. On the other hand, brief development could escalate the project quality and add value through upgrading project facilities, eliminating poor quality materials and equipment as well as responding to market demand.

Relative importance of brief developing drivers

The numerical scores from the questionnaire responses provided an indication of the varying degree of influence that each driver has on developing the project brief. To further investigate the data, a relative importance index (RII) was used to rank the drivers according to their influences (Olomolaiye *et al.*, 1987; Shash, 1993). This was calculated using the following formula:

$$\text{Relative importance index (RII)} = \frac{\sum w}{AN}$$

Where w = weighting given to each driver by the respondents and range from 1 to 5 where 1 = very low influence and 5 = very high influence; A = highest weight (five in our case); and N = total number of sample (Kometa and Olomolaiye, 1997). The RII ranges from zero to one. As would be expected, while some drivers have very high influence on brief development, others do not. Table VIII provides a full list of the RIIs and ranking of drivers. The numbers in brackets in the "rank" column represents the sequential ranking, as some drivers have similar RIIs as in the case of the first two drivers.

Inspection of the results showed that the brief developing drivers could be classified into three categories (see Figure 1). Firstly, the drivers with very high influence with RII above 0.800. This includes:

- stakeholders change project requirements and have second thoughts at later stages;
- uncoordinated and incorrect construction documents;
- brief information is still being given during later design and construction stages;

Brief development impacts (1)	Mean (2)	Median (3)	Mode (4)	Variance (5)	Standard deviation (6)
Increase project cost	4.2	4	5.00	1.06	1.03
Decrease project cost	2.77	3	3.00	1.08	1.038
Increase project duration	4.26	4	5.00	1.10	1.05
Decrease project duration	3.89	3	4.00	1.02	1.009
Increase project quality	4.31	4	5.00	1.15	1.071
Decrease project quality	2.93	3	3.00	1.07	1.004
Add project value	4.06	4	5.00	1.01	1.003
Reduce project value	2.87	3	2.00	1.03	1.013
Increase project risk	4.21	4	5.00	1.07	1.033
Decrease project risk	2.68	3	2.00	1.16	1.075

Table VII.
The implications of brief development against their measures of central tendency and dispersion

Brief developing drivers (1)	Percentage of respondents scoring <3 (2)	3-4 (3)	>4 (4)	Relative importance index (7)	Rank (8)
Stakeholders change project requirements and have second thoughts at later stages	0.00	0.00	100	1.000	1 (1)
Uncoordinated and incorrect construction documents	0.00	0.00	100	1.000	1 (2)
Brief information is still being given during later design and construction stages	0.00	9.20	90.80	0.982	2 (3)
Materials are no longer available in market and use better substitute materials	0.00	15.71	84.29	0.969	3 (4)
Lack of information provision	0.00	19.16	80.84	0.962	4 (5)
Meeting new technology changes	0.00	20.69	79.31	0.959	5 (6)
Lack of regulatory up-dating	0.00	24.14	75.86	0.952	6 (7)
Project users are not involved in the briefing process	0.00	27.59	72.41	0.945	7 (8)
Unforeseen conditions	0.00	27.59	72.41	0.945	7 (9)
Lack of understanding of different users' culture and traditions	0.00	47.51	52.49	0.865	8 (10)
Eliminate proven poor quality materials and equipment	0.00	51.34	48.66	0.863	9 (11)
Lack of design experience	0.00	48.66	51.34	0.857	10 (12)
Changing government regulation and codes	0.00	52.49	47.51	0.857	10 (13)
Responding to market demand	0.00	49.04	50.96	0.856	11 (14)
Improper feasibility studies	0.00	55.94	44.06	0.844	12 (15)
Restricted design fees	0.00	52.87	47.13	0.831	13 (16)
Lack of understanding of the client organisations	0.00	81.61	18.39	0.810	14 (17)
Inappropriate communication between the client and the designer	0.00	62.45	37.55	0.803	15 (18)
Unclear and incomplete project brief	0.00	86.59	13.41	0.775	16 (19)
Designers ignore the client role and behave unilaterally	0.00	81.23	18.77	0.771	17 (20)
Lack of communication and co-ordination between government authorities and design firms over planning and approvals	0.00	89.66	10.34	0.745	18 (21)
Lack of presentation and visualisation of design	12.26	87.74	0.00	0.697	19 (22)
Users exaggerate their needs	15.71	84.29	0.00	0.689	20 (23)
Upgrade project facilities	18.01	81.99	0.00	0.672	21 (24)
Project users appear at later stages	24.14	75.86	0.00	0.648	22 (25)
Inadequate available design time	28.35	71.65	0.00	0.623	23 (26)
Lack of functional, aesthetic safety requirements and constructability	13.41	86.59	0.00	0.615	24 (27)
Lack of consideration of environmental requirements	41.38	58.62	0.00	0.500	25 (28)
Whole project life not considered	46.36	53.64	0.00	0.474	26 (29)
Initiating value engineering changes	66.28	33.72	0.00	0.467	27 (30)

