DEVELOPING AN INTEGRATED RISK AND VALUE MANAGEMENT FRAMEWORK FOR CONSTRUCTION PROJECT MANAGEMENT

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The management of risk and the search for best value for money in the UK construction industry have been the subject of many investigations over the last decade, as clients and the industry as a whole realised that there is indeed much room for improvement. Currently, many construction project management consultants offer value and risk management services either separately or combined within a broad project management framework. This paper will demonstrate how risk and value management methodologies can be interfaced both theoretically and in practice and will propose a framework for integrated value and risk management within construction project management. Before looking at the underlying interface between risk and value management, a review of the evolution of value and risk management frameworks is carried out to situate the theoretical context and to explain the basis for developing the integrated framework. Numerous instances of risk consideration within different value management frameworks are explained and compared. A tentative integrated framework is then developed from the concepts and variables identified from the review of literature and existing practices. This integrated framework is currently being evaluated by means of a mixed-methodological research, which is outlined in the paper.

Keywords: Construction industry, project management, risk management, value management, systems thinking.

INTRODUCTION

Thompson and Perry (1992) found that construction time for the public sector is exceeded by more than 40% in every sixth project and for a large number of projects it is even exceeded by over 80%. The importance of risk considerations in ensuring best value for money is highlighted by Flanagan and Norman (1993). Sir Michael Latham (1994) made many recommendations for improving the performance of the UK construction industry and highlighted the need for risk assessment to be carried out at important stages of the construction process. His call for a 30% reduction in the real cost of construction is now well known and has been the subject of much debate in many spheres of the construction industry. Furthermore, in recent years, value management and risk management have become increasingly popular among project management practitioners for many reasons including: more accountable decision-making, new contractual schemes, the prototypic nature of construction projects and the emergence of increasingly multi-faceted clients as opposed to unitary clients in the industry (Green 1996), amongst other reasons. For example, for projects procured under the Private Finance Initiative, the public sector’s underlying objectives are to achieve best value for money and optimum risk transfer.
Therefore the objectives of this paper are firstly, to demonstrate how risk and value management methodologies can be interfaced in the management of construction projects and secondly to propose a tentative framework for integrated value and risk management within construction project management. To achieve these objectives, the two processes are examined closely by looking at the relevant literature and existing practices. In particular, the paper will demonstrate real opportunities for developing an integrated risk and value management framework within construction project management. The basis for interface between risk and value management will be established by reviewing the different perspectives of value and risk management methodologies. The important themes and variables are identified from this review and an integrated framework is developed, taking into account the hard-soft dichotomy of problem situations that can be present during the life of a project.

VALUE MANAGEMENT FRAMEWORKS

Since the development of value engineering by Lawrence Miles in the 1940s, in the American manufacturing industry, the process has undergone serious evolution and modifications. At present, the Society of American Value Engineers (SAVE) presents value management as the value methodology (Society of American Value Engineers 1997) including value analysis, value engineering and value management. SAVE defines the value methodology as ‘the systematic application of recognised techniques which identify the functions of the product or service, establish the worth of those functions and provide the necessary functions to meet the required performance at the lowest overall cost’ (Society of American Value Engineers 1997). The value methodology is applied by a multi-disciplinary value study team using the systematic Job Plan with emphasis on function analysis. The Job Plan covers three major periods of activity: pre-study, the value study and post-study. The phases within the value study are information, function analysis, creative, evaluation, development and presentation. However, according to Palmer (1992) and Palmer, Kelly and Male (1996), the success of the value methodology in the American construction industry depends on other factors independently of the use of function analysis although they do not reject the necessity for investigating how function analysis could be used successfully for construction projects. Moreover, Palmer (1992) highlights the gap between theory and practice of value engineering, especially concerning the use of function analysis as emphasised by SAVE. Barton (1996) proposes a systemic approach for value management in the Australian context based on the paradigm of holism to “provide a vehicle to ensure that ‘whole system’ views are established and provide the opportunity to focus upon purposive actions (or functions) which actually determine the systemic interrelationships.” He interestingly points out that new challenges in project management lead to the conclusion that the dominant paradigm of a project’s objectives of time, cost and quality is insufficient to address these challenges. In the UK, the practice of value management is promoted by the Institute of Value Management as an all-encompassing hierarchical multi-level framework (Dallas 1996) for achieving shared business, work and human values for a business as a whole. The levels are: strategy, response, implementation, evaluation and continuous improvement. At each level, the framework is supported by relevant enabling techniques. For example, at the strategy level, the enabling techniques are: setting strategy, business process understanding, identification of core competencies, market research/analysis. The aim of this framework is to create access to and competence in a broad range of techniques and skills. In the UK construction industry, from the 1980s to date, the interest for value management has kept on
growing due to the search for value for money on projects. In the 1980s, the optimising nature of value engineering was relevant to achieve clients’ needs of balancing time, cost and quality and also to investigate alternative methods of constructing building elements (Locke and Randall 1994). In the 1990s however, Green’s ‘soft’ SMART value management (Green 1992 & 1994) emerged as a leading methodology for clarifying the objectives of the multiple stakeholders of construction projects in early development phases. The soft systems thinking paradigm is compared with value management as opposed to the analogy between the hard systems thinking paradigm and value engineering and its pragmatism. Thus it is argued that the hard systems approach has serious limitations when it is used with soft problem situations especially in early project management phases which are dominated by conflicting objectives and value judgements (Green 1994). This is somewhat comparable with the differences identified between the underlying philosophy of the interpretative research paradigm based on subjectivism and perceptions as opposed to the objectivist approach based on positivism and scientific research methods.

