SLQS JOURNAL

SRI LANKAN QUANTITY SURVEYORS

JANUARY 2009

www.slqs-uae.org

DAWN OF A NEW ERA

M&M
Seven Seas

M & M SEVEN SEAS CONSULTANTS PRIVATE LIMITED

A FORCE TO RECKON WITH IN QUANTITY SURVEYING, COST CONSULTANCY
&
PROJECT MANAGEMENT SERVICES

55, Mahabage Road,
Elapitiwela, Ragama,
Sri Lanka.
Tel: (+9411) 2958993

P. O. Box. 1398, P. C. 130,
Al Azaiba,
Sultanate of Oman
Tel: (+968) 24498948

Contributing to the Nation's Development

SLQS Journal

The Forum of Sri Lankan Quantity Surveyors Across the Globe

Volume 1 – January 2009

Editorial Policy

We, the editorial committee reserve the right to select, reject, edit, and excerpt articles at our sole discretion. We will publish no article which, in the opinion of the editorial committee, can be reasonably interpreted as insulting or offensive to any individual or group. We will not return unsolicited manuscripts. The opinions expressed in articles contained in the SLQS Journal are the opinions of individual authors and not necessarily those of the SLQS Journal editorial committee. Articles are provided for the general interest of the quantity surveying and contract administration community, but the information contained therein does not constitute legal advice and should not be relied on as such. Neither the SLQS nor the individual authors assume any responsibility for the accuracy of information reported.

The editorial committee assumes no responsibility for failure to report any matter inadvertently omitted or withheld from it. The mode of citation utilised within the articles and for the bibliography would be the Chicago method.

Email your own creations to **journal@slqs-uae.org** with your passport size photograph and brief profile of yourself which should not be more than 35 words.

SLQS JOURNAL

January 2009

CONTENTS

Page

Editorial

Editorial

Dear Sri Lankan Quantity Surveyors,

At the opening of another year, on the occasion of a celebration of the previous year and its significance to the Sri Lankan quantity surveying community in the United Arab Emirates and the world at large, we are pleased to announce the inaugural publication of the SLQS Journal, the first of three periodical journals per annum. It is our hope that the articles compiled within this journal will be of interest and professional use to you in your day to day practice.

We wish to thank everyone who has contributed to the journal, all of whose articles were a tremendous pleasure to read. It was with great satisfaction that we observed the outpouring of interest in being a part of the inaugural journal, a satisfaction that we feel certain will be echoed by you as you read through the topics it contains.

Our main objective in the publication of this journal is to provide a regular channel for members of the SLQS group and other respected Sri Lankan industry professionals (by invitation) to share their knowledge and experience, in such a manner to be useful to our entire community.

It is designed to encourage interest in all matters relating to contract administration, with an emphasis on matters of theory and on board issues arising from the relationship of contract administration to other disciplines in construction industry. The subject matter of the articles will consist mainly, but not be limited to contractual matters, academic assignments or theses prepared for academic and professional purposes, legal matters, case studies, dispute resolution mechanisms, arbitration, cost management, project management, construction technology and information technology associated with the construction industry. All of the topics mentioned above are of value within the field of construction. However, it is not the purpose of this journal to concentrate solely on drily academia-oriented matters.

The topics written upon in this journal are those submitted by your peers and various highly experienced and qualified industry professionals and academics of today. Articles which have been arriving from the very large number of Sri Lankan quantity surveyors living and working across the globe, are those felt to be relevant to our entire readership, either personally or professionally. We welcome contributions from SLQS members all over the world.

Also, we look forward to future entries into forthcoming journals from amongst you.

Wishing you instructive entertainment,

Editorial Committee

SLQS JOURNAL

January 2009

Impact of Performance Measurement on Construction Research and Development

Dr. Udayangani Kulatunga Ph.D & Prof. Dilanthi Amaratunga Ph.D

School of the Built Environment
The University of Salford
Salford, UK

Background

As a subset of the built environment, the UK construction industry plays an important role in making the built environment a place which is accessible to everyone, comfortable and enjoyable. In bringing the built environment to the standards required by society, the construction industry faces a number of challenges in addressing social, economical and environmental constraints. For example, the construction industry is challenged to adhere to sustainable development policy by ensuring that its activities provide economic, social and environmental benefits; by reducing initial and lifecycle costs; by optimising use of natural resources; and by increasing the satisfaction of its stakeholders. Accordingly, many authors recognise research and development (R&D) as a way forward in addressing these challenges in the construction industry (Barrett, 2007; Fox and Skitmore, 2007; Hampson and Brandon, 2004; Fairclough, 2002). R&D activities produce efficient and effective construction processes, materials and components and develop management methodologies in addressing these challenges. Furthermore, R&D activities deliver intangible benefits such as knowledge creations and knowledge transfers within the research team members and their organisations, establish good rapport with stakeholders and create long term research partnerships and net-woks (Lim and Ofori, 2007; Gilkinson and Barrett, 2004). These intangible benefits add value to organisations by increasing their capacity for absorbing and using internal and external knowledge thus ultimately providing them with a competitive edge to survive in the market.

A few decades ago, it was believed that imposing financial constraints could negatively affect the freedom and creativity of R&D activities (Roussel et al, 1991). However, this has been challenged due to the rising cost and resource constraints involved in R&D activities, thus consideration is given to identifying the correct allocation and utilisation of finance and other resources. Further, more attention is paid to ensuring the outputs are properly aligned with the expected goals, increasing the efficiency and effectiveness of R&D activities, ensuring the accountability of resources consumed and making clear the contributions from R&D activities towards the organisational developments. Despite the importance of R&D activities for the growth of the construction industry, there are number of issues which affect its success. Inappropriate mechanisms for reporting expenditure (Seaden and Manseau, 2001; Lorch, 2000; Hodkinson, 1999), inadequate mechanisms to evaluate the successfulness of activities (Lorch, 2000), lack of clear and visible links between investment and contributions (Print, 1999; Hodkinson, 1999) have negatively affected construction R&D activities, resulting in a decrease in investment in R&D activities. Further, when the expectations are not met, a low level of contribution from industrial partners is evident (Barrett and Barrett, 2003; Print, 1999). Moreover, lack of feedback on the progress and success of R&D activities and lack of communication between the parties involved (Dulaimi et al, 2002; Print, 1999; CRISP consultancy commission, 1999) have reduced the interest and attraction for contributors to ongoing R&D activities.

partnerships and net-woks (Lim and Ofori, 2007; Gilkinson and Barrett, 2004). These intangible benefits add value to organisations by increasing their capacity for absorbing and using internal and external knowledge thus ultimately providing them with a competitive edge to survive in the market.

These issues illustrate a need for effective controlling, monitoring and validating mechanisms within construction R&D to enhance its success. Thus this study suggests that the implementation of Performance Measurement (PM) within the construction R&D activities would achieve this goal. Literally, PM is defined as the "process of quantifying the past actions, where measurement is the process of quantification and past actions determines current performance" (Neely, 1998). Procurement executive association (1998) defines PM as a "process of assessing progress toward achieving predetermined goals, including information on the efficiency

with which resources are transformed into goods and services (outputs), the quality of those outputs (how well they are delivered to clients and the extent to which clients are satisfied) and outcomes (the results of a programme of activity compared to its intended purpose). Since PM systems encompasses supporting infrastructure, a wider definition has been given by Neely (1998) as the quantification of efficiency and effectiveness of past actions by means of data acquiring, collection, sorting, analysing, interpreting and disseminating.

PM focuses the employee attention and communicates the priority factors of the organisation by linking the organisational strategy with the employee's occupation (Martinez, 2005; Neely et al, 2002; Magretta and Stone, 2002; The Procurement executives association, 1998). According to Martinez (2005), there are eight positive effects from PM such as focus people's attention on what is important to the company; get business improvement; improve customer satisfaction; increase productivity; align operational performance with strategic objectives; improve people satisfaction; align people behaviours towards continuous improvement; and improve company reputation. Accordingly, this study investigated the impact of PM and the usage of PM applications within collaborative construction R&D activities.

Methodology

Semi structured interviews and a questionnaire survey was used to collect the data for this study. The interviews were conducted with 5 principal investigators, 5 researchers and 3 industrial partners who have got involved in collaborative construction R&D work. The questionnaire was distributed among 34 principal investigators and researches and 26 industrial partners.

Findings

Impact of PM on construction R&D

The study revealed a number of benefits of PM in construction R&D activities such as facilitating the selection of the best option/ aim and objectives; improving the quality of the research work; identifying and ensures the contribution of the team; directing the team members towards targets; improving the transparency of the work; improving the dissemination of research results; facilitating inter project comparisons; validating the achievements; improving communication; motivating the team; ensuring proper progress of work; and increasing the satisfaction of the stakeholders.

Besides the benefits of PM, the empirical investigation revealed a number of negative influences. The implementation of PM applications within R&D work could result in wasting the resources employed by it when the results of PM are not integrated with the ongoing process or used as a reference for future projects. Thus, some argued that the effort put into PM could be used to achieve the objectives of the research work. Further, inclusion of incorrect performance targets could result in adding inaccurate feedback thus misleading the research team. Moreover, the bias of the performance evaluator could also add inaccurate feedback. In addition to this, it was revealed that the PM results could be manipulated to provide a better picture of the performance. However, these negative influences of PM points to the need for setting correct targets for PM and the importance of making the applications of PM an integral part of the R&D work by incorporating the PM results.

Use of performance measurement applications in construction R&D work

A variety of performance measures were being used in the construction R&D work ranging from financial to non financial, qualitative to quantitative. Nevertheless, the respondents had their own preferences in choosing the performance measures whilst the majority of them primarily focusing on the quantitative measures due to their straightforwardness and ease of measurement. Further, some favoured the use of performance measures related to the human resources as human resource is a vital factor behind the success of construction R&D activities.

Lack of demand from the funding bodies and industrial partners to come up with better performance measures which show the efficiency and effectiveness of the R&D work was identified as a shortcoming of PM applications in the current system. Further, rigidity of the current system in making amendments during the R&D process to the existing performance measures was evident as another drawback. This has forbidden the possibility of accommodating correct and necessary performance measures during the R&D process thus the project has to go ahead with the performance measures even if they are incorrect or assess the wrong targets. Therefore, the importance of making PM applications flexible to add or omit correct performance measures during the process was emphasised from the study. Moreover, the PM applications should be designed in such a way as to identify future improvements and alternative methods of improving the success rather than stopping when the required performance is achieved.

Lack of measures to evaluate the actual impact of R&D work for its beneficiaries was identified as another shortcoming. Thus, incorporating and allocating funds for the evaluation of post delivery success within R&D PM applications was recommended. Another drawback of the current PM applications was revealed as lack of feedback from PM to the ongoing R&D process and lack of communication of the results to the people who are involved. This has weakened the interest of the funding bodies and industrial partners resulting in low investment and lack of involvement by industrial partners. Therefore, creating appropriate feedback loops, effective communication on the progress to the involved parties and obtaining the views of the beneficiaries

towards the ongoing R&D process was identified as important factors for the success of construction R&D activities. Lack of clarity, structure and the use of informal methods to measure the performance of R&D project was another issue which was revealed from this study. Lack of formality has lead to confusion over the scope of the work required. Further, lack of quality parameters within PM applications was another drawback which has lead to substandard outcomes. Thus, incorporation of peer reviews and building up testing and validation mechanisms for research results was emphasised from the study.

The respondents of the study opted for the use of performance measures which satisfy the stakeholder (funding bodies and industrial partners) needs such as; measures of finance, time, quality; accomplishment of objectives and milestones of the project and identification of stakeholder requirements. As opposed to the indicators on the satisfaction of the stakeholders of the construction R&D activities, the indicators targeting the researchers (identification of the researchers' requirements, education and training of researchers, satisfaction of the researchers) have been utilised less. The performance indicators on the evaluation of post delivery success (development of new research directions, retention of the stakeholders, acquisition of new business relationships) were not extensively used within the case study.

Conclusion

The study revealed that PM positively influences the construction R&D activities from its initiation to dissemination of the project results. However, the use of complicated and excess performance measures has created negative effects due to the considerable consumption of time, investments, and commitment of people. The negative impacts of PM on the construction R&D work suggest importance of making PM an integral part of the R&D project so that it acts as a feedback loop to the system. Even though the use of PM within construction R&D activities generates both positive and negative impacts, the solution is not to avoid the use of PM, but to design the PM applications with user friendly characteristics that could negate the negative impacts by providing more positive impacts.