Table VIII.
Brief developing drivers with their relative importance indices and ranking

- materials are no longer available in the market or better substitute materials are identified;
- lack of information provision;
- meeting new technology changes;
- lack of regulatory up-dating;
- project users are not involved in the briefing process;

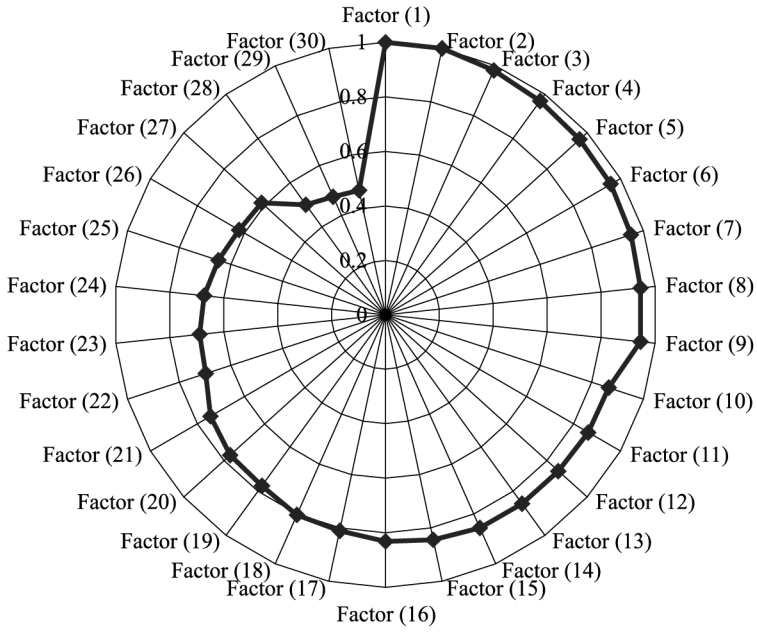

Figure 1.
Ranking and relative importance index of the brief developing drivers

- unforeseen conditions;
- lack of understanding different users' culture and traditions;
- eliminate proven poor quality materials and equipment;
- lack of design experience;
- changing government regulation and codes;
- responding to market demand;
- improper feasibility studies;
- restricted design fees;
- lack of understanding of the client organisations; and
- inappropriate communication between the client and the designer.

Secondly, the drivers with average to high influence, with RIIs lying between 0.600 and 0.800. This includes:

- unclear and incomplete project brief;
- designers ignore the client role and behave unilaterally;
- lack of communication and co-ordination between government authorities and design firms over planning and approvals;
- lack of presentation and visualisation of design;
- users exaggerate their needs;
- upgrade project facilities;
- project users appear at later stages;

- inadequate available design time; and
- lack of functional, aesthetic, safety requirements and constructability.

Finally, the drivers with very low to low influence with RIIs less than 0.600. This includes:

- lack of consideration of environmental requirements;
- whole project life not considered; and
- initiating value engineering changes.

