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Making client values explicit in value management workshops

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Value management is a project-focused process that makes explicit and appraises the functional benefits of a product, process or service consistent with a value system determined by the client. The value system of the client necessarily requires a method for value setting using harder performance variables than the commonly described facets of time, cost and quality. Current value theory is critically appraised in the context of current value management practice. The research proposition is that the constituent parts of time, cost and quality can be made overt enabling a client to express satisfaction in terms of a finite number of variables enabling the explicit statement of client value within a value management workshop. An action research study into the discovery of the component parts of the client's value system at the early stages of construction projects concludes that the variables are the nine non-correlated, high order, discretionary performance variables of capital expenditure, operational expenditure, time, esteem, environment, exchange, politics/community, flexibility and comfort.

Keywords: Value management, client, function analysis, quality, value

Introduction

Value management is the name given to a process in which the functional benefits of a project are made explicit and appraised consistent with a value system determined by the client (Kelly *et al.*, 2004). In the context of this definition a project is 'a temporary activity with defined goals and resources of its own, delimited from but highly dependent upon the regular activity' (Borjeson, 1976). Morris and Hough (1987) define a project as 'an undertaking to achieve a specified objective, defined usually in terms of technical performance, budget and schedule'. In summary and from a value management perspective a project is an investment by an organization on a temporary activity to achieve a core business objective within a programmed time that returns added value to the business activity of the organization. For the purpose of this research the 'client' is the unitary or multifaceted specifier of construction activity and employer of resources, sponsoring the project in parallel to the core business activity. It is the client whose requirements are to be satisfied and whose core business will be enhanced through the undertaking of the project. It is proposed that value is achieved when client satisfaction exceeds the resources invested. The research aim is to determine whether the constituent parts of time, cost and quality can be made overt enabling a client to express satisfaction in terms of a finite number of variables enabling the explicit statement of client value within a value management workshop at the early stages of a construction project.

Value in the context of value management

Value management as a structured methodology began within the manufacturing industry of the USA in 1947. At that time it was referred to as value analysis. In 1954 the technique was adopted by the US Department of Defense and renamed value engineering. In 1959 the formation of the Society of American Value Engineers (now SAVE International) formalized the term 'value engineering', which is the term most used in the USA today. Value engineering is defined as an organized approach to the provision of the necessary functions at

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the lowest cost (Kelly and Male, 1993). Value is assumed to be enhanced when the same functions are provided at a lower cost, and also when more desired functions are provided for the same or a lower cost. This definition is also relevant to contemporary manufacturing. In 1963 the US Department of Defense, Navy Facilities Command became the first organization to use value engineering in construction applied to sketch design stage after a cost plan has been prepared. A number of other countries adopted the SAVE International model of value engineering in construction notably, Japan, Korea, India, Saudi Arabia and Hungary (Male *et al.*, 1998a, b).

The practice of value engineering in US construction remains close to the original definition (Dell'Isola, 1997) but its purpose, particularly on public sector projects, is to prove value for money through a structured audit process. In those countries with a quantity surveying profession, accountability for public funds was ensured through the normal work of a quantity surveyor and therefore the US style of value engineering appeared to offer little (McGeorge and Palmer, 1997). However, in the early 1990s, notably in New South Wales, Australia, in the UK, and to some extent in Canada (Male *et al.*, 1998a, b) the technique was adapted, commonly under the term 'value management', to apply both proactively and reactively to the construction stages of strategic and project briefing as well as to sketch design. In the USA, strategic and project briefs, where formalized, are often prepared by architectural programmers, a professional that has no equivalent in UK (Hershberger, 1999).

In value management studies and architectural programming activities value is assumed to be capable of identification in the presence of all stakeholders (Miles, 1989; Duerk, 1993; Hershberger, 1999; Peña and Parshall, 2001). It is this assumption which is challenged in the following section.