References

Barrett, P. 2007, Revaluing Construction: a holistic model, *Building Research and Information*, Vol. 35(3), pp. 268–286

CRISP consultancy commission, 1999, *Linking construction research and innovation to research and innovation in other sectors*, Construction research and innovation strategy panel (accessed 15th December 2005), available from: http://ncrisp.steel-sci.org/Publications/ws984_r.pdf

Dulaimi, M F., Ling, F.Y.Y., Ofori, G., and De Silva, N. 2002, Enhancing integration and innovation in construction, *Building research and information*, Vol. 30(4), pp. 237-247

Fairclough, J., 2002, *Rethinking construction innovation and research: A review of government R and D policies and practices*, Department of Trade and Industry, London

Fox, P., and Skitmore, M. 2007, Factors facilitating construction industry development, *Building Research and Information*, Vol. 35(2), pp. 178–188

Hampson, K., and Brandon, P. 2004, *Construction 2020: A vision for Australia's property and construction industry*, CRC Construction innovation, Australia

Hodkinson, R. 1999, *Innovative ways of funding construction Research: an ideas paper*, Construction research and innovation strategy panel, (accessed 21st June 2005), available from: http://ncrisp.steel-sci.org/Publications/9913fpRC.pdf

Gilkinson, N., and Barrett, P. 2004, The unanticipated impacts of research on practice, *CIB world congress*, 2nd – 7th May, Canada

Lim, J. N., and Ofori, G. 2007, Classification of innovation for strategic decision making in construction businesses, *Construction Management and Economics*, Vol. 25(9), pp. 963 - 978

Loch, C. H., and Tapper, U. A. S. 2000, *R&D performance measurement that are linked to strategy, working paper*, INSEAD, (accessed 5th March 2005), available from: http://ged.insead.edu/fichiersti/inseadwp2000/2000-14.pdf

Magretta, J., and Stone, N. 2002, *What management is: How it works and why its everyone's business, Free press*, New York

Martinez, V. 2005, *Performance measurement Systems: Mix Effects*, (accessed 15th August 2005), available from: http://euram2005.wi.tum.de/index.php/

Neely, A., Adams, C., and Kennerley, M. 2002, *The performance prism: the scorecard for measuring and managing business success*, Prentice Hall, London

Neely, A. 1998, *Measuring Business performance*, Economist books, London

Print, M, 1999, *Funding Construction Industry Research and Innovation - time for a change?*, (accessed 15th June 2005), Constructions research and innovation strategy panel, UK, available form: http://www.ncrisp.org.uk/Articles/News_Home.asp

Roussel, P. A., Saad, K. N., and Erickson, T. J., 1991, *Third Generation R&D: Managing the Link to Corporate Strategy*, Harvard Business School Press, Boston, MA

Seaden, G., and Manseau, A. 2001, Public policy and construction innovation, *Building research and information*, Vol. 29(3), pp. 182-196

The Procurement executives' association, 1998, Guide to a Balanced Scorecard performance management methodology, (accessed 21st January 2005), available from: http://professionals.pr.doe.gov/ma5/MA5Web.nsf/d152596b6fe7366485256a5d005a2259/7363e1ab1e5a429a85256ae80042cb6d/$FILE/BalancedScorecardPerfAndMeth.pdf

The Role of the Expert Witness

Palitha Premasiri Gamage *FRICS, ACIArb*

Project Quantity Surveyor in Royal Estates, Oman.
worked as a quantity surveyor for over 19 years in overseas and 7 years in Sri Lanka. Become an expert in modern construction procurement strategies while working as PQS for Emirates Twin Towers in Dubai, Qasr Al Alam Guest Palace in Muscat, and sub-contractor's QS for Power Station "G" in Jabel Ali and National Bank of Dubai Head Quarters. Lecturer in CPD for SLQSs in Oman.

Expert witnesses do not resolve disputes but they are key figures in both criminal and civil litigation and arbitration. Expert witnesses are people with skills, experience and competence within a particular field of operation who give opinion evidence based on their technical knowledge as applied to the matter in dispute.

The role of an expert witness is to assist the judge or arbitrator by explaining and interpreting technical issues. Their duty is to act impartially and honestly. An expert must not advance the case of one of the parties; to do so would not only be a breach of duty but it would also be counterproductive – a judge or arbitrator will give little or no weight to the evidence of an expert who is obviously advocating one party's case, rather than giving an honest and unbiased opinion.

This article is written based on the English law under which the duties of experts are now set out in Part 35 of the Civil Procedure Rules. Part 35.3 provides:

(1) It is the duty of an expert to help the court on the matters within his expertise.
(2) This duty overrides any obligation to the person from whom he has received instructions or by whom he is paid.

The practice direction annexed to Part 35 require at paragraph 1.2(5) that:

'Where there is a range of opinion on the matters dealt with in the report (expert must):

(1) Summaries the range of opinion, and
(2) Give reason for his own opinion.'

The expert witness must understand the rules of procedures of the tribunal or court where he is acting. Being a compelling expert witness requires specialist knowledge and skills in written and oral presentation. The expert must have had sufficient experience with problems of the same kind as those of the dispute. He must prepare thoroughly. He must understand the nature of the contract from which the problem has arisen and have studied all material papers connected with the problem to ascertain whether he can support on balance of probabilities of the civil case and be fair by those who approach him to act as an "expert witness".

Alternatively one may be approached to produce a thorough fact finding report. An accurate objective assessment of a situation may be required. This could lead to years later being called as a witness and being questioned on some aspect of the documentary or oral advice one has given to one of the parties who later has become engaged in disputatious proceedings arising from the initial contract. When approached by a lawyer, it is likely that proceedings involving litigation or arbitration are in contemplation. It should be established whether one has a privileged relationship extant with the client's legal adviser. The terms of reference should be established, and be assured that one is proceeding on the basis of instructions received from the particular lawyer acting on behalf the client.

The expert witness must understand the rules of procedures of the tribunal or court where he is acting. Being a compelling expert witness requires specialist knowledge and skills in written and oral presentation.

The expert witness's written report will be seen by his client's opponents. He will be questioned by lawyers, and possibly members of a judicial tribunal, some of whom may possess knowledge in the same particular field. The expert witness may be asked to provide an expert testimony anywhere in the world. He must be careful that his evidence does not conflict with the opinion he has previously expressed. Within the English Legal System the expert witness must maintain objectivity.

Under the English Adversarial System, it may be argued

that cross examination is destructive, that it is directed at uncovering ignorance rather than highlighting the witness's knowledge. In contrast, the report of a court expert is used under the Continental Civil Law System. Under this system it seems, that the view of a number of experts can be put before the court more cheaply and conveniently than under the English System. The French court experts unlike the English court experts do not have to spend many expensive hours sitting in court listening to oral evidence being given.

Under the English system, judges, planning inquiry inspectors, and juries, having observed rival experts under cross-examination, are free to reject any expert evidence adduced.

In England, conflicts where the core of the dispute is a genuine difference of opinion between experts possibly account for a fewer percentage of all cases which come before the courts or arbitrators. An arbitrator of like discipline, or in the case of a major dispute, a tribunal consisting of both lawyer and expert, or lawyer sitting with an expert as assessor may be advisable.

Expert witnesses should not allow different conclusions to arise simply because they began with different facts. Unreliable Expert evidence because of biases is a problem. Partisanship by an expert or both expert accounts for possibly as high as eighty to ninety percent of cases heard. Difficulties arise because in the normal sequence of events leading to arbitration or litigation, the expert performs his role, giving his opinion to his client, the negotiator and the expert witness. When advising the client the expert must not give into the temptation to give the client the opinion the client wants. Once the expert has also been involved in negotiations he has almost inevitably aligned himself to some extent with the client. Clients facing an opposing expert who is exaggerating, often want their own expert to exaggerate in the contrary direction. Many clients believe that judges and arbitrators "take the mid-point" and some actually do.

There is the argument that the role of the expert witness in the common law jurisdictions is intellectually ambiguous.

An Expert can also be engaged to assist as advisors in negotiations, mediation and adjudication.

Amec Civil Engineering Ltd -v- Secretary of State for Transport [2005]

The appellants, Amec Civil Engineering Limited, had as Contractor carried out major renovation works to the viaduct under a contract with the Secretary of State as Employer. Amec substantially completed these works on 23rd December 1996. The work included replacing an existing reinforced concrete deck slab and providing new roller bearings permitting the slab or other elements to move. In June 2002, some of the roller bearings appeared to have failed. The Highways Agency, acting as agent for the Secretary of State, needed to investigate the cause of the failure. Investigation, which included materials testing, was bound to take some time.

Intrinsically the cause of the failure was likely to be poor workmanship, poor design, poor materials or a combination of these. Amec had supplied and installed the roller bearings which had been supplied to them by a sub-supplier in Italy. Amec had also designed the roller bearings, but their design had been adopted by the Engineer under the contract, Pell Frischmann Consultants Limited.

The contractors appealed a decision that an arbitrator had jurisdiction to hear a claim against them in respect of works carried out on the Thelwall viaduct. The contractors denied that there had been a dispute which could found a reference, and no valid engineer's decision within the time limit provided. Held: The court must avoid an over-legalistic approach to interpretation of the contract. The engineer has a duty to act independently honestly and with fairness, but the rules of natural justice as such did not apply to his decision.

Professional's Culture; in the Context of Construction Management

Nadeeka Kodippily *BSc(QS) Hons.*

is a Quantity Surveyor graduated from University of Moratuwa, Sri Lanka in 2006 with a first class BSc. (QS) Hons. She is currently working for Halcrow International Partnership as a quantity surveyor. She is a Probationer Member of AIQS and a Graduate Member of IQSSL.

Introduction

Due to the diversified nature of the industry, diverse values are held by different groups of individuals. What pleases one may be unbearable to another, what contains problem solution for one is problem-generation for another. Under such circumstances, and in the absence of a paramount social theory, we cannot declare which group is right and which is wrong.

Cherns and Bryant (1984) argue, "any comprehensive account of the problems encountered in the management of construction projects needs to consider at least three dimensions: The Organizational, The Professional and The Contractual". Therefore, managing people /professionals can be considered as an utmost important dimension in proper construction management.

Culture

Originally an anthropological term, culture refers to the underlying values, beliefs and codes of practice that make a community what it is. The traditions of society, the self – image of its members, the things that make it different from other societies, are its culture. Culture is greatly subjective and reflects the meanings and understandings that we typically attribute to situations.

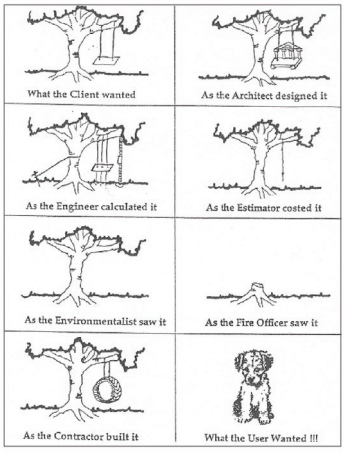


Figure 1: Construction Stereotypes
Source: Root (2002)

With the use of latest materials, high technology and skilled employees, the construction processes yet get delayed and become multifaceted. This poor performance may occur due to the behavior of project members with different cultural backgrounds and different objectives. (See - Figure 1)

"Culture" is a common issue in all parts of the industry around the globe. But the main focus and use of its implications are still not highly recognized in the world at large as well as in the construction industry. According to Tijhuis (2003), the culture issue often acts as just an excuse for failures, thus keeping it like a 'black box' in construction process.

"Culture" is a common issue in all parts of the industry around the globe. But the main focus and use of its implications are still not highly recognized in the world at large as well as in the construction industry.

To face and manage the conflict situations effectively, professionals should be equipped not only with dispute resolution skills but also with a sound knowledge and understanding of each other's culture. But still there is a dearth of research in the area of culture. There can be seen many researches on organizational culture but research on Professionals' Culture with respect to the construction industry is a novel concept.