On the other hand, Kelly and Male (1993) develop a global methodology for life cycle application of value management which is based on the Job Plan with techniques like function analysis and life cycle costing, thus seemingly drawing from the hard systems thinking paradigm. However between actual practice and the formulation of a Job Plan-based methodology, there is the question of what style of facilitation is adopted and how the methodology is carried out. For although the underlying philosophy of the Job Plan is based on the scientific method and may be categorised as positivist or optimising, the nature, type and output of such a value management methodology will also depend on the facilitating style and on facilitative devices used by the facilitator. This therefore raises the question of whether it is always relevant to categorise value management based on the Job Plan as positivist, since the application of such a value management methodology is not only dependent on the techniques used but also on the approach and style adopted by the facilitator. Another recent development in value management for the construction industry (Connaughton and Green 1996) defines value management ‘as a structured approach to defining what value means to a client in meeting a perceived need by establishing a clear consensus about the project objectives and how they can be achieved’. It is recommended thus that value management should incorporate value engineering, which is defined as ‘a systematic approach to delivering the required functions at lowest cost without detriment to quality, performance and reliability’. Projects with clear objectives can be value-engineered to ensure cost-effectiveness whereas projects with ambiguous objectives will benefit most from value management in the early development phases before applying value engineering. However a shift from clarified objectives to ambiguous objectives can be possible anytime during a project’s life and this leaves doubts as to whether it is indeed always relevant to relate the application of a value methodology systematically with the project’s life cycle. Systemic categorisation in terms of hard and soft problem situations seems more appropriate as contended by Green (1997).

**REVIEW OF PROJECT RISK MANAGEMENT FRAMEWORKS**

The growing interest in project risk management in the UK during the 1990s (APM 1992; Simister 1994; Chapman and Ward 1995 and 1997; APM 1997) has given rise to a multitude of risk management frameworks and risk analysis packages (APM
1994) being available to the project management practitioner. In brief, a typical project risk management framework within a workshop environment consists of: identifying the risks affecting project objectives by means of structured interviews or brainstorming; classifying the risks by type and by degree of impact; recording qualitatively the risks in a risk register; assessing qualitatively the risks by frequency and impact scales and ranking them; where necessary and relevant, modelling and analysing quantitatively risks; formulating a risk response strategy by risk avoidance, reduction, transfer, acceptance; preparing a project risk management plan that summarises the status of the project on risk issues and the response strategy with a risk action schedule; implementing the strategy; reviewing periodically the strategy and identifying new risks.