The identification of value

Perry (1914) poses the question 'what is value generically?' by rehearsing the contemporary argument that value cannot be defined, value being adjectival rather than substantive. Hence a valuable gemstone can only be defined as a stone which has value, i.e. value has no meaning in the absence of the stone. Perry's argument is that the adjectival criterion is only sound if value were incapable of analysis and this is clearly not the case since a stone in a gold setting is likely have more value than the stone alone and therefore there is some attribute of the setting which is capable of description. The English philosopher, G.E. Moore, supported realism in debates on *inter alia* axiology. In the work on ethics, *Principia Ethica* (1903) Moore debates the meaning of 'good' (Audi, 1999). Discussing Moore's assessment of value in relation to 'goodness', Perry states that Moore's definition is too narrow as value exists when something can be described as 'good for', taking the concept of 'goodness' as relative to the importance something has when interest is taken in it. Perry claims that for something to be of value it has simply to meet the requirements for interest and pleasure. Perry distinguishes between 'intrinsic values' as being possessed by the object–interest complex, whereas 'extrinsic value' is possessed by the object itself. Perry asserts therefore that it is possible to admire one's neighbour's yacht and derive pleasure (goodness) and therefore obtain value from it, without partaking in the object–interest complex which would be a necessary part of owning the yacht. Zimmerman (2001) consolidates and develops the theory of intrinsic value in which it is stated that in any value system no parts of the variables are correlated and all variables should have intrinsic value.

Rice (1943) introduces a debate on quality and value stating that the term 'quality', as applied to values, has a multiplicity of meanings giving the example of a piece of cloth being better quality than another because it is warmer and more durable. However, an alternative piece of cloth may be better quality because of its exquisite sensation of sight and touch even although it is flimsy. Rice concludes with the observation that value in this context is intrinsic, i.e. it relates solely to the perspective of the user.

In the context of construction Burt (1975) refers to the components of value as being quality and cost whereas Best and De Valance (1999) refer to quality, cost and time. The project management tool for determining value, the time, cost, quality triangle, is attributed to Dr Martin Barnes although academic debate is thin and citations are dominated by Atkinson (1999).

An analysis of value management texts (O'Brien, 1976; Crum, 1971; European Commission, 1993; ICE, 1996; Hayden and Parsloe, 1996; Park, 1999) demonstrates that the most usual expression for value is its relationship with function and cost most usually expressed in mathematical terms as (a) below.

Fallon (1971) states that value from the perspective of the producer is function divided by cost whereas value to the buyer is perceived as benefits divided by price. Shillitoe and De Marle (1992) define value as the

$\text{Value} = \frac{\text{Function}}{\text{Cost}}$	$\text{Value} = \frac{\text{Benefits}}{\text{Price}}$
(a) Most common	(b) Customer: Fallon (1971)

need related to the ability to satisfy divided by cost.

$$\text{Value} = \frac{\text{need} * \text{ability to satisfy}}{\text{cost}}$$

BS EN 1325 1: 1997 defines value as the relationship between the contribution of the function (or value analysis subject) and the satisfaction of the need and the cost of the function. In more recent work, Austin *et al.* (2005) see value as:

$$\text{Value} = \frac{\text{Benefits - Sacrifices}}{\text{Resources}} \quad \text{(related to)}$$

While value management texts focus on the definition of function, none develops further the concept of value beyond that expressed in the time, cost, quality triangle or in the formulaic expressions above.

Critique of existing value expressions in the context of a workshop tool

The time, cost, quality triangle is conducive for use as a workshop tool (Best and De Valence, 1999) but the other formulaic expressions are not. However, the time, cost, quality triangle is a crude measure of value. Previous attempts to derive a more sophisticated expression of value have met with criticism. Green (1999) is critical of earlier work by Kelly and Male (1993) in its search for a client value system. Green states that 'it is seemingly taken for granted [by Kelly and Male] that the clients ''value system'' can be analysed in the same dispassionate way in which one would manipulate a quadratic equation' and 'the very process of modelling will inevitably influence the values and perceptions of the workshop participants. The implication is that the ''functional value'' of a project indeed exists independently of the conflicting and transient aspirations of the project's stakeholders'. Green implies that the value system of the project's stakeholders should be understood for each individual project at each stage of development. Liu and Leung (2002) rely heavily on soft systems methodology to evolve a 'goal–behaviour–performance–outcome' paradigm to value management in which they link the value system of the client to goal specificity. They argue that goals are established from value judgements and that value importance dictates goal prioritization and is also a constituent of goal commitment. Their proposed soft systems model attempts to find the value gap through an objective setting procedure in which the participant's psychological needs and desires are considered. This argument is also made in the Austin *et al.* (2005) model in which stakeholders' individual value criteria are measured to determine the relationship between stakeholders and the project. However, the measurement of preference is supported by Perry (1914) who states:

> … to discover a criterion by which superiority or inferiority shall be assigned to values themselves is the desire to justify a criticism of the natural or empirical values. It seems necessary to provide for a scale or hierarchy in which inclinations [of stakeholders] shall be subordinated to duty, impulse to a 'norm', or enjoyment to an ideal. There is but one way in which this can be accomplished without abandoning our present definition of value, and that is by employing a quantitative scale.

Perry's argument supports the notion that structure is more helpful than free flow or even anarchy in value setting even if this means imposing some discipline on the stakeholders. This is the catalyst in the development of a more sophisticated expression than the current time, cost, quality triangle. The above debate leads to alternative propositions for the way forward which are:

- that the client value system can be modelled by reference to a fixed number of facets; and
- the client value system is multifaceted and can only be defined on a project-by-project basis by reference to the project's stakeholders.

Following the argument of Perry (1914) the research proposition is that a client value system can be more fully understood by reference to a fixed number of facets which, in the context of construction projects, are capable of description. In order to develop these facets, however, the concept of quality has to be further understood.

Quality

Deming (cited in Bicheno, 2002) states that quality can only be defined in terms of customer satisfaction. There is no absolute measure—two customers may perceive a product or service differently (Bicheno, 2000). Juran and Gryna (1988) defines quality as 'the totality of features and characteristics of a product or service that bear on its ability to satisfy stated needs or implied needs … quality consists of freedom from defects'. Dr Noriaki Kano (cited in Bicheno, 2000) states that maximum quality is obtained when targeted characteristics are achieved and the customer is delighted (Bicheno, 2000). The Kano model includes three factors: basic, performance and delighters. A basic characteristic is expected to be present. The customer will be dissatisfied if a basic characteristic is absent and only neutral if the characteristic is completely fulfilled. Performance characteristics relate to the essen-

tial function and the customer will be more satisfied if higher levels of performance are achieved. The delighter is the extra characteristic that was not expected or previously experienced by the customer and therefore will be satisfied even at low levels of their potential. The Kano model is illustrated in Figure 1. The Kano model is important because it distinguishes between factors to be included at 100% (basic) and factors that have the ability to disappoint and also to delight.

Quality and value

The primary theme underlying the discussion of value is the element of discretion on some sort of continuum or scale. However, in respect of certain facets of value Kano would suggest the client has no discretion. For example, in the context of safety, a floor finish in a hospital may be specified as safe in a wet environment. If a patient slips on the floor injuring themselves then clearly the floor was unsafe. In this context there are no levels of safety since the floor is either safe or unsafe. The client will be satisfied with a safe floor and dissatisfied with an unsafe floor. A similar situation exists with security since if there is no unintended penetration of the facility then the client will be satisfied but if the security system fails then the client will be dissatisfied. Levels of security beyond that required add no value and cannot delight the client. In the client value system therefore basic criteria should be excluded since there is no element of discretion.

Criteria for a value system

Taking the proposition that the constituent parts of time, cost and quality can be made overt, enabling a client to express satisfaction in terms of a finite number of variables and the debate regarding quality the following seven criteria are proposed for the development of the value system:

(1) A distinction is made between basic and performance variables with basic variables being excluded from the value system.
(2) Those variables which perform at a level which is at the discretion of the client and those that are capable of delighting the client are valid variables of a value system.
(3) The client value system must be comprised of variables which are not correlated.
(4) A client value system must be comprised of variables which are not inclusive, i.e. they must be singular in context.
(5) A client value system must exclude the specification of factors which it is attempting to influence. For example, the order, arrangement and the efficiency in the distribution of specified space result from the application of the designer's skill and are not a part of the value system.
(6) The client value system is not a hierarchy of variables but rather an order of preference for those variables which lie at the same level.
(7) The final test of a valid variable is the extent to which it can be the subject of a continuum against which the client can indicate a point of satisfaction.