Professionals' Culture

Merton (1957 cited Root 2002) described the "Professional Culture" as "a body of shared and transmitted ideas; values and standards towards which members of a Profession are expected to orient their behavior". The norms and standards define technically and morally allowable patterns of behavior, indicating what is prescribed, preferred, permitted or proscribed. Therefore the subculture then refers to more than habitual behavior; its norms codify the values of the Profession. In simpler terms, Professional Culture can be described as how a particular group of professionals would think, feel and behave in professional activities.

Implications of understanding the "Professionals' Culture" towards Project Performance

Managing projects is increasingly recognized as requiring a greater sensitivity to the values and priorities, assumptions and attitudes, expectations and habits of mind that are developed within different occupational and corporate groupings.

Conflicts between project participants have been identified in various construction industry reports as being one of the principal causes of poor performance on construction projects. These conflicts occur at the interface level in one respect because participants have different objectives and different organizational/Professional Cultures, which define their approach to work and relationship with other project participants. Awareness of these differences, however, improves the chances of achieving the right balance when constructing the team and this could lead to the development of synergy with positive consequences for overall project performance (Ankrah and Langford, 2005).

It is important for those who manage the projects to deal with complicated relationships and to consider the emotions, motivations and forms of reasoning that stand behind the actions and activities of the players in the process (Hancock, 2000).

In addition to that, all social behavior is embedded in a particular context and is connected to other deeply held values and beliefs. This means that the stakes are high for mismanaging cultural differences. Ignoring or mishandling differences can cause an incapability to retain and motivate employees, marketing/ advertising errors, and conflicts among parties. Also mismanaging cultural differences can make the successful managers and organizations ineffective and frustrated. When successfully managed, however, differences in the culture can lead to innovative business practices and faster and better learning within the organization.

Low (2002) also concludes that the cultural background of project team members should be taken into consideration in project management to create a conducive environment for innovation.

Conclusion

The above emphasizes the importance of construction management, managing professionals and how the culture affects peoples' behavior. Therefore it will be valuable to investigate the Professionals' Culture in the construction industry and the significance of the same for the advancement of the construction industry and thereby the country as a whole.

It can be said that understanding Professionals' Culture may help to carry out or manage a construction project successfully. Therefore studying Professionals' Culture in construction will be a valuable effort.

References

1. ANKRAH, N.A., LANGFORD, D.A, 2005. Architects and contractors: a comparative study of organizational cultures. *Construction Management and Economics*, 23, 595-607.

2. CHERNS, A.B., BRYANT D.T., 1984. Studying the Client's Role in Construction Management. Construction Management and Economics, 2, 177-184.

3. PHENG, L.S., YUQUAN, S., 2002. An exploratory study of Hofstede's cross-cultural dimensions in construction projects. *Management Decision*, 40(1), 7-16.

4. TIJHUIS, W., 2003. The Meaning of Culture in a Professionalizing Construction Industry: A Discussion on the CIB Task Group 23. CIB TG 23 International Conference, October 2003, Hon Kong.

5. HANCOCK, M.R. (2000). Cultural Differences between Construction Professionals in Denmark and United Kingdom. *SBI Report* [on line], 324.

6. ROOT, D. (droot@ebe.uct.ac.za) (12 February 2006) Re:Validating occupational imagery in construction; applying Hofstede's VSM to occupations and roles in the UK construction industry, in *CIB Report*, 275.

SLQS JOURNAL

January 2009

Concurrent Delays: Some Considerations on Determining Compensability in Delay Analysis

Nihal Perera *LL.M, MSc, FRICS, FCIArb*

(This article assumes the reader to have basic hands-on knowledge of forensic schedule analysis, and is written in the context of CPM (Critical Path Method) based delay analysis methods.)

Any practicing delay analyst would agree that the concept of 'Concurrent Delays' has been the single most perplexed issue in determining the compensability.

The significance of concurrent delays in delay analysis is wholly related to one issue: Compensability. Concurrent delays may permit a party, to offset the own delays from the claimed delays, when all delays are critically affecting the time for completion. In other words, its use is for the contracting parties trying to cancel out the compensability of one another.

There are three types of delays, namely Independent, Serial and Concurrent delays which may be encountered in a delay analysis.

Of these, Independent Delays occur in isolation and do not result from a previous delay. The effect of an independent delay on the contract completion date usually can be calculated with relative ease. Serial Delays occur solely as the result of an earlier, unrelated delay to preceding work. For example, a labour strike delays electrical installation work because there was an earlier design hold. In fact, in apportioning the responsibility in a delay analysis these two types of delays pose not much difficulty, and are found to be more straightforward than dealing with Concurrent Delays.

Concurrent Delays essentially involve two or more delay events. The difficulty with these delays is that taken alone either of the events would cause a delay in the project schedule and therefore the contract completion, but if either of the delays had not occurred, the schedule would have been delayed by the other delay. (For clarity, parallel delays caused by the same party are not categorised as Concurrent Delays).

Bramble and Callahan (2000) define that, in delay claims, concurrency may occur *'when there are two or more independent delays during the same period' and they may also occur 'during any part of the project performance period, not necessarily at the same time'*[1]. Therefore, *'a concurrent delay may occur during the same period as another delay but may also include any delays that contributed to the overall project delay, whether one delay overlaps with another or not'* [2]. In this context, the period of concurrency is the period of project performance and not just the period during which any individual delay may have occurred. Bramble and Callahan (2000) further suggest that the term '*offsetting*' rather than '*concurrent*' for delays that have the same effect on project completion but do not occur within the same time period.[3]

There are three types of delays, namely Independent, Serial and Concurrent delays which may be encountered in a delay analysis.

The increasingly popular 'Delay and Disruption Protocol' of the Society of Construction Law defines:

> *'True concurrent delay is the occurrence of two or more delay events at the same time, one an Employer Risk Event, the other a Contractor Risk Event and the effects of which are felt at the same time. The term 'concurrent delay' is often used to describe the situation where two or more delay events arise at different times, but the effects of them are felt (in whole or in part) at the same time. To avoid confusion, this is more correctly termed the 'concurrent effect' of sequential delay events'* [4].

Tobin (2007)[5] explained and differentiated the concepts of concurrency of causes and concurrency of effects of delays, throwing a further light on the above definitions.

One may note that the above definitions generally consist of a similar approach with regard to the delays occurring within the same period as well as those occur sequentially but with the effects of them being felt at the same time on completion. However, the delays occurring with concurrent effects of not so equal potency are dealt with differently at least by two schools of thought. More on this will be discussed later in the article.

Apportioning Responsibility

Like other types of delay, concurrent delays also require to be grilled through the normal 'chain of proof' for damages. Accordingly, establishment of that necessary link between 'cause' and 'effect' is required for each concurrent delay, separately. This process starts with the apportioning the responsibility for each delay and then proceeds to assessing the 'criticality' of the effect of the delay.

	Excusable Concurrent with **Non-Executable**	**Excusable** Concurrent with **Compensable**	**Compensable** Concurrent with **Non-Executable**
Theories of Concurrent Delays Gui Ponce de lean PE, 1987 AACE Transactions	**Executable**	**Executable**	**Executable**
Delay Analysis: A Systamatic Approach Joseph S. Reams, Cost Engineering, Vol. 31, No. 2, February 1989	**Executable**	**Executable**	**N/A**
Construction Claims Monthly October 1993, Vol. 15, Number 30	**Non-Executable**	**Executable**	**Non-Executable**
A Cost Effective Delay Analysis Technique Mireille Battikha & Sabah Alkass, P.E. 1994 AACE Transactions	**Executable**	**Executable**	**N/A**
Concurrent Delays in Construction Litigation Dr. David Arditi & Mark A. Robinson, P.E. Cost Engineering, Vol. 37, No. 7, July, 1995	**Non-Executable**	**Executable**	**N/A**
The Five Commandments of Construction Project Delay Analysis, Hamed A. Al-Saggaf, CCE, Cost Engineering, Vol. 40, No. 4, April, 1998	**Non-Executable**	**Executable**	**N/A**
Concurrent Delays: What are they and how to deal with them? George E. Baram, PE, CCE, 2000 AACE International Transactions	**Non-Executable**	**Executable**	**Non-Executable**
Concurrent Delay: A Modest Proposal R.B. Reynolds & S.G. Revay The Revay Report, Vol. 20, Number 2, June 2001	**Executable**	**Executable**	**Executable**
Construction Claims Monthly March 2002, Volume 24, Number 3	**Non-Executable**	**Executable**	**Non-Executable**

When dealing with Concurrent Delays, apportioning by responsibility can be characterized as:

- "Non-excusable" which are within the control of the contractor;
- "Excusable" which are typically outside the control of the parties and non-compensable;
- "Compensable" which are essentially excusable and caused by the employer and or its representatives.

The literature available on the subject of concurrent delays shows divergent opinions amongst the experts[6] on compensability based on various combinations of the above types of responsibilities. The following table illustrates this situation which has been prepared on the basis of articles submitted by some prominent experts on the subject:

On the other hand, there also exists a lack of coherent legal position on the issue[7].

However, with regard to the concurrency related to extension of time, the following guidance given in the 'SCL Protocol' seems to be consistent with the general judicial thinking in both UK and USA jurisdictions:

- *Where Contractor Delay to Completion occurs concurrently with Employer Delay to Completion, the Contractor's concurrent delay should not reduce any EOT due;*
- *Where Employer Risk Events and Contractor Risk Events occur sequentially but have concurrent effects, here again any Contractor Delay should not reduce the amount of EOT due to the Contractor as a result of the Employer Delay.* [8]

In this approach, unless stated otherwise in the contract concerned, the employer would not be allowed to recover 'liquidated damages' (or 'penalty' in the practice of most of the UAE contracts) for the prolonged period within concurrent delays. Likewise, as to contractor-incurred additional cost in a concurrent delay, the contractor should only recover compensation if it is able to separate the additional costs caused by the employer delay from those caused by the contractor delay. Thus, losses lie where they fell. This approach appears to be in accord with the legal axiom that no party should benefit from its own faults.

The issue of Criticality

Once the apportioning of responsibility for each delay is dealt with, the delay analysis may proceed to the other most important issue in assessing compensability in concurrent delays which is the determination of 'criticality' of delay effect.

In this connection, due to the limited space available, this article focuses only on the fundamental approaches, without getting into discussion on the wider issues like delay analysis methodology (techniques).

The '*AACE International Recommended Practice No.29R-03 – Forensic Schedule Analysis*'[9] has recognised and explicitly differentiated the fundamental differences between the two schools of thought, namely 'Longest Path School' and 'Total Float Value School', as to identifying the critical path. Acknowledgement and understanding of these differences are fundamentally significant for determining the entitlement to compensability in concurrent delays.

Once a constraint is allowed on the scheduled completion date, that will alter one of the basic theory rules of CPM (Critical Path Method) scheduling. In doing so the late finish of the last activity becomes equal to the early finish of the last activity, and accordingly if that last activity is delayed beyond that late finish date the calculation of the Total Float will be a negative value. ('Total Float' is "*the amount of time that an activity may be delayed beyond its early start/early finish dates without delaying the contract completion date*"[10]).

Thus, when a project is behind schedule, the network model may display negative float values for float. As explained, this results from the fact that the earliest possible dates of performance for the activities are later than the latest dates by which they must be performed in order for the overall network to complete by the constrained contract completion date. In other words, the negative value is a direct indication of how many work days the schedule activity is behind schedule.

Now, there arises the most important question: whether all activities having total float less than or equal to zero are critical, or only those having the *maximum* negative float.

The answer to this question holds the essential difference between the two schools interpreting the criticality of activity paths carrying negative float value. The 'Total Float Value School', which is also called the zero float school, maintains that all activities with negative float are, by definition, critical assuming the definition of critical path is anything less than total float of one unit. On its part, the 'Longest Path School', which is also called the lowest value school, insists that only the activity path(s) that carry the lowest value (i.e. the maximum negative values) are critical.

Peters (2003)[11] submitted that application of concurrent delay theory is inextricably linked to one's definition of criticality. It is important therefore, though difficult, to determine whether Courts generally advocate the longest path or the total float theory of criticality[12], in the absence of provision in the contract specifying such definition.

In order to understand further the fundamental differences between the two theories, it would be appropriate to see how they apply in a concurrent delay situation possibly giving contrasting results as to the entitlement of the parties. For this, two scenarios are examined below with reference to Fig. 01.