Bivariate analysis of brief developing drivers

To investigate the correlation between the brief developing drivers, bivariate analysis was carried out to establish any linear relationship using the most common measure of correlation, Pearson's r (Clarke and Cooke, 1992). Bivariate analysis is used to reveal the relationship between two variables and to what extent the variation in one variable coincides with the variation in another variable. Bivariate analysis with the aid of SPSS computer software was used to generate the correlation matrix, an extract of which is shown in Table IX. The chief feature of using Pearson's r is that the correlation coefficient will almost certainly lie between 0 (no relationship between the two drivers) and 1 (a perfect relationship). The closer the coefficient is to 1, the stronger the relationship, the closer it is to zero, the weaker the relationship.

The coefficient will be either positive or negative, this indicates the direction of a relationship (Bryman, 2001). For example, the scatter diagram presented in Figure 2 shows a perfect positive relationship, with a Pearson's r correlation of +1. This means that, as the lack of understanding of different users' culture and traditions increase, the lack of design experience increases by the same amount. In other words the different user's culture and traditions will only be fully perceived and reflected in design if the designer is experienced and possess the art of questioning, extracting and analysing information from the user.

The scatter diagram presented in Figure 3 shows a perfect negative relationship with a Pearson's r correlation of −1. This means that, as project users exaggerate their needs in an effort to enhance the facility function and performance, the initiation of value engineering changes will reduce.

Finally, Figure 4 shows that there is no correlation between the 15th and 20th ranked drivers as the correlation is close to zero and there is no apparent pattern in the scatter diagram. This means that the variation in each driver is associated with drivers

Table IX.
The numbers of planned and held interviews with their response rates

Surveyed category	Interviews planned	Interviews held	Response rate (%)
Design firms' managers	9	6	66.67
Head of architectural, structural, civil, mechanical and electrical sections	45	21	46.67
Construction companies' managers	16	8	50
Senior project managers	16	10	62.5
Head of engineering section in design firms	2	2	100
Total	88	47	53.41

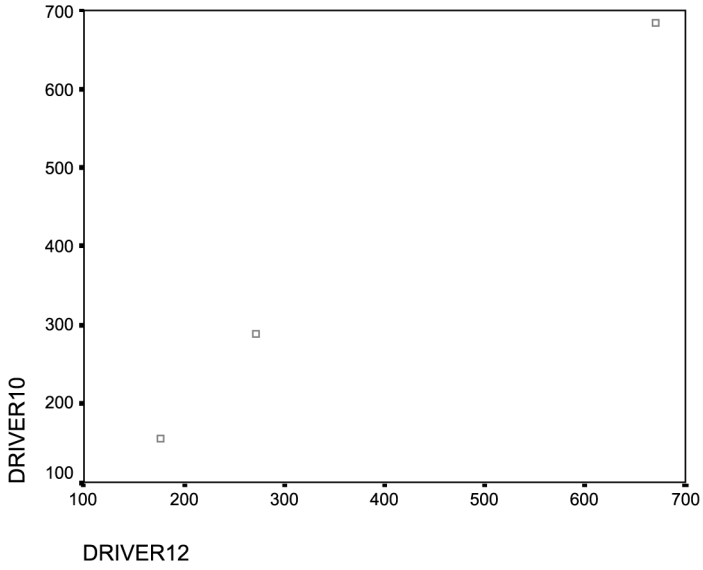

Figure 2.
Scatter diagram showing a perfect positive relationship between driver 10 and driver 12