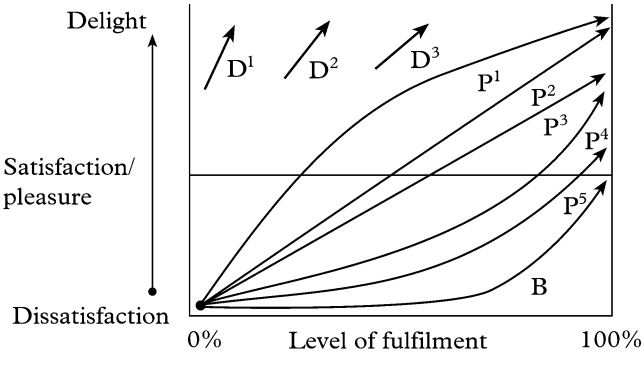

Figure 1 The Kano model. *Source*: Adapted from Bicheno (2000). *Note*: B: Basic P^n: Performance D^n: Delighters.

Existing value systems

In discussing types of value Crum (1971), Zimmerman and Hart (1982), Mudge (1981) and Thiry (1997) all list: use value, esteem value and exchange value. In the analysis of architectural design Vitruvius (100BC, translated Morgan, 1960) states that the value system for architecture depends on order, arrangement, eurhythmy, symmetry, propriety and economy. Kirk and Speckelmeyer (1993) cite image, efficiency, expansion, flexibility, human performance, technical performance, life cycle cost, community, energy conservation and security. Peña and Parshall (2001) list four 'considerations' function, form, economy and time. In October 2003 the Construction Industry Council launched the Design Quality Indicator (Construction Industry Council, 2006) under three headings: functionality, build quality, impact; with additionally: finance, time, environment and resources. These lists tend to jumble quality and values, basic and performance variables but are nonetheless useful as checklists of variables which meet the value criteria discussed above. Through the analysis of the various

value systems against the criteria described in the previous section the following headings were derived: capital cost (all investment costs incurred prior to project completion, e.g. date of occupancy); operating cost (all costs incurred after project completion until the end of the client's time horizon); time (the period from the date of the workshop until project completion); exchange (the earning potential or sale worth of the completed project); environmental impact (for example impact on the land, carbon units consumed, etc.); utility (use value); and esteem (regard/respect benefits to the client from the world at large as a result of the project).

Testing the value system

The research methods considered to test the accuracy of the headings of a construction client's value system were divided into four types, namely empirical methods, database methods, opinion survey and logical deduction. The element of the control of the researcher over the experiment was considered and illustrated in Figure 2.

A value management workshop is a discrete event occurring with a finite number of people at a fixed point in time at a geographical location suitable to the project. All research methods illustrated in Figure 2 were considered but those which demanded, for example, statistically significant amounts of data, a common location for experiments, focused on longitudinal studies, and reliant on data in the public domain were rejected. Six possible courses of research action were considered, namely case vignettes, interviews, Delphi, action research, grounded theory and