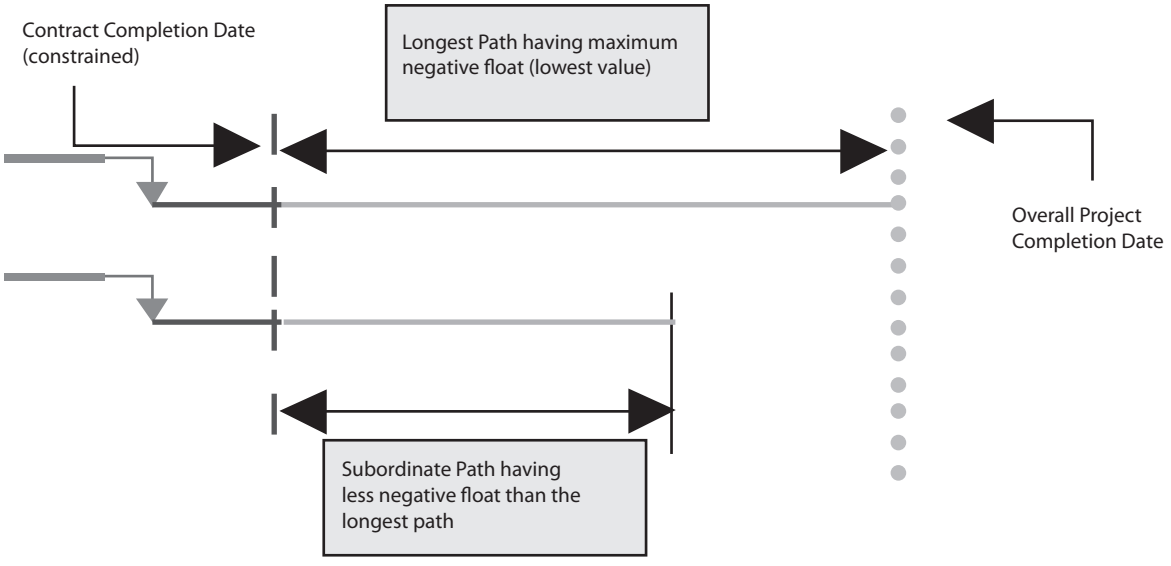


Fig.01

⇒ **Scenario #01:**

- Longest path delay is caused by the employer with a compensable delay and Subordinate path delay is caused by a non-excusable contractor delay.

- Outcome under 'Longest Path Approach': the contractor may consume negative float (created by longest delay) as long as the contractor's subordinate path finished earlier than the employer's longest delay. He is not in a critical delay relative to the project completion date which is set by the longest path, and also is entitled to recovery of extended overhead expenses for the entire length of the longest path delay.

- Outcome under 'Total Float Approach': Concurrent effect of delays is considered and the contractor is granted extension of time only for the duration of the effect of subordinate delay; employer loses right to LAD – i.e. 'Liquidated and Ascertained Damages' (or 'penalty') and contractor has to forego extended overheads unless he can segregate costs from those caused by employer delay. The contractor, however, is entitled to both time and money (in the form of extended overheads) for the remaining non-concurrent period. In this outcome the employer does not have to compensate for extended overhead costs for the entire longest path delay period of employer's compensable delay.

⇒ **Scenario #02:**

➢ Longest path delay is caused by the contractor with a non-excusable contractor delay and Subordinate path delay is caused by the employer with a compensable delay.

- Outcome under 'Longest Path Approach': the employer may consume negative float (created by longest delay) as long as the employer's subordinate path finished earlier than the contractor's longest delay. He is not in a critical delay relative to the project completion date which is set by the longest path, and also is entitled to recovery of LAD (or 'penalty') for the entire length of the longest path delay.

- Outcome under 'Total Float Approach': Concurrent effect of delays is considered and the contractor is granted extension of time only for the duration of the effect of subordinate delay; employer loses right to LAD (or 'penalty') and contractor has to forego extended overheads unless he can segregate costs from those caused by employer delay. The employer, however, is entitled to recover LAD (or 'penalty') for the remaining non-concurrent period. In this outcome the contractor does not have to pay LAD (or 'penalty') for the entire longest path delay period of contractor's non-excusable delay.

The foregoing illustrates that if the 'Longest Path Approach' is adopted the delays on the other subordinate paths (which are delaying the contract completion date to a lesser degree than the longest path delay) are considered non-critical relative to the (prevailing) overall project completion date. In this instance, the effect of subordinate concurrent delay would not permit to offset the compensability of the longest delay. However, if the 'Total Float Approach' is the one adopted then all the delays (in the longest and the subordinate path) are considered 'critical' against the (prevailing) contract completion date. In this case, the subordinate delay would permit to offset the compensability of the longest delay to the net extent of the concurrency (subject to segregation of costs).

As submitted in the *AACE International Recommended Practice No.29R-03 – Forensic Schedule Analysis*, which approach is correct depends on which principles are considered.

Thus, in order to add certainty to the contract risk-distribution and for avoiding post-contract disputes the best solution is to conspicuously address the issue of 'criticality' in the contract itself. Thus, if the preferred one is the 'Longest Path Approach' for criticality then it requires to provide in the contract to assign total responsibility for compensable delay to the party on longest path; if the inclination is to use 'Total Float Approach' for criticality, then provide in the contract to treat the net effect of concurrent delays is excusable only and not compensable.

That said, it is interesting to note the position taken by the 'SCL Protocol'. In its definition to 'Delay to Completion' it says that: *"In common usage, the expression may mean either delay to the date when the contractor planned to complete its works, or a delay to the contract completion date. The Protocol uses the expressions Employer Delay to Completion and Contractor Delay to Completion,* ***both of which mean delay to a contract completion date****.."*[13][Emphasis added]

Also, it maintains that " *..an EOT should only be granted* ***to the extent that the Employer Delay is predicted to reduce to below zero the total float*** *on the activity paths affected by the Employer Delay."*[14] [Emphasis added]

A delay analyst who is assigned to determine compensability in concurrent delays requires appraising the fundamental differences that exist between the two theories of criticality. In the selection of approach for criticality, he should rely on the terms of contract to draw necessary inferences, or seek agreement of the parties if that is called for.

References

[1]Bramble BB, Callahan MT, 2000, Construction Delay Claims, Aspen Publishers, New York
[2]Ibid
[3]Ibid
[4]The Society of Construction Law - Delay and Disruption Protocol' October 2002 – Appendix A
[5]Tobin P, April 2007, 'Concurrent and Sequential Cause of Delay',The International Construction Law Review , Volume 24(part 2), pp. 143-167
[6]Peters TF, 2003, 'Dissecting the Doctrine of Concurrent Delay', AACE International Transactions
[7]Henry Boot Construction (UK) Ltd. v Malmaison Hotel (Manchester) Ltd. (1999), ConL R32; John Doyle Construction Ltd. V Laing Management (Scotland) Ltd. [2002] BLR 393 (Outer House) and [2004] BLR 295 (Inner House)
[8](ref. 4 above) - Articles 1.4.1 and 1.4.7
[9]Published by 'The Association for Advancement of Cost Engineering', in USA in 2007.
[10](ref. 4 above)
[11](ref. 6 above)
[12]In the US case authorities, Santa Fe Inc., VABC No.1943-1946 decided in favour of 'Longest Path approach', whereas Toombs & Co. Inc., v United States, 4 Cl. Ct.535 (1984) decided for 'Total Float approach'.
[13](ref. 4 above)
[14](ref. 4 above) - Article 1.3.1

Value Management in Construction & Quantity Surveyor

S.A. Widanage *BSc(QS) Hons.*

Sudheera Widanage is a Quantity Surveyor graduated from University of Moratuwa, Sri Lanka in 2004 with a first class *BSc(QS) Hons*. He is currently working for Halcrow International Partnership as a quantity surveyor since November 2007. He is a Probationer Member of AIQS and a Graduate Member of IQSSL.

What Is Value Management?

Value Management (VM) is a structured, analytical process which seeks to satisfy "customer" needs by ensuring that all necessary functions are provided at the lowest total cost, while maintaining the required levels of quality and performance - in other words Value Management is "to maximize value". (The Institute of Value Management Australia)

It can be understood more with the equation in figure 01.

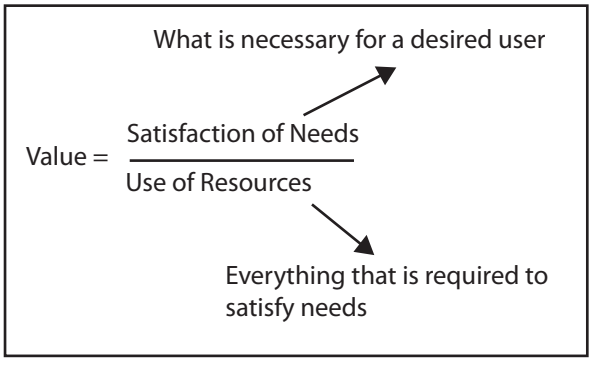


Figure 01: Formula for Value

Possible benefits of the value management process

- **Project life cycle cost savings:** Savings may be achieved from construction cost and/or operational cost at the post occupancy stage.
- **Time savings:** Consideration of alternative methods of construction, materials and designs through VM can save the construction time and may lead to early return on investment.
- **Consideration of options:** VM creates the environment to consider the alternative options (designs, method of construction…etc) to deliver the same functional requirements of the project at lower cost.
- **Reduced wastage:** This will be another cost saving area through VM. Establishing of waste minimising designs and methods of construction, introducing waste management methods may be introduced by the VM process.
- **Risks being forecast:** Identification of positive opportunities or negative impacts (risks of the project) which may arise during the project period will assist to ensure the project to be delivered at the correct time within the targeted cost and quality.
- **Expenditure being concentrated on adding value:** VM endeavours to spend money on the areas which can increase the value of the project and leads to more profitability.
- **Staging and phasing:** For large projects, staging and phasing will assist to have easier operation and gain early return on investment.

Value Management is a structured, analytical process which seeks to satisfy "customer" needs by ensuring that all necessary functions are provided at the lowest total cost,

VM throughout the project lifecycle - Typically, when VM is applied to a project it will have a planned series of workshops integrated with the project programme beginning at project definition level, and continue through to construction level. At the operations stage, lessons learnt at workshops and post occupancy evaluation studies assist in improving future projects in addition to utilizing of the new facility.

Cost cutting Vs value improvement - For many years, value analysis and value engineering was associated with cost cutting, but through applying value methods on projects, it became apparent that Best Value was not about cost cutting, rather improving the understanding of the client's

requirements and business needs. This is central to today's VM thinking.

Understanding of client needs - Where there is a poor understanding of client need, or where this is not clearly defined in the client's brief, the result is often poor value throughout the project lifecycle with wasted resource in management time, design time, production time and the cost of change. Securing a clear client brief requires skilled facilitation so that misconceptions on all sides are challenged.

Value Management considers:
The involvement of multi-disciplined users and stakeholders at the earliest strategic and tactical workshops to be of paramount importance

External 'challenge' - is important to achieving innovation in the construction industry, so for all strategic and tactical workshops, facilitators who are external to the project team are involved. This ensures that there is no undue political or commercial pressure brought to bear on the project team. This also ensures that areas of uncertainty are identified and dealt with. Technically orientated workshops at the detailed design or construction phases are often integrated with the project team meetings and are often facilitated by a member of the team.

Value Management Process
Value Management (VM), is a systematic and structured process of team based decision making. It is undertaken as a series stakeholder workshops held at key stages during the development of the project. It is a flexible, team-based activity, planned and directed by an independent VM facilitator and driven by consensus. The workshops are short duration, intense and highly structured.

The process works top-down, starting with needs and strategic goals and focusing on root causes, not symptoms. An early consensus is developed between the key stakeholders about the need for the project or service, the scope, deliverables, key functions and risks, in the context of the wider business objectives. Opportunities for innovation are explored and the most cost effective means of implementation developed, consistent with desired time and quality requirements. VM considers the whole project rather than components and the process is underpinned by consensus. Team selection for the workshop is crucial to success; to ensure that the full range of influences are properly addressed by people with the right balance of knowledge, skills, experience and judgment. Where particular stakeholders are not able to take part, or it is not politic to involve them, specific team members should be tasked as champions of those stakeholder interests.