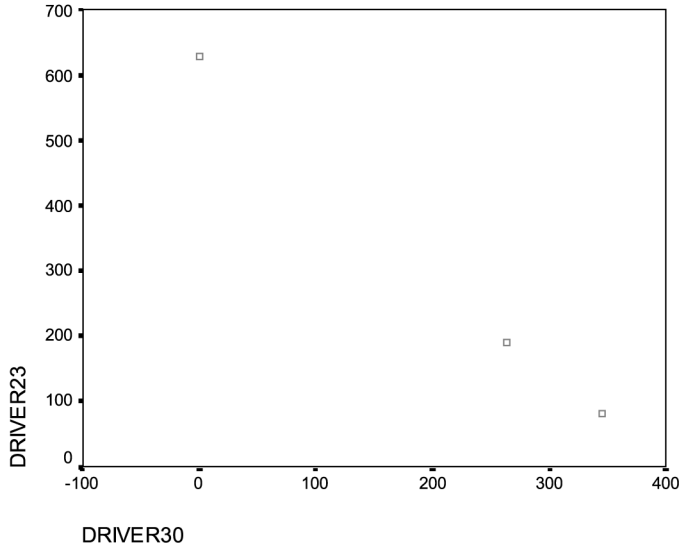

Figure 3.
Scatter diagram showing a perfect negative relationship between driver 23 and driver 30

other than the ones present in this analysis (Bryman, 2001) for instance driver 15 is associated with drivers 20, 29 and 28 and driver 20 is related to drivers 27 and 21. Therefore understanding the correlation between the brief developing drivers will help client organisations achieve their emerging requirements, meet user needs, cope with regulation changes, exploit business opportunities, adapt to technology improvement, add value and manage associated risks.

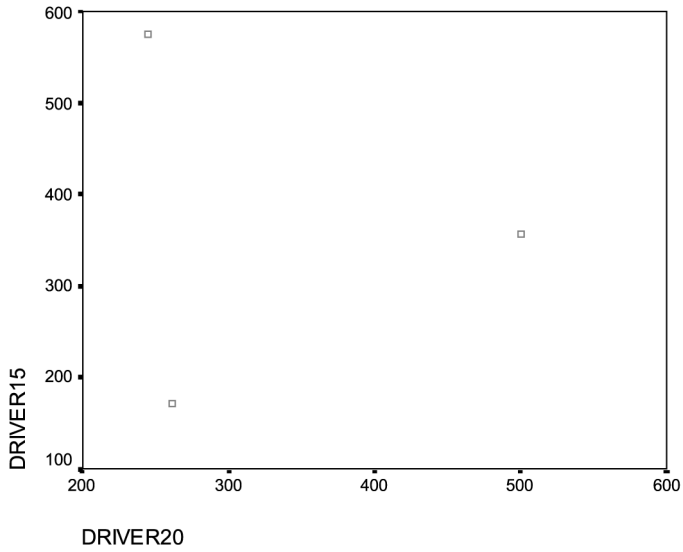

Figure 4.
Scatter diagram showing no relationship between driver 15 and driver 20

Interviews with managers

The interview sample is illustrated in Table IX. The interview was designed to investigate the understanding of design firms, constructors and funding bodies of the brief development concept advocated by Othman *et al.* (2004), and to identify the different techniques adopted to that development and is summarised in the following sections.

The implications of brief development on the interviewed organisations

The responses showed that 92.2 per cent of the interviewees felt that brief development helps achieve the clients' and end-users' satisfaction and enhances project performance. On the other hand it increases the rework of project documents, increases organisation supervision duties, disturbs the overall work schedule and could be considered as a source of disputes. A total of 94.15 per cent of the interviewees mentioned that brief development could add value, rectify brief errors and missing data and eliminate associated risks but at the same time could increase organisation overhead and reduce employee/labour productivity. Finally, 47 per cent of the interviewees agreed that developing the brief could reduce profitability. Therefore, brief development has positive and negative impacts on both the project and interviewed organisation. If positive impacts are to be exploited and negative ones managed and reduced, a brief developing management system capable of responding in ways that add value and eliminate associated risk is important if client satisfaction is to be achieved.

The support of brief development once the construction commences

When asked if they supported brief development once construction had started, 38.30 per cent of the interviewees said never, 31.91 per cent said rarely and 29.79 per cent sometimes. Their reluctance to support this could be attributed to negative impacts occurring with brief development at later stages, although some recognise there may

be benefits. Design firms, constructors and funding bodies need to adopt a more flexible approach to brief development based on a better understanding of the benefits and drawbacks associated with the changes.