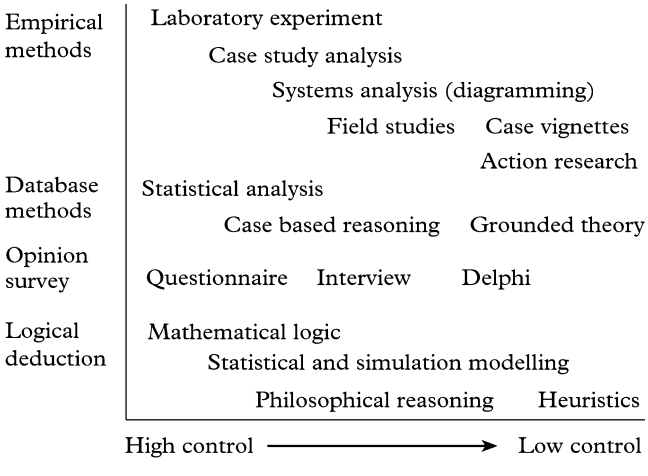

Figure 2 Research methods considered with reference to researcher control

mathematical logic. The first three were considered valid approaches based upon opinion survey but with the proviso that the majority of those responding would not have experienced the use of a method for deriving a client value system within a workshop environment. A grounded theory study based upon the analysis of value management workshop reports is a practical proposition. However, because the reports are not in a standard format, tending to be synopses of verbatim discussions using colloquial language, and record the client's values implicitly rather than explicitly the processing was to be complex with no certainty of any useful outcome. Mathematical logic was rejected at this formative stage since the first task was the confirmation of identity of the variables of a value system. Action research was accepted as the preferred method of investigation although it was recognized that once the experiment was running the researcher had little control in the period between commencement and completion and no credible opportunity to re-run the experiment within the same workshop.

Action research is a social science research approach which includes the researcher in an activity that combines the generation of theory with problem seeking and solution (Susman and Evered, 1978). The characteristics of action research are: it is agnostic in its undertaking; it has a future orientation; it requires collaboration between the researcher and the client; and its application includes the key phases of plan, act, observe, reflect (Costello, 2003). The method of sampling was non-probabilistic convenience sampling for the reason that the sampling frame was clients with a project at an early developmental stage who wished to undertake a value management exercise. The number of such clients within the survey period was limited.

The identification of variables is an important step in the understanding of the components of a client's value system. However, as indicated by Perry (1914) the variables must be arranged in an order of preference otherwise the statement 'as a client I require a building which comes in on budget and to time, attracts minimum operating costs, has high utility and earning potential, with minimal impact on the environment and is aesthetically stunning' will be a synopsis of the value system applied to every project. A number of techniques to derive order were examined, including social–distance scales, simple paired comparison, Likert scales, Delphi, multi-attribute utility analysis and the analytic hierarchy process. With the recognition that the technique chosen must be used in a workshop environment and arrange non-correlated criteria into an order of preference, simple paired comparison was selected.

Action research

Eleven action research experiments were undertaken on nine projects, namely:

(1) Regional distribution centre for a national brewery
(2) Framework tender for a regional maintenance contract
(3) Aviation bulk fuel carrying vehicle park
(4) Housing association brown field development—two workshops
(5) Communication and organization workshop for a speculative office project
(6) NHS ambulatory care and diagnostic centre (ACAD)—two workshops
(7) NHS new accident and emergency department for existing hospital
(8) PFI schools project
(9) Design & build special school as a part of a framework agreement

The action research experiments were conducted in a similar manner in all 11 workshops. The client representatives present undertook the facilitated paired comparison exercise. The same facilitator was used for all workshops and the questions leading to a preference between pairs were asked using similar phraseology. The design and where applicable construction team members present did not contribute to the paired comparison exercise although they asked questions focused on elucidation only. At the end of each experiment the lessons learned were analysed and any corrections and/or improvements to the client value system incorporated prior to the next experiment.

Workshop 1 had issues concerning neighbours, planning, community relations, traffic impact and site access. These issues could be included in a variable entitled 'local politics/community' which was included for subsequent workshops. Workshop 2 was undertaken in the absence of a client representative and was therefore an exercise in second guessing the client value system which the tendering team found invaluable. The variables all worked well except for utility which caused prolonged discussion until it was realized that utility was one end of a continuum of which the other end was opulence. The variable was renamed 'comfort'. Workshop 3 worked well including 'comfort', which in this case related to the comfort and convenience of the facility for tanker drivers. Workshops 4a and 4b were held at different stages of a housing association development. At workshop 4a (partnering/strategic brief) the client representatives excluded the housing association director who was unable to attend. At workshop 4b (project brief) the client value system matrix was re-run and the director asked to contribute. The value system of workshop 4a was confirmed. The variables remained unaltered with all those suggested as additions by the client (commonly safety) being either excluded by the criteria above or were highly correlated with existing (e.g. minimum maintenance). Workshop 5 ran the facilitated paired comparison matrix without any change to the variables.