Value Management process differs from project to project in terms of workshop duration, structure, and team composition. However a typical Value Management study has the following stages.

Information: This phase is to bring everyone of the VM team to the same level of knowledge of the most important aspects of the project. The facilitator (adviser for VM) first gives a brief overview of the value management process; consensus; project and study objectives. Information will be gathered and presented on the objectives, critical issues and constraints identified.

Function analysis: Identification and ranking of primary and secondary functions and their associated cost and worth relationship. This shows what each of the project elements actually does and how they collectively achieve the project value objectives. The team analyses functions to identify wastage, duplication, unnecessary cost and opportunities for improvement.

Ideas generation: Generation of value improvement options through innovation and alternate means of achieving the required function.

Evaluation: Sorting and prioritising value improvement options to identify viable alternatives. Evaluation of options may continue beyond the Value Management Study.

Action plan: Identification of actions/strategy required to achieve Value Study outcomes.

Analysis and reporting
Final reporting includes a description of outcomes and documentation of rationale to ensure appropriate focus is maintained through the project development stages.

Quantity Surveyor
A Quantity Surveyor is a professional who is to manages and controls costs within construction projects and is involved in the use of a wide range of management procedures and technical tools to achieve this goal. Also quantity surveyors are well known as the experts to deal with contractual matters in the industry. The Quantity Surveyor, also known as Construction Economist, or Cost Manager, is one of the team of professional advisers to the construction industry.
Quantity surveyor's services cover a wide range of activities in construction industry in areas such as commercial management of construction, design economics and cost planning, construction technology and environmental services, contract practice, procurement and tendering, project financial control and reporting, quantification and costing of construction works...etc.

In addition QS is one of the professionals in construction industry who closely collaborates with many stakeholders at different stages of projects. More commonly quantity surveyors

are categorised in to two as Consultant Quantity Surveyor and Contractor's Quantity Surveyor depending on the nature of the services they offer and the type of organisations they work for.

Quantity Surveyor & Value Management

The stakeholders are the people who have a real interest in the project outcome, such as: promoter, owner, financier, designer, quantity surveyor, engineer, technical specialist, constructor, operator, user…etc. The objectives of the project should reflect the entire principal needs and interests of all the stakeholders.

In order to have a successful VM process, all the key stakeholders should be involved or have their views represented. Being the expert in cost management/commercial aspects of construction projects, allows quantity surveyor to be considered himself as a key stakeholder in the process of Value Management. Quantity Surveyor's core competencies effectively assist the efforts of Value Management which is focused to gain the highest possible value at the lowest cost without sacrificing the quality and performance.

Value Management was seen by leading practitioners and academics to afford the Quantity Surveying profession with much opportunity to develop new skills and assist in changing its image. This is demonstrated by the comments of McDonagh and Brandon in 1991 and Poynter Brown in 1992:

'In Value Management, the QS has the opportunity to define his role in a positive way and bury the negative cost cutter image of the past' (McDonagh and Brandon; 1991)

'In VM, chartered Quantity Surveyors have an opportunity to develop their 'leading edge' skills and promote the profession by providing an innovative service to the discerning construction industry client' (Poynter Brown; 1992)

These references serve to highlight the level of acclaim given to Value Management and in particular identify the opportunity afforded to the quantity surveying profession to improve the existing service it provides to clients.

Poynter Brown in 1992, emphasized the word "chartered quantity surveyors" in his statement to explain that only a highly skilful QS who has broad knowledge in the filed of quantity surveying at various levels of construction projects, has the ability to provide VM services.

All stages of VM process associated with cost considerations. Highly competent and experienced professionals required to assess the cost of the alternative options generated during the VM process with the benefits they offer. That makes the knowledge of the quantity surveyor an essential element in VM process in construction projects.

The potential of QS to offer VM services

According to RICS (1984, cited in Visser et al n.d.), should Quantity Surveyors want to render a Value Management service, they ought to take cognisance of changing client reqirements. Visser et al (n.d.) further states that Quantity surveyors shall have to become synonymous with the rendering of comprehensive cost and management services that are considered to be the sine qua non of ensuring "value for money" for their clients. To achieve this goal, the services rendered by Quantity Surveyor should be improved and extended.

Ideal characteristics of a Value Manager have been identified by Visser et al (n.d.) as follows:

- Has above-average intellectual abilities; and capable of thinking conceptually and of relating theoretical system and systemic variables in a holistic context.
- He/she will constantly want to see and understand the "larger picture" and will decidedly not get bogged down in insignificant detail.
- He/she will remain vigilant to identify the unexpected relationship between elements.
- He/she therefore has to be acutely attuned to the external world; be open to the exceptional; and have an above-average directedness towards the behaviour and actions of other people and to any information that they may offer.
- When the expected does not occur, he/she will probably reveal a flexible attitude and be prepared to make adaptations, possible even taking a direction which he/she could no have foreseen.
- He/she will consider himself/herself to be a person who should initiate action, maintain it and accept responsibility and liability if it does not take the desired course. External sources may exist, but his/her motivation mainly emanates from own satisfaction, values and needs. Consequently he/she is a "self-starter".
- His/her thinking will be innovative and original. He/she will approach the possible solutions to problems constructively and as challenges and when he/she comes into conflict with others, he/she will mainly deal with it in a co-operative way (win/win).
- He/she will focus on the problem and its solution and not on the person, cause or result of the problem.

- He/she will have a vision for the future, will know where he/she wants to take his/her organization, department or team and will know how to get them to identify with his/her vision and to get them to identify with it.

It is generally known that the skill to facilitate is probably the most important expertise that a successful value manager has.

The above stated characteristics should be developed by any person or organization who is willing to offer VM services to the industry. It is believed that within their day to day working environment, most of the experienced quantity surveyors are able to gather above mentioned competencies required by a Value Manager more easily than other professionals in the construction industry. In addition Quantity Surveyor's extensive expertise in commercial aspects of the construction industry makes it easier for them to become leaders in Value Management.

Through a research conducted by Visser et al (n.d.), it has been found that the skills profile of quantity surveyors is matched against that of the key skills required for value management.

References

1. Ellis R.C.T., Wood G.D. and Keel D.A., (2003), An Investigation into the Value Management Services offered by UK Cost Consultants, The RICS Foundation, London.

2. Hogg K., 1999, Value management: A failing opportunity?, The RICS Foundation, London.

3. Value Management - concept and application
Available from: http://value-management.com.au/a_profile/a1.htm

4. Value Management in Building Construction
Available from:
http://www.ivm.org.uk/vm_sector_building.htm#benefits

5. Value Management
Available from:
http://www.build.qld.gov.au/sam/sam_web/content/72_cont.htm

6. The potential of quantity surveyors in South Africa, New Zealand, Australia and Sri Lanka to offer a value Management service: a comparative study.
Available from:
http://www.psisystems.co.za/down/03%20-%20PIBSPEEX/FILE%2010%20-%20PIB%20IN%20QUANTITY%20SURVEYORS%20STUDY.pdf

Further reading

1. VM in Construction – Case Studies
Available from:
http://www.ogc.gov.uk/documents/CP0152ValueManagementInConstruction.pdf

2. VM in Construction
Available from:
http://www.alabc.org.uk/nov_02/HH%20Handout%20-%20The%20Value%20Management%20Process.pdf

Bellefield Computer Services and others -v- E Turner & Sons Limited & others [2002]

The defendants had carried out works of construction on the premises. They subcontracted the design, but not the supervision, of the works to architects. Years later there was a fire, which spread rapidly because of negligence in the design of a wall intended to restrain any fire. The architects said their duty was limited to responding to the first defendant's requests for plans, and they did not themselves have responsibility for failures of specification.

Held: The omissions in design were the responsibility of the architects, who owed a duty of care to purchasers of a building as beneficial owners, where they had been involved in the construction, in respect of latent defects in the building of which there is no reasonable possibility of inspection.

Leed and Pearl Rating System in the UAE

Dammika Kumari *MSc, Member APQSE, ACIOB, AACE*

has successfully completed her National Certificate of Technology in Quantity Surveying course in the University of Moratuwa in 1985. She has joined M/s Vasiri Constructions (Pvt) Ltd. Sri Lanka as a Senior Quantity Surveyor and was promoted up to a Director. Dammika joined with D G Jones and Partners (Middle East) Limited of Dubai in 2004. She has obtained her Master of Science in Quantity Surveying from Heriot Watt University of Scotland in 2008 as the first lady student from Asia.

UAE's construction industry is considered to be the largest growing industry in the Gulf Region. The Emirate of Dubai in the UAE has been identified as one of the top ten fastest growing commercial cities in the world. The fast growth of the economy during the last five years, made UAE to experience a rapid boom in the construction industry. The UAE leaders are now seeking a sustainable development for the country by 2015. Therefore, developers in the UAE are to commence exploring sustainable development and green building concepts in order to maximize both economical, social and environment friendly performance of their buildings.

Sustainable development is a pattern of resources use aiming to meet human needs while preserving the environment. Green building concept represents designing of any structure, built, renovated, in operation or re-used with objectives to:

- Protect occupant's health
- Improve employee productivity
- Use wisely natural resources
- Reduce the environmental impact

It has now become a legislative requirement for building owners and developers to take into consideration the impact of the buildings towards the environment.

More than 70 definitions of sustainable development are given and are used by different groups to suit their goals (Langston, Ding, 2004). A widely quoted definition of sustainable development is the definition given in Brundtland report:"development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (cited in Brundtland etal, 1997, p169) Seven green building rating systems are available to choose from and they are used for promoting and contributing to environmentally conscious construction practices.

LEED is a certification scheme that produces independent third party verification that a building project is environmentally responsible, profitable and a healthy place to live and work (USGBC). Initially LEED was designed for US buildings and founder of the LEED rating system was Mr. David Gottfried. He formed the US Green Building Council in 1993. Now it is one of the fastest growing nonprofit organizations in the world having over 20,000 member organizations. In 1998 he formed the Global Green Building Council (GGBC) comprising with fifty other countries including the UAE as well. However, (GGBC/ USGBC) does not have any provision to allow individual participants to be members. Organizations, regardless of their product, can be members, of the GGBC or USGBC as appropriate.

Sustainable development is a pattern of resources use aiming to meet human needs while preserving the environment

LEED is a voluntary certification system utilized to gain a market share and advantage over competitors. This system is based on a process in which certain building criteria is analyzed, a credit value is designated, and a certification standard is conferred accordingly. Some of these main criteria are:

i] Site selection
ii] Water efficiency
iii] Energy uses,
iv] Atmospheric effects
v] Material and resources use,
vi] Indoor environmental quality
vii] Innovation and design process of a building

These buildings must pass the LEED technical review to achieve certification and then these projects are certified by the USGBC. Points are awarded in various categories, as energy use, water efficiency, and indoor environment quality. The total number of points received determines the building's LEED rating. Also extra points can be earned by installing special features such as renewable energy generators or carbon dioxide monitoring systems.

Leed Rating System

LEED Rating Systems are developed through an open, consensus based process according to the USGBC, a building that achieve a score of;

26 – 32 points earns a "Certified Rating
33 – 38 points earns a "Silver Rating"
39 – 51 points earns a "Gold Rating"
52 – 69 points earns a "Platinum Rating".

Gold rated buildings are estimated to have reduced its environmental impact by 50% compared with an equivalent conventional building, and a platinum rated building by over 70%. ("Leadership in Energy & Environmental Design" NTRES 431: Environment Strategies Fall 2004).

As of June – 2008 the number of projects registers are 139, out of which 46 are registered by TECOM alone (USGBC, 2008). However, the UAE construction industry stepped into this concept and still is at a very primary stage. Abu Dhabi's Urban Planning Council, UPC will introduce a set of regulations to suit the environment, climatic conditions and the culture of the UAE. As per the UPC General Manager Falah AL Ahbabi's views expressed in Construction Week September 2008 issue, new "Pearl Rating System" will be affected from January 2009. Pearl Rating System includes rating from one to five, and five is the highest category.

The Pearl Rating System is known as

ESTIDAMA, which means "sustainability" in Arabic, is an integrated program to devise guidelines and registrations for sustainable design, operation and maintenance of all types of buildings and communities within Emirates of Adu Dhabi. Unlike other rating systems, ESTIDAMA can only be used to assess the sustainability performance of a buildings.