In the construction industry or in project management, a large number of risk management frameworks have been developed (Birnie and Yates 1991; Thompson and Perry 1992; Flanagan and Norman 1993; HM Treasury 1993; Raftery 1994; Williams 1994; Kometta et al. 1995; Godfrey 1995; Edwards 1995; James 1996; Chapman and Ward 1997; and others). This is because the construction industry is recognised as a high risk industry. One of the reasons for this is that no two projects are alike. This is even more relevant with the advent of new contractual schemes like the Private Finance Initiative (PFI), Build Operate Transfer (BOT), Build Operate Own Transfer (BOOT) etc. Risk management is also increasingly popular because it provides value for money (HM Treasury 1993). Flanagan and Norman (1993) emphasise the importance of managing risks in construction projects and present a risk management system using many techniques for risk analysis like decision analysis, multi-attribute value theory, sensitivity analysis, probabilistic analysis and Monte-Carlo simulation. Such an approach to risk management is useful for quantitative risk analysis within the context of cost modelling and is relevant to value engineering. In fact, hard and soft approaches in risk management are both relevant in risk management studies and thus the issues become very similar to value management. Hence the risk perceptions of the multiple stakeholders of a project as well as the risks themselves have to be identified in some way and managed, because not having any knowledge of stakeholders’ perceptions on uncertainty or grey areas will lead to unidentified risks.

**BASIS FOR RISK AND VALUE MANAGEMENT INTERFACE**

It is argued that value for money can be achieved either by enhancing the requirements of a project, or by reducing the cost of meeting them and thus the search for value for money is trying to find the best balance between meeting the requirements of the stakeholders and the resources available (Connaughton and Green 1996). Finding this best balance will inevitably involve some risks and these risks have to be identified and assessed. The SMART value management process favours shared views and perceptions rather than optimising views. One should recognise however that shared views and perceptions are themselves accompanied by uncertainty, which is why there is no right answer but rather a consensus on the objectives. To try to resolve this uncertainty would be ambitious, but the assessment of risk and risk perceptions can at least provide a valuable framework for controlling the uncertainty of value management outputs.

The value management literature suggests various possibilities for considering risk in value management or value engineering workshops. Green (1994) argues that although it is not useful to model risk until there is a common perception of what the
problem actually is, the inclusion of risk preferences in the SMART model can be helpful. Sensitivity analysis is used to reduce the degree of uncertainty in the elicitation of importance weights of criteria. The consideration of risk in the Kelly and Male methodology is in the form of risk analysis and sensitivity analysis with the emphasis on costs (Kelly and Male 1993: 122-123), using probabilities for the optimistic/most likely/pessimistic cost estimations. Norton and Mc Elligott (1995: 176-177) outline two possible practical ways of integrating value management and risk management within the Job Plan. One way is to have the value management team reviewing a project risk management plan previously developed by the project team. They propose that the team review the plan during the information phase to check whether all risks have been identified and properly assessed. During creativity, alternative risk mitigating actions are generated and the proposals are prepared with risk issues in mind. The other alternative is to include a risk analysis specialist in the value management team as they develop the project risk management plan. This is achieved firstly by brainstorming and assessing risks either qualitatively or quantitatively with the technical support of the risk analyst; secondly by generating the risk mitigating measures during creative phase; thirdly by carrying out further quantitative risk analysis of proposals and lastly by collating all the information on risk in the project risk management plan. Connaughton and Green (1996) advance that it is indeed possible to combine value and risk management in the same workshop without however overloading workshop participants by trying to achieve too much. More recently, Green (1997) argues that risk and value management can no longer be considered to be two separate entities, implying that integration is not only plausible but essential. He thus proposes the integration of risk and value management methodologies with concepts from the Strategic Choice Approach (see Friend and Hickling 1988).

In the USA, Kirk (1995) proposes a methodology for integration of value and risk management in value analysis studies, within the Job Plan, for specific construction projects. The methodology starts by preliminary risk identification in general qualitative terms. Then probabilistic analysis and Monte-Carlo simulation of project costs are carried out during the information phase. Risk mitigations are brainstormed in parallel with idea generation during creativity phase. Risk is considered as a weighted criterion in the evaluation phase. The alternatives are risk analysed during development. In the presentation phase, the qualitative risk assessment is presented with mitigations as well as the cost and schedule risk analysis with new proposals and cost savings. During implementation, if these proposals have to be modified, a second risk analysis of the final proposals is performed. Kirk’s risk and value management methodology concentrates on quantitative risk analysis that can be applied to project cost and schedule, although the first step does consider general risk issues in qualitative terms. Other practitioners like Starling (1995) makes an attempt at conducting risk analysis within value management by using a specific risk analysis software for carrying out an uncertainty analysis of proposals resulting from value engineering studies. This method aims at determining the degree of uncertainty in value engineering proposals in terms of its effect on the projected savings on project costs.