The methods used to facilitate the visualisation of brief development by clients, end users and construction professionals

Site visits, meeting with the parties concerned, photos of completed projects, using CAD drawings and feasibility studies were always used methods for visualising brief development, animated walk through methods were sometimes used whilst overhead projector presentations, samples and models were rarely used.

The parties that participate in managing brief development

Client organisations, design firms, constructors and funding bodies participated most in managing brief development. End users and government authorities participated less and suppliers least. Understanding the role each party plays in the construction process will facilitate the management of brief development. Participation of end users, government authorities and suppliers should be increased since they often initiate brief development.

The techniques used to follow up brief development during the construction process

Following up brief development during the construction process allows client organisations and construction professionals to identify its nature, stage, driver, implications and the parties responsible. Additionally, decisions made, lessons learned and feedback play a vital role in improving the design and construction of future projects. Of the techniques that were used to follow up brief development, regular co-ordination meetings and the party who initiates developments informing other related parties, were the most used techniques. Checklists to verify the compatibility of various components in the project were used less.

The different steps followed by the interviewed organisations to manage brief development

All interviewees agreed that if the brief development was requested by government authorities and funding bodies because of regulation changes or to meet building codes and requirements these changes had to be made. A total of 53 per cent stated they made changes requested by the client or end user in order to secure the project or agree with the client even if they did not improve project performance. In addition, they pointed out that the client would pay compensation for documentation rework. The remaining 47 per cent stated if the client or end user requested changes the designer met with the concerned parties to study the feasibility of the change and its effect on other disciplines. The cost of development was determined from practical experience and the feasibility study. The client organisation then either arranged for additional funds or modified the project design or specifications in order to cover that cost.

A total of 60 per cent felt brief development was often undertaken due to new information, unforeseen conditions, lack of materials production, rectification of design errors, or generation of new ideas without getting prior consent of the client organisation.

All interviewees mentioned that no particular attention had been paid to the value of brief development or the extent it could enhance project performance. This was because the designer was compensated for re-work and the contractor could claim for extension of time as a result. No clear steps or procedures were established in advance that could help client organisations and construction professionals decide to/not to accept the requested development for the benefit of the project. It is important therefore that design firms play their role as client advisors and should not ignore the role of the client in brief development. Design firms should understand that achieving client satisfaction does not, necessarily, entail developing the project brief without adequate evaluation of its value and risks. The need for a system to help project participants decide to/not to embark brief development based on costs and benefits is clear.

The techniques adopted by the interviewed organisations for managing brief development

None of the interviewees claimed to use value and/or risk management in managing brief development. The principal use for information management and information technology was for organising and updating project files. CAD programmes and word processing software were used in producing and modifying construction documentation. The techniques used to manage brief development depended on calculating the cost of omission or addition, their implications on other disciplines and to what extent the client could bear the cost of development. In many cases the project design is changed or the specification reduced in order to cover the costs. The techniques adopted to mange brief development were not deep enough to consider the value of development, the associated risk or the extent brief development could enhance project performance.

The role of correct, reliable, and up-to-date information in managing brief development

Of the interview responses, 93.1 per cent believed correct, reliable and up to date information plays a vital role in achieving client and end user satisfaction, reaching prudent decisions, reducing change orders on future projects and co-ordinating with other disciplines. A total of 63.82 per cent agreed that such information helps improve project quality, adds value and avoids associated risk. Finally, 33.34 per cent mentioned that correct, reliable and up to date information could minimise the project cost and reduce the project duration. This means that in order to ensure the adequacy of the brief development decision, the parties who are responsible for brief development should rely on facts and events collected from correct, reliable and up-to-date information rather than subjective interpretations.