Assessment and scoring aspects for Green Building design are:

• Water	30%
• Energy use	20%
• Indoor environmental quality	15%
• Ecology	7.5%
• Management	5%
• Transport	5%
• Pollution	5%
• Materials	5%
• Waste Management	2.5%

ESTIDAMA Pearl Rating scale is as follows:

• 35%	1 Pearl certificate
• 45%	2 Pearl certificate
• 55%	3 Pearl certificate
• 65%	4 Pearl certificate
• 75%	5 Pearl certificate

High-performance green building is the solution to energy efficient buildings and conservation of water. It provides healthy indoor environment and improves the productivity of occupants. (EGBC 2008, http://www.emiratesgbs.org)

The implementation of ESTIDAMA in the UAE can transform UAE into a green paradise of the desert.

Independiente Ltd and others -v- Music Trading On-Line (Hk) Ltd and others (2003)

The claimants claimed damages for the sale by the defendants in the UK of CD's manufactured for sale only in the far East. The defendants challenged the right of a claimant phonographic society to have the right to sue on behalf of its members.

Held: The right to issue representative actions varies with the nature of the claim. Did members of the society have a common interest in preventing parallel imports as opposed to preventing copyright piracy? Yes. The claims were all of the same nature and it was to be expected that the members would have a complaint. It was not necessary to require the claimants to circularise their members to obtain specific authority under CPR 19.6(2).

Today's Emerging Need: FM

Nadheeshani Wanigarathna *BSc(QS) Hons.*

Nadheeshani Wanigarathna is graduated from University of Moratuwa, Sri Lanka in 2006 with a first class for the honors degree of Batchelor of Science in Quantity Surveying.
She was awarded with Professor H.P.S. Caldera memorial award for the best research titled "Procurement of Facilities Management in Sri Lanka" submitted for the bachelors degree. She has served as a lecturer and research assistant for the Department of Building Economics, University of Moratuwa, currently working with Halcrow International Partnership, Dubai, UAE.

Working environment in business organizations has decisively changed in the past years. Due to globalization new trends in business organizations has emerged from north region to the world. Thus a trend emerged for outsourcing non core business activities in business organizations under the concept of facilities management (FM) to facilitate a supportive environment that robustly supports the primary objectives of the organization.

Even though the Facilities Management is relatively a new term to most of the developing countries like the UAE and practiced messily, it has improved gradually and become a profession world wide. The origin of Facilities Management can be traced back to the late 1800s [3]. It has been first started in real estate sector and then reached areas like infrastructure and construction. Nowadays property is important to all business organizations. The cost of this asset alone, i.e. procuring, managing and operating should make it a resource that is high on the agenda of business managers. Moreover costs involved in providing these management services are not small, being secondary only to staff in most organizations [12]. Hence, it is important to employ a good strategy while procuring non-core activities to business organizations in order to grasp maximum customer satisfaction and value for money.

Statistics demonstrate a large increase in its building stock over the years in UAE (see Figure 1). Considering buildings as a facility and the envelope for the business organizations, the country shows an emerging need for a prominent strategy for Facilities Management.

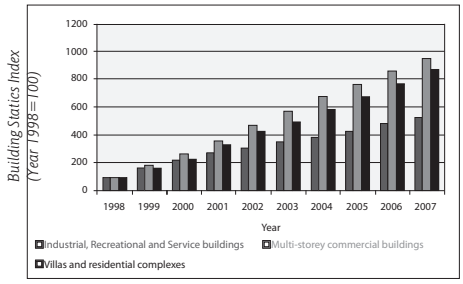


Figure 1: Building Stock index over the years in the UAE
Source: Statistical year book, centre of statistics

Different authors (ex: [6]; [10]; [4]; [1]) have defined differently the term, "Facilities Management" in their researches. One such is "Facilities Management is an integrated approach for operating, maintaining, improving and adapting the buildings and infrastructure of an organization in order to create an environment that strongly supports the primary objectives of that organization" [4]. Today, the area referred to Facilities Management includes a wide scope including management of support services, real estate management and financial aspects, (ex:[5]; [1]).While the definitions appear diverse and different in their emphases, a closer examination suggests that there are some common recurring themes threading together to give FM its identity. First, the focus of FM is the workplace. The workplace in this instance refers to a place where work (of any nature) is carried out. Thus, it is not limited to commercial office buildings but also includes other types of workplaces such as medical, educational and industrial workplaces. Secondly, FM is applicable to all organizations because they all occupy space for their work. Thirdly, FM plays a supporting role in enhancing the performance of the organizational core business and it is started practicing from the design stage of the building for an organization. Finally, an integrated approach is required in practicing FM. Thus Facilities Management can be concisely defined as the integrated management of the workplace to enhance the performance of the organization.

Statistics demonstrate a large increase in its building stock over the years in UAE (see Figure 1). Considering buildings as a facility and the envelope for the business organizations, the country shows an emerging need for a prominent strategy for Facilities Management.

The modern form of facilities management can be seen as a combination of different disciplines of management. Earlier [8] it has been identified as a one sector of real estate management among Asset Management and Property Management. Now it

is referred to the management of all non core activities of the organization ([1]; [2]). RICS identification for scope of facilities management includes thirteen activities such as Business management, real estate management, security, support services management, project management, financial works, health and safety aspects of the organization and procurement activities. However it includes almost all functions identified by a variety of authors. Thus the scope identified by the RICS can be treated as the latest and comprehensive scope of facilities management.

Procurement Strategy

Procurement of Facilities Management is the acquisition of the process by which an organization delivers and sustains non-core activities in a quality environment that strongly supports the primary objectives of organization [1]. The best of such process acquired would be at the best possible total cost of ownership, in the right quantity, at the right time, in the right place for the direct benefit or use of the organization wich would not be limited to a contract. A Number of authors ([4]; [2]; [1]) have identified several procurement options for Facilities Management in an organization. Most of the researchers have identified 'in house' and 'out source' as major categorization of procurement options. Further subdivisions have also been identified in various ways on various bases.

The most common way of identifying sub categories of the outsourcing are three main types of contracting-out service provisions as shown in Figure 2(e.g. [2]; [8]; [11]). They range from the use of an external organization or an individual who manages the client's organization own employees, through the appointment of a contractor managing some or all service providers, to an arrangement where all facilities are managed by an external entity offering a single point of responsibility. Some deviated arrangements can also be found while conserving their unique attributes. Out tasking, partnering, strategic alliance, public-private partnership can also be identified as other modes of procurement strategies for Facilities Management.

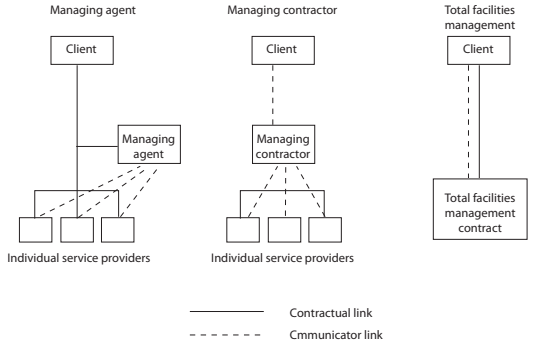


Figure 2: Main types of Outsourcing arrangements [2]

A Number of criteria can be identified for the selection of Facilities Management procurement options. It includes analysis of advantages and disadvantages of alternatives against the organizations strategic needs (e.g. [9]; [1]), decision tree models [7], transaction cost approach ([6]; [4]), etc. Criterion developed later consider and employ soft factors such as customer satisfaction, risk minimization etc... in their strategies beyond the price optimization (ex. [2]). A business organization can decide on the best strategy depending on their properly defined organizational characteristics and requirements. Since the factors affecting the selection of procurement options may change, the arrangement by which the Facilities Management procured, should be reviewed at appropriate intervals. Moreover an adequate effort should be made in selecting service providers, defining roles and responsibilities of positions and in the preparation of proper contract documents irrespective of the procurement option. Further, if an organization decides to change its procurement strategy, a well established change in management process should be adopted in changing considering implications, such as user reaction employee capabilities, organizational structure and organizational policies. Finally, a sound practice will create an environment that strongly supports the core business for any organization.

Reference:

1. ALEXANDER, K., 1996. *Facilities Management –Theory and Practice*. London: E & FN Spon.
2. ATKIN, B. AND BROOKS, A., 2002. Total Facilities Management. London: The Further Education Funding Council and Blackwell Science Ltd.
3. ATKIN, B., 2003. Contracting Out or Managing Services In-House. *Nordic Journal of Surveying and Real Estate*, 1, 18-33.
4. BARRETT, P., 1995. *Facilities Management –Towards Best Practice*. London: Blackwell Science Ltd.
5. BECKER, F.1990. *The Total Workplace: Facilities Management and the Elastic Organization*. New York: Van Nostrand Reinhold.
6. BRIDGE, A.J., 1999. The procurement of Facilities Services: A transaction cost approach and beyond. COBRA 1999, London: RICS.
7. DEPARTMENT OF HIGHER AND FURTHER EDUCATION, 2000. Facilities management: Improving the management of support services in higher education. Northern Ireland, National report *(March 00/14)*.
8. LINDHOLM, A.L., 2005. *Public facilities management services in local Government:International experiences*.. Thesis (PhD).Helsinki University of Technology Construction Economics and Management.
9. LUCIANI, P., 2005. Outsourcing or In-House Facilities Management?. FM, February /March, 16-21.
10. PARK, A., 1994. *Facilities Management -An explanation*. London: The Macmillan Press Ltd.
11. PUHTO, J. AND TUOMELA, A., 2001. *Service Provision Trends of Facility Management in Northern Europe*. Thesis (PhD).Helsinki University of Technology Construction Economics and Management.
12. WILLIAMS, B., 1996. Cost-effective facilities management: a practical approach. Facilities, 14 (5/6), 26–38.

Can a Project be Successful without Proper Contract Administration?

Prof. Indrawansa Samaratunga *PhD, DSc, FRICS, FAIQS, FIQS(SL), FCIArb, FCIOB, FCMI, FIAS, FBEng,*

(Arbitrator & Expert registered with Dubai International
Arbitration Centre/Chartered QS/Chartered Manager/Chartered Builder)
Australian Institute of Quantity Surveyors – Middle East Representative

Timely completion, defects-free facility and value for money are the key expectations of a developer when he embarks on a development. On the other hand, the Contractor aims at constructing and completing the facility within his budget, with optimum utilization of his resources and by securing his rights in order to generate his anticipated reward.

It is the duty of the Contract Administrators of each of these two parties to ensure that these expectations are realized efficiently. In order to achieve this, the Contact Administrators should be fully conversant with the obligations, rights and liabilities of the parties to the contracts that they are administrating.

The multi disciplinary function of Contract Administration in a construction project is carried out by Quantity Surveyors, Engineers, Project Managers and Commercial Executives. It is essential that they are capable of not only identifying the obligations, rights and liabilities of the parties under the contracts and in law, but also advising on how to discharge those obligations and secure those rights in a timely and proper manner, in order to protect the interests of their companies thus protecting them from exposure to liabilities.

A Contract Administrator who is ignorant of the fact that his company would lose its entitlement either in full or in part, if he does not serve a notice in a timely and proper manner (where such notice is a condition precedent to the right) would not be capable of protecting the interests of his company. Since contracts are not stand alone documents and since they are to be read with many legal provisions applicable thereto, it is not an easy task for a person to identify the obligations, rights and liabilities of the parties intended thereby. In order to overcome this difficulty to some extent, the study programmes of Contract Administrators (especially those of Quantity Surveyors) include the subject of Contract Law.

The root cause of many an inflated claim, is the inability of the Contract Administrator to identify the entitlement of the party or its limits. Similarly the unjust denial of a claim is mostly due to the ignorance of the entitlement of the other party. Both these failures of the Contract Administrators often result in disputes, which are quite abundant in the Construction industry.

Even the most praised top quality project, unique or otherwise, cannot be considered a success if it left one or more stakeholders dissatisfied. During the construction or following completion, if the parties are at arbitration, the Contract Administrators have failed in their duties.