All the methodologies and approaches described above refer to risk issues relevant to specific areas within the value methodology and in most of these cases, the focus is on project costs and on schedule. Furthermore all these methodologies seem to be undergoing continuous improvement and there is no definite strategy at present.
amongst project management practitioners. However they can be definitely seen as major stepping stones for exploring further the possibility of developing an integrated approach to risk and value management that will improve value and manage risk effectively for a project.

**DEVELOPING THE INTEGRATED FRAMEWORK**

Based on the above theoretical and practical perspectives on the existing interface between risk management and value management, the most relevant variables of influence are identified as: the theoretical and methodological interface, the type of value and risk management studies conducted by practitioners, the possible benefits and drawbacks of integration, the belief in a combined framework, the methodologies and techniques used, facilitating styles and facilitative devices and extent of interface between respective techniques. These variables are believed to impact on the degree, type and nature of value and risk management interface in project management. The influences will be moderated by the types of problem situations and by the stage in the project life cycle as discussed in the review of value management frameworks. The possible outcomes of these relationships are that (1) the risk and value interface could be dynamically realisable by integrating value and risk methodologies as and when required in project management, depending on the type of problem situation at any point in the project’s life; (2) some partial interaction or integration could be possible with interventions at project management phases and (3) full integration of risk and value management could be possible and relevant for specific projects, for specific problem situations at specific times in the project’s life. A conceptual framework for integration is thus formulated in Figure 1. The Figure shows the successive phases at which integrated value and risk management studies can be carried out in the management of a typical construction project. These studies will help to achieve consensus on objectives at project definition, to determine the design options at the design phase, to select the most appropriate contract strategy at procurement, to solve problems during implementation and to record lessons learnt for future projects. The conceptual framework takes into account the hard-soft nature of problem situations within a project as well as the project life cycle dimension in the application of integrated value and risk management.

At the very early stages of a project, the objectives are generally ill-defined and soft approaches will be relevant for identifying the objectives of the project stakeholders and for building consensus on those objectives. Further along the project’s life, issues become clear and decisions can generally be made with more certainty using a Job Plan-based systematic integrated value and risk management methodology. However where problem situations shift from clearly defined to undefined, especially where political decisions are involved, the methodology will be dealing with issues like restructuring of objectives and stakeholder perceptions. Hence the application of any value and risk methodology within the proposed integrated framework should remain dynamic and be adapted to the project management phase and to the type of problem situation. Figure 2 draws a parallel between risk and value management processes.
Figure 1: The integrated value and risk management framework within project management

Figure 2: The dynamic inter-phase interface between value and risk management
themselves and hence demonstrates the dynamic interface between the different phases governing the two processes. The phases represented in the Figure are broadly specified and apply to the value management frameworks discussed above, involving either structuring of objectives or function analysis or both. This approach is chosen purely to demonstrate the affinity between the two processes whether the value or risk management approach is soft or hard and whether the value management team has to deal with clear or ill-defined objectives.

RESEARCH METHODOLOGY ADOPTED FOR THE PROJECT

Presently, this integrated framework is being evaluated as part of a mixed-methodological PhD research project based on surveys, case-studies, participant-observations of value management studies and ongoing literature review. The research methodology adopted allows both the evaluation and building of theory in an iterative manner while examining the emergence of any other inter-variable relationships as well as new relevant variables. The multi-method strategy ensures to some extent that the methodological strengths and weaknesses of different methods cancel out to produce more convincing findings by triangulation (Gill and Johnson 1997: 160). The final results of this research project will be published in the near future.

CONCLUSION

Within the limits of this paper, a review of value and risk management frameworks has been carried out, illustrating the different approaches advocated by numerous authors. The different value management methodologies in the UK construction industry, for both ‘soft’ and ‘hard’ problem situations have been covered. Numerous instances of risk consideration within different value management frameworks have been explained and compared. These risk approaches in value management are under constant change, demonstrating the need and thus the basis for an explicit integrated framework within the context of project management. A dynamic conceptual framework for integration is developed, taking into account the two dimensions of project life cycle and hard-soft dichotomy of problem situations. The interrelated variables involved in the integrated framework are identified from the review of value and risk management frameworks and the research methodology adopted is explained. Finally the theoretical and practical perspectives of risk and value management interface presented in this paper will certainly provide further avenues for project management researchers and practitioners to explore.

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