Workshops 6a and 6b were held at different stages of the development of an ACAD for an NHS Trust procured under Procure21. During workshop 6a two significant changes were made to the variables. First, a comment made by one of the client representatives that the budget was fixed, and therefore it was more a question of what could be obtained for the money, triggered a debate about the discretion available under the heading of capital expenditure (CAPEX). For workshop 6a and for all subsequent workshops questions relating to CAPEX were changed to accommodate fixed budget situations, for example, 'are you willing to sacrifice space in order to save time?' The second change was the inclusion of a new variable, 'flexibility'. Workshop 6b was held at a later stage in the project. The client value system changed from workshop 6a to reflect primarily changes to the political dimension of the project, many issues having been resolved during the period between the two workshops. The implication of this is still being researched.

Workshop 7 ran smoothly; however, there were hierarchical issues and the value system was acknowledged to be the views of the most senior representatives. The implications of this are still being researched.

Workshop 8 involved a PFI bid for 23 school projects, the majority of which were extensions and/or minor repairs. The client value system was focused on the largest constituent of the bid, a new secondary school. An early discussion addressed the question of who is the client—the private sector partner (PSP) or the local authority. The conclusion of the debate was that the local authority's value system was the primary subject and that since the local authority is concerned only with the unitary charge then the CAPEX and operating expenditure (OPEX) elements could be combined. Workshop 9 ran successfully with the modified rules and matrix headings but in the presence of three notable debates. First there were fixed budget and fixed space requirements as indicated in Building Bulletin 99: Briefing Framework for Primary School Projects (DfES, n. d.). These two factors dominated client thinking with regard to CAPEX. Second, the team could not resolve the relative importance of OPEX and comfort, requiring a compromise. Third, there was a complete misunderstanding with regard to flexibility: the headmaster wanted a selection of rooms of differing sizes suitable for differing cohorts of pupils

with special needs, whereas the design team were thinking in terms of a building in which every internal wall could be taken down. Figure 3 illustrates the client value system matrix for workshop 9.

Conclusion

The completion of this project to determine the constituent parts of time, cost and quality to enable a client to express satisfaction in terms of a finite number of variables has indicated that further research is required to:

- address the proper influence of stakeholders from an intrinsic and extrinsic value perspective. Although the Austin *et al.* (2005) research addresses this it does not resolve it;
- understand the relative influences of factions within client organizations and also the changes which occur in values over project time. For example in the ACAD project, 'community' was of high value importance until the site had been secured, then in the subsequent workshop it slipped in significance as an issue resolved, although to be within the community was still a high value criterion for the client;
- appreciate the apparent logic errors in the completed client value matrix, i.e. if A is more important than B and B is more important than C can C be more important than A? This question arose in few workshops; it was never pointed out to clients and never resolved;
- investigate the consequence of the requirement for an 'on the spot' performance from client representatives and whether this may have influenced their judgement.

A. Capital/Cost – CAPEX

A	B. Through Life Cost – OPEX							
A	B	C. Time						
A	B	D	D. Esteem/Popularist					
A	B	E	E	E. Environment				
A	B	F	D	E	F. Exchange			
A	G	G	G	G	G	G. Politics/Community		
A	H	H	H	H	H	H	H. Flexibility	
A	B/J	J	J	J	J	J	J	J. Comfort
A	B	C	D	E	F	G	H	J
8	4.5	0	2	3	1	5	6	6.5 Total

Figure 3 Client value system matrix: final version

Notwithstanding the above the research described supports the conclusion that the variables of a construction client's value system are the nine non-correlated, high order, discretionary performance variables of capital expenditure (CAPEX), operational expenditure (OPEX), time (present to conclusion of project), esteem, environment, exchange, politics/community, flexibility and comfort. The evidence is that there are no further discretionary variables not correlated with these. The evidence also supports the conclusion that the nine variables can be ordered for preference through a process of paired comparison. Further work is continuing to address the issue of the proper influence of the various stakeholders to the project with particular reference to the supply chain of the client's core business and the construction project supply chain.

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