Construction Methodology, quality control mechanism, measurement techniques and valuation procedures are all essential to the project but Contract Administration becomes of prime importance for a project to be successful.

Even the most praised top quality project, unique or otherwise, cannot be considered a success if it left one or more stakeholders dissatisfied. During the construction or following completion, if the parties are at arbitration, the Contract Administrators have failed in their duties.

Many incorrect practices exist in the administration of contracts and if they are to be rectified, all Contract Administrators need to be made aware of such incorrect practices and educated on what the correct practice should be. To this extent, those who employ Contract Administrators should encourage them to undertake further studies and CPD (Continuous Professional Development) as to the best practice techniques of Contract Administration. Additionally, University and Polytechnic study programmes for Contract Administrators (Quantity Surveyors, Engineers, Architects etc.) should expand their curricula to provide a complete education on how to identify the obligations, rights and liabilities of the parties under Construction Contracts, not only in the theoretical aspects but also in their applications.

Incorrect practices or any corrupt practices could also be regulated if there is an insistence on all Contract Administrators to become members of their respective Professional Institutions. All Professional Institutions require their members to be bound by their Codes of Conduct, and take disciplinary action if members are found to be in contravention. Until a Contract Administrator is admitted as a member of the relevant Professional Institution, he or she should attempt to be governed by a self imposed set of rules which would prevent the possibility of inadvertently veering into incorrect/corrupt practices, for which purpose, the following guide lines could be adopted (some of these are common to codes of conduct of many professional institutions):

- Do not misuse privileged information
- Observe confidentiality where specified
- Be honest in all professional dealings (Never claim more than justifiably due / Never deny a just and fair entitlement)
- Do not provide advice on matters beyond your competence
- Observe safety and environmental protection requirements
- Maintain a positive attitude and take positive action at all times
- Observe and perform your obligations and duties in a proper and timely manner
- Ensure fair treatment to everybody
- Avoid engagements bearing conflict of interest with your work
- Ensure Continuous Professional Development (CPD) (Undertake further studies in all the competence necessary for practising the profession).

Success of a project depends on the capabilities of the Contract Administrators. Unless the Contract Administrators exercise the Contract Administration best practice, the construction industry would continue to suffer from break-down of relationships and dissatisfied stakeholders as a result of disputes which inevitably end up in otherwise unnecessary, prohibitively expensive and extremely time consuming resolution processes.

Let us all work and contribute towards a better Contract Administration in the construction industry !

Investors Compensation Scheme Ltd -v- West Bromwich Building Society [1998]

The respondent gave advice on home income plans. The individual claimants had assigned their initial claims to the scheme, but later sought also to have their mortgages in favour of the respondent set aside.

Held: Investors having once assigned their causes of action to the ICS, could not later themselves sue to rescind their mortgages. In construing a deed of assignment, an ambiguity need not be established before the surrounding circumstances may be taken into account. Lord Hoffmann: "Interpretation is the ascertainment of the meaning which the document would convey to a reasonable person having all the background knowledge which would reasonably have been available to the parties in the situation in which they were at the time of the contract."
and
Lord Hoffman: "The meaning which a document . . would convey to a reasonable man is not the same thing as the meaning of its words. The meaning of words is a matter of dictionaries and grammars; the meaning of the document is what the parties using those words against the relevant background would reasonably have been understood to mean. The background may not merely enable the reasonable man to choose between the possible meanings of words which are ambiguous but even (as occasionally happens in ordinary life) to conclude that the parties must, for whatever reason, have used the wrong words or syntax. "

Application of ANN in construction Management

Sampath Suriyaarachchi *BSc(QS) Hons.*

Sampath Suriyaarachchi is a Quantity Surveyor graduated from University of Moratuwa Sri Lanka in 2006 with a second class upper division for the Honors Degree of Batchelor of Science in Quantity Surveying. After graduation, he also assisted the Department of Building Economics of University of Moratuwa for neural network methodology related researches. Since 2007, he has served as a Project Quantity Surveyor for Al Naboodha Engineering LLC, Dubai, UAE.

"Artificial Neural Networks (ANNs) offer an approach to computation that is different from conventional analytic methods. ANNs are an information processing technology that simulates the human brain and the nervous system. Like the human brain, neural networks learn from experience, generalize from previous examples to new ones and abstract essential characteristics from inputs containing irrelevant data" (Boussabaine, 1996).

What is an ANN: An ANN is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurones) working in unison to solve specific problems. ANNs, like people, learn by example. An ANN is configured for a specific application, such as forecasting, pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurones. This is true of ANNs as well.

Historical background: The first artificial neuron was produced in 1943 by the neurophysiologist Warren McCulloch and the logician Walter Pits. But the technology available at that time did not allow them to do too much. However, this field was established before the advent of computers, and has survived at least one major setback and several eras.

Why use neural networks: Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze. This expert can then be used to provide projections given new situations of interest and answer "what if" questions.

Other advantages include:
Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.

Self-Organisation: An ANN can create its own organisation or representation of the information it receives during learning time.

Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.

Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage.

Neural networks vs. conventional computers: Neural networks take a different approach to problem solving than that of conventional computers. Conventional computers use an algorithmic approach i.e. the computer follows a set of instructions in order to solve a problem. Unless the specific steps that the computer needs to follow are known the computer cannot solve the problem. That restricts the problem solving capability of conventional computers to problems that we already understand and know how to solve. But computers would be so much more useful if they could do things that we don't exactly know how to do.

A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze. This expert can then be used to provide projections on given new situations of interest and answer "what if" questions.

Neural networks process information in a similar way the human brain does. The network is composed of a large number of highly interconnected processing elements (neurones) working in parallel to solve a specific problem. Neural networks learn by example. They cannot be programmed to perform a specific task. The examples must be selected carefully otherwise useful time is wasted or at worse the network might be functioning incorrectly. The disadvantage is that because the network finds out how to solve the problem by itself, its operation can be unpredictable.

On the other hand, conventional computers use a cognitive approach to problem solving; the way the problem is to solved must be known and stated in small unambiguous instructions. These instructions are then converted to a high level language program and then into machine code that the computer can understand. These machines are totally predictable; if anything goes wrong it is due to a software or hardware fault.

Neural networks and conventional algorithmic computers are not

in competition but complement each other. There are tasks that are more suited to an algorithmic approach like arithmetic operations and tasks that are more suited to neural networks. Even more, a large number of tasks, require systems that use a combination of the two approaches (normally a conventional computer is used to supervise the neural network) in order to perform at maximum efficiency.

There are number of activities where ANN can be deployed in construction management as discussed below.

Predicting project cash flow and costs: An ANN system can be used to provide assistance to construction contractors in predicting, updating and managing (planning and controlling) project cash flow and cost. This will assist the contractor in taking necessary managerial action to avoid a shortage of cash, bankruptcy and to give early warning of cost and time overrun. The input of such a system would be based on the data collected by the cost system, cost estimating and planning.

Risk analysis: An ANN can be used as a tool to assist with decision making in financial investments and in assessing situations where opportunities for alternative contractual arrangements are available involving different allocations of risk and reward. In addition, it is possible to develop an ANN system to assess risks of project cost overruns and assist in developing contingency management strategies. Such a system could have sources of risk as (an) input/ inputs (for example, project complexity, unrealistic estimates, poor project specification, etc.) and a classification of risk and the range of likely estimates as the outputs.

Decision making: Many decisions take place under conditions of uncertainty. Construction managers take decisions with incomplete knowledge or knowing that the outcomes of these decisions are uncertain. While there are a number of mathematical and statistical models for assisting managers to take decisions, these models are based on probability and regression techniques whereby the best fit is sought. In addition, these models lack the ability to learn or generalize solutions from incomplete or previously unseen data. Here, the characteristics of ANNs offer a chance to match the problem's complexity.

Resource optimization: In construction management many problems are encountered that require minimizing costs by optimizing the contending factors. For example, one of the problems in construction is resource allocation. Many methods have been used to solve this problem. However, none of them have the complete ability to predict the effect of factors that affect the allocation of resources (e.g. design change, site conditions, plant conditions, etc.) and learn from experience. For such a complex problem, an ANN approach to predict and determine the priority ranking of resources would be of a great benefit to construction managers and planners.

Prediction of tendering outcomes: A neural network system can be developed to assist with the deliberation of the circumstances in which competitive or other type of bids should or should not be made and to help contractors to predict the results of a bid before embarking on the costly process of estimating and costing of the bid, as a result of assessing the risk involved in a particular bid or contract accurately.

Classification and selection: The selection and classification of construction material, plant, construction methods, etc., is a complex problem and has to be based on experience and judgment. Information and knowledge about the processes of selecting and classifying these resources together with data about the strengths and weaknesses, in meeting operational requirements and the general priorities and preference of industry uses of existing comparable construction technologies could be used to train a probabilistic neural network system to assist in the selection and classification of these expensive resources.

Because of valuable characteristics, which are unavailable in conventional prediction and optimization techniques, ANNs have been successfully applied to a number of diverse fields of construction management. Boussabaine (1996) identified several applications of ANNs to construction management. They can be listed as follows:

1. An ANN- based approach for predicting the adoption potential or acceptability of a new construction technology
2. An application of three-layered back-propagation (BP) network to forecast the construction duration of buildings at the pre-design stage
3. ANN-based optimizing method for the sequencing of construction tasks with the objective of minimizing production time
4. ANNs for mark-up estimation
5. An ANN model forecasting residential construction demand
6. Selecting vertical formwork systems
7. An ANN base model for identifying the key management factors affecting budget performance in a project
8. A model for estimating construction cost.
9. A trial neural network system for optimum mark-up estimation under different bid situations
10. A back-propagation ANN model to predict the changes in construction cost indexes
11. Two ANN modules for estimating excavation capacity based on job conditions and estimating excavator efficiency based on the attributes of operation elements
12. A model for decision making about construction modularization using ANNs

Therefore the ANN technology which can assist in decision making and can serve to preserve scarce expertise in organizations will be very useful for success of construction management.

Reference:

1. BHOKHA, S. & OGUNLANA, S.O., 1999. Application of artificial neural network to forecast construction duration of buildings at the pre design stage. *Engineering Construction and Architectural Management*, 6(2), 133-144.

2. BOUSSABAINE, A, H., 1996. The use of artificial neural networks in constriction management: a review. *Construction Management and Economics*, 14, 427-436.

3. BOUSSABAINE, A, H., 2001a. Neurofuzzy modeling of construction projects' duration II application. *Engineering Construction and Architectural Management*, 8(2), 104-113.

4. BOUSSABAINE, A, H., 2001b. Neurofuzzy modeling of construction projects' duration II application. *Engineering Construction and Architectural Management*, 8(2), 114-129.

5. BOUSSABAINE, A. H. & DUFF, R.A. 1996. An expert-simulation system for construction productivity forecasting. *Building research and information journal*, 1,279-286

What is this Employer-Employee vicarious liability?

Nadeera Dayal Nenatunga

Nadeera Dayal Nenatunga, attached to DG Jones International Dubai as a Quantity Surveyor since 2007. He has over ten years experience in quantity surveying practice in Sri Lanka, and Sultanate of Oman.

When one person is liable for a tort of another person, even though the first person was not directly responsible for the injury resulted from that tortious act; it is called vicarious liability. In such a way, an employer sometimes can be vicariously liable for the acts of a worker, i.e. an employer is not always liable for a tort of a worker. Therefore it is worth to consider these situations and conditions.

It can be clarified that an employer is vicariously liable for the torts committed by an employee (intentionally or negligently) **in the course of his employment**. However, generally an employer is not liable for torts committed by an independent contractor.

The most important element in vicarious liability is that the wrongdoer can be in the position of a servant or employee, and that the tort is connected to the employee's course of employment. Therefore, it is very important to identify whether there is an employer-employee relationship and if so, whether the employee was acting in the course of his employment.

Sometimes, it is difficult to decide whether the person who committed the tort is indeed an employee of the concerned employer; especially when a tort is committed while an employee has been seconded/ hired/ loaned to another employer, and if, he is a more skilled worker. In such a situation, the courts have devised a number of tests which can be briefly stated as:

- **The control test:** i.e. the importance of who controlled or gave orders to the employee.
- **The integration test:** i.e. the importance of the work to the organization; was it an integral part of the business?
- **The multiple test:** i.e. various factors which can be said to constitute employment; for example payment, pensions, and who gives the orders.