Information sources used in managing brief development

Client organisations, design firms, constructor, government regulations, funding body, previous projects, building standards and codes, business requirements and market demand, and central project databases were the information sources most used to manage brief development. End users' requirements and suppliers were least used. Utilising a wide range of information sources will help client organisations and construction professionals make prudent decisions. The role of end users and suppliers as sources of information has to be increased since many of the brief developing

drivers are derived from end user requirements and the provision of materials and equipment by suppliers.

Reflections of feedback on the briefing process for new projects

A total of 63.82 per cent of interviewees felt that feedback plays an effective role in enhancing the design and construction as well as reducing change orders on future projects. Reflecting on the briefing process to provide feedback could help achieve client objectives and end user needs, improve project performance in terms of cost, time, and quality, add value, avoid associated risk, and help to produce accurate, co-ordinated construction documents. A total of 21.28 per cent felt lessons were not learned and mistakes repeated. Feedback from project clients, end users and facilities management teams would enable design firms and construction professionals overcome repetition of problems and make use of decisions made and corrective action taken to reduce the effect of change orders in new projects.

Analysis of the brainstorming session

The brainstorming session investigated the relationship between the brief developing drivers and the project team members in order to identify the originators of brief development and the value and risk sources from the client's point of view. Out of 38 invitations issued, a total of 12 client organisations agreed to attend the session and the results were analysed in a matrix summarised in Table X.

The session used the following definitions:

- Brief developing originator: the person or authority that begins, initiates or is the cause of brief development either by modification, omission or addition to the brief document contents (*Webster's Dictionary*, 2000).
- Value: a measure expressed in currency, effort, exchange or on a comparative scale, which reflects the desire to obtain or retain an item, service or idea (Kelly and Males, 1993). Thiry (1997) states that value is a very subjective concept with different meanings for different people. A consumer may regard it as the "best buy", a manufacturer may consider it as "the lowest cost", and the designer may view it as the "highest functionality". Value can be considered as the ratio of function achieved to its life cycle cost, i.e. Value = Function/Cost (LCC) (ICE, 1996). Hence, the value source to the client may be defined as the person or authority that can improve the function of the project at no extra cost or by maintaining the function and removing unnecessary cost in a way that achieves client requirements and enhances the performance of the project.
- Risk: a variety of unexpected events that may occur during the process of building procurement, often causing losses to the client or other interested parties (Shen, 1999). The outcome may be better or worse than expected, known as upside and downside risks (Raftery, 1994). Therefore, the risk source for the client may be defined as the person, authority or event that either threatens the achievement of the client objectives or provides an opportunity to improve the project performance.

Analysis of the matrix and feedback from the discussion in the brainstorming session showed that client organisations are the key originators of brief development. Project clients are dissatisfied with design firms' performance as client advisors. Clients view

Table X.
Originators of brief development, value sources and risk sources to the project from the client's point of view