As the second element, an employee is said to be acting in the course of his employment if the act which constitutes the tort is:

- Expressly
- authorized by his employer; or
- impliedly authorized by his employer; or
- incidental to an authorized act; or
- a method, even if an improper one, of carrying out an authorized act.

Number of examples can be given, related to the vicarious liability, by the previous cases in English Law:

- in *Fennelly v Conex South Eastern Ltd* (2000) case, Fennelly, railway passenger, was assaulted by a ticket inspector, after Fennelly refused to show his ticket. It was held that the company is vicariously liable for the tort committed by the ticket inspector.

The most important element in vicarious liability is that the wrongdoer can be in the position of a servant or employee, and that the tort is connected to the employee's course of employment.

- in *Century Insurance Co v Northern Ireland Road Transport Board* (1942), a petrol tanker driver was delivering petrol to a garage. While the petrol was flowing he lit a cigarette and negligently threw away the lighted match, causing an explosion and extensive damage. Finally, it was held that the driver was still acting in the course of his employment, since part of his job was to wait while the petrol flowed; although lighting the cigarette was for his own benefit, not his employer's; that was not enough to relieve the employer liability.

- in *Limpus v London General Omnibus Co* (1862) case, the drivers of horse-drawn buses were expressly forbidden to race their buses. However, one did so and caused an accident. It was held that the company was vicariously liable; even though the act was expressly forbidden, the driver was performing an authorized act (driving the bus) in an unauthorized way.

- in Rose v Plenty (1976) case, a milkman took a 13-year-old boy to help him on his round, and the boy was injured through the milkman's negligent driving. The Court of Appeal found the employer was vicariously liable for the boy's injuries even though the act was against company orders. The boy was actually helping to deliver the milk, and so the driver's action was an unauthorized way of performing his duties.

However, if, an employee radically departs from what he is authorized to do, and he is on a frolic of his own, the employer is not liable for the torts committed by that employee.

One of the examples is Beard v London General Omnibus Co (1900) case where the bus conductor turned the bus around and in doing so injured the plaintiff. He was held to have been acting outside the scope of his employment (he was not employed to drive buses) and so his employers were not liable.

Also, in Heasmans v Clarity Cleaning Company (1987), an agency cleaning lady made a series of unauthorized telephone calls in the office which she was cleaning. The office wanted to recover the cost of these calls from the agency which employed her. It was held that the cleaning lady was not acting in the course of her employment when she was making the telephone calls, and therefore it followed that the agency was not liable for the cost of the calls.

When the issue comes to an independent contractor, generally an employer is not liable for torts committed by independent contractors. However, if, at least one of the following facts is presented, the employer is liable for the torts committed even by an independent contractor.

- The client has authorized the tortious act; e.g. a client of an independent building contractor authorises the contractor to carry out work which will undermine the neighbour's supporting wall.

- There is exceptional risk; e.g. Honeywill and Stein v Larkin Bros Ltd (1933) case, where the client engaged independent contractors to take flash photographs of the interior of a cinema. The client was held liable for the independent contractor's negligent use of the magnesium flash powder which resulted in the cinema burning down.

- Non-delegable duty; i.e. an employer's personal duty to provide for the safety of his employees. As an example, in McDermid v Nash Dredging (1987) case, an employee had been 'lent' to an owner of a tug-boat. The tug-boat owner had negligently caused that employee to suffer injury; it was held that the original employer (of the employee) owed to the employee non-delegable duties, and as he had breached those duties, through the agency of the tug-boat captain, the employer was vicariously liable to the employee for the acts of the tug-boat captain.

- Negligence selection; e.g. the client has himself been negligent by not selecting a competent contractor to carry out the work.

However, even in circumstance where the law recognises a non- delegable duty, it is usually said that the client/employer is not responsible for casual or collateral negligence of the independent contractor unless in the case of negligence in the very act which he is employed to carry out. Thus in Padbury v Holiday and Greenwood Ltd, where a workman employed by sub-contractors negligently left an iron tool on a window-sill and it fell on to a passer-by, the client of the sub-contractors were held not liable.

Some one may think that in this type of situations, the employee is the only one liable for the injury where vicarious liability is applicable. In most of the cases where vicarious liability is imposed on an employer, both the employer and employee are liable. However, defendants always try to sue the employer, looking for more benefits.

By considering the above facts and previous cases, it can be concluded that the most important element to establish a case for vicarious liability is that the wrongdoer be acting as a servant or employee, and that the wrong done be connected to the employee's course of employment. Also, it is clear that the employer is not always liable for the torts committed by the people that he employs to carry out work.

W Higgins v Northhampton Corporation (1927)

The contractor made an error in pricing in a tender for 58 houses. As a result of the error, the price quoted was £1,613 per pair instead of £1,670 per pair. On discovering the error, the contractor sought to be released from the contract.

Held that they were bound by the terms of the contract as signed.

SLQS JOURNAL

January 2009

Simulated Earned Value Management: An Innovative Monitoring and Forecasting for Project Control (Part one)

Prabath Hemachandra *M.Sc.*

Project Management Specialization
Schulich School of Engineering,
University of Canada
Canada

Janaka Ruwanpura *Ph.D, PQS (Canada), FIQS (SL)*

Canada Research Chair in Project Management Systems
Director and Associate Professor, Project Management Specialization
Schulich School of Engineering, University of Canada
Canada

Abstract:
Earned value management (EVM) is one of a widely used control tools in project management. In addition to providing vital information regarding the status of a project in terms of budget and schedule at any given time, it could forecast the ultimate outcome of the project with a set of limited assumptions. However, EVM has limitations when it comes to proactive decision making in handling uncertainties. This paper presents the development of a tool integrating Monte Carlo simulation with EVM method to assist project managers to reduce adverse impacts on projects due to uncertain situations. Simulated Earned Value Management Tool (SEVM), can simulate cost and duration outcome for each activity of a project and has the capacity to incorporate the current progress of all the activities. This simulation tool provides information on a) probability of completion for a given cost and time and b) range estimation on the cost and schedule performance variances and indices at any future date until the project completion, both of which enables the project manager to identify different cost and schedule outcome combinations and timeframes where adverse impacts are more significant.
Keywords: Cost, Schedule, Earned Value, Simulation, Stochastic

1. Introduction

Success of a project is defined based on the performance of number of project parameters such as the project cost, duration, scope and performance. Numbers of tools were developed over the years to support the project managers to achieve these project objectives. Earned Value Management (EVM) which integrates the cost, time and scope parameters has proven itself to be one of the most effective performance measurement and feedback tools for managing projects. EVM is the most commonly used method of project performance measurement (PMBOK Guide, 2004). According to the conclusions of a number of qualitative researchers, Earned Value Management could be an effective project control and management methodology (Vargas, 2003; Marshall 2006).

Since the introduction of EVM in 1960's, it has been successfully used in different industries with varying level of complexity in project management. Earned Value Management system, which was initially named the Cost/Schedule Control System Criteria (C/SCSC) by the originators at the United States Department of Defence, has evolved in terms of theoretical basis and also in terms of application practices (National Defence Industrial Association, 2004). With the introduction of government guidelines for the use of EVM in the United States, the earned value management process has become more streamlined (Marshall, 2006).

Success of a project is defined based on the performance of number of project parameters such as the project cost, duration, scope and performance.

Earned Value Management is a project control methodology that integrates cost and schedule performance into a single set of parameters. Earned Value Management system measures the actual project progress at a given point in time against the baseline of time and cost estimates prepared at the beginning of the project. Generally the system is used as a monitoring and a forecasting tool for project control. Previous researchers have identified that EVM contributes to 1) project planning, 2) project control and 3) the final project success. These researchers have identified the importance of EVM as a project monitoring tool, but not as a strong project forecasting tool.

For effective project control, it is important not only to monitor the time and cost variances of the actual project progress, but also to properly establish the project outcome at the completion. A forecast looking into the future of the project is necessary for the project manager to determine if corrective actions are required to minimize the expected variances from the planned performance. Accurate cost and schedule forecasts are difficult to be generated because of the impact of events such as unforeseen cost changes, material delays, scope deviation etc.

Final project cost and duration can be estimated using two approaches: deterministic forecasting and probabilistic forecasting (Barraza et al. 2004). Project forecasting involves predicting the outcome of a future event. Risks and uncertainties in future events makes project forecasting a difficult process. Traditionally, project planners predict the most likely outcomes of future events and generate a deterministic plan based on these outcomes. The major limitation of the deterministic plan is that it considers only one single outcome and ignores all the other possibilities. Probabilistic or stochastic planning approach was evolved to address the limitation of deterministic planning. Probabilistic planning considers variability in project parameters and develops stochastic cost and schedule estimates for the project. Monte Carlo simulation is a commonly used tool in generating probabilistic project estimates and schedules. This paper describes a new and innovative tool that integrates EVM and probabilistic project planning and control.

2.Earned Value Management System

The most attractive feature of Earned Value Management is its unique metrics. This metrics consists of key parameters which are the building blocks of the earned value management system, performance measures and forecasting indicators. Through this metrics, Earned Value Management integrates the project scope, cost and schedule. Earned value performance measures and forecasting indicators are calculated from three parameters of project scope, cost and schedule. Conceptually the earned value management system integrates the cost and schedule measurement. Figure 1 provides a graphical representation of the three parameters on a project Time – Cost graph. The three key parameters of EVM are:

1. Planned Value (PV) or Budgeted Cost of Work Schedule (BCWS): Planed Value is the cumulative budgeted cost at a given time point on the baseline schedule. The planned value graph provides the budgeted time – cost combination from the project start to the project end. Calculation of BCWS is based on the baseline schedule and the project budget.

2. Earned Value (EV) or Budgeted Cost of Work Performed (BCWP): Earned value is equal to the cumulative budget cost of the work completed. This integrates the budget into the actual progress of the project. The actual cost and the earned value represent the same amount of work completed, but differ in the value as earned value cost the completed work according to the budget rates. As this uses the original budget rates to value the work completed, it represents the value of the work earned by the project performer.

3. Actual Cost (AC) or Actual Cost of Work Performed (ACWP): Actual Cost is the cumulative project cost that was incurred at a given time point of the project. The details relating to the actual cost is exclusive from the baseline budget or the schedule. The actual cost incurred for each time unit is derived through the cost accounting system.

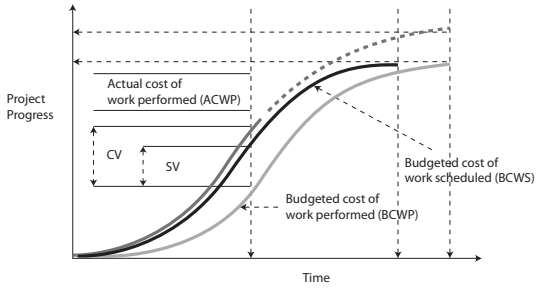


Figure 1: Graphical presentation of key Earned Value Parameters

Earned Value Management has originated as a project monitoring tool that integrates the cost and the schedule. The EVM metric consists of number of performance measures developed to monitor the project progress. There are two types of performance measures, namely, variance measures and index measures. The variance calculates the deviation of the actual performance from the baseline as an absolute figure while the index reports the deviation as a ratio. Though the variance in an absolute figure, it does not provides- deleted a good indication on the magnitude of the deviation across the whole project time line. Performance measures used in EVM are Cost Variance (CV), Cost Performance Index (CPI), Schedule Variance (SV) and Schedule Performance Index (SPI). A variance with a smaller value at the early stage of the project may have a larger relative deviation than a larger variance at the later stages of the project. Hence, the index provides a better monitoring indicator compared to the variance. Cost variance (CV) compares the earned value of the project at a certain time point against the actual cost at that point. The following formulas calculate the cost variance and cost performance index.

Cost Variance (CV) = Earned Value (BCWP) – Actual Cost (ACWP). **(1)**
Cost Performance Index (CPI) = Earned Value (EV)/ Actual Cost (AC) **(2)**

Both the earned value and the actual cost represent the same amount of work completed up to the calculation point but use different cost rates. A positive cost variance indicates a favourable situation where actual cost incurred is less than the anticipated value according to the budget. CPI compares earned value against actual cost in the form of a ratio. An Index Value greater