No.	Brief development drivers	Development originator							Project team members Value source to client							Risk source to client						
		CO	EU	DF	C	S	GA	FB	CO	EU	DF	C	S	GA	FB	CO	EU	DF	C	S	GA	FB
1	Stakeholders change project requirements and have second thoughts at later stages	X	X	X	X	X	X	X	X	X												
2	Uncoordinated and incorrect construction documents			X							X	X	X	X	X	X	X	X	X	X	X	X
3	Brief information is still being given during later design and construction stages	X	X	X	X	X	X	X	X	X							X	X	X	X	X	X
4	Materials are no longer available in market and use better substitute materials	X		X		X					X	X	X	X	X	X	X	X	X	X	X	X
5	Lack of information provision	X	X	X	X	X	X	X					X					X	X	X	X	X
6	Meeting new technology changes	X	X			X	X									X	X	X	X	X	X	X
7	Lack of regulatory up-dating			X			X											X	X	X		X
8	Project users are not involved in the briefing process	X		X												X	X	X				
9	Unforeseen conditions															X	X	X	X	X	X	X
10	Lack of understanding of different users' culture and tradition		X	X													X	X				
11	Eliminate proven poor quality materials and equipment	X	X			X	X			X			X	X				X	X	X		
12	Lack of design experience			X												X	X	X	X	X	X	X
13	Changing government regulation and codes						X										X	X	X	X	X	
14	Responding to market demand	X	X							X								X	X	X		X
15	Improper feasibility studies			X														X				X
16	Restricted design fees	X					X										X	X	X	X	X	X
17	Lack of understanding of the client organisations	X		X												X		X				
18	Inappropriate communication between the client and the designer	X		X												X		X				
19	Unclear and incomplete project brief	X	X	X												X	X	X				
20	Designers ignore the client role and behave unilaterally			X														X				
21	Lack of communication and co-ordination between government authorities and design firms over planning and approvals			X			X											X			X	
22	Lack of presentation and visualisation of design			X													X	X	X	X		X
23	Users exaggerate their needs		X							X							X	X	X	X		
24	Upgrade project facilities	X	X						X	X							X	X	X	X		
25	Project users appear at later stages		X							X							X	X	X	X		
26	Inadequate available design time	X		X													X	X	X	X	X	X
27	Lack of functional, aesthetic safety requirements and constructability			X													X	X	X	X	X	
28	Lack of consideration of environmental requirements	X	X	X	X		X										X	X	X		X	
29	Whole project life not considered	X		X													X	X	X	X		X
30	Initiating value engineering changes																					

Note: CO = Client organisation; EU = End user; DF = Design firm; C = Constructor; S = Supplier; GA = Govern. authority; FB = Funding body

design firms as originators of brief development and risk sources because they may produce uncoordinated and incorrect construction documents, specify building materials or technologies that are either not produced anymore or outdated. Design firms may also ignore the role of the client and behave unilaterally. All these can hinder the construction process due to contradictions between the construction documents, time delay due to selecting and importing substitute materials and modern technologies as well as future changes as a consequence of implementing decisions which do not reflect the client's point of view. In addition, the matrix showed that some parties could be deemed as value and risk sources at the same time. For example, material suppliers could advise other project team members on the quality of specified materials and equipment as they are closer to manufacturers. Value can be associated with the risk of finding suitable materials or equipment which are commensurate with the project budget, time of delivery and matches with project design. Furthermore, analysis of the matrix showed that there is no relationship between project team members and the brief developing driver of initiating value engineering changes, although this is principally because value engineering and value management techniques are not used in managing brief development in the surveyed city and may not be representative of the industry generally.

Findings and conclusions

The principal findings of this paper hinge on the importance of achieving client satisfaction. To this end the factors that drive the development of the project brief identified through literature review and analysis of 36 case studies (Othman *et al.*, 2004) were examined in more depth through 261 survey questionnaires, 47 structured interviews and a brainstorming session with 12 clients. The main findings drawn from the data collected and analysed are:

- Questionnaire responses showed there was a need to continue developing the project brief throughout the project life cycle.
- This dynamic brief development should concentrate on achieving client satisfaction, responding in an innovative manner to the different brief developing drivers and managing project change orders.
- In addition, there is a need to identify specific points through project life cycle (milestones) where the brief development activities undertaken can be evaluated and performance feedback undertaken.
- The interview responses confirmed there was no widely used technique for managing the brief development and that little attention is paid to identifying the value and/or risk of brief development activities or the extent to which they can enhance the project performance.
- The brainstorming session revealed clients dissatisfaction with current project processes and the way project team members executed their roles in terms of originating development of the brief, generating value and managing risk.

The findings lead to the conclusion that there is a need to set out a detailed brief development management system that incorporates both value management and risk management. This system should enable the appropriate project participant make informed decisions at the right time for the benefit of the client. The system must

facilitate feedback to both client organisations and construction professionals to enable lessons to be learned in order to improve the briefing process for future projects. Understanding the relationship between the factors that drive brief development and the various project team members will facilitate managing brief development in a way that increases client satisfaction and enhances the performance of the project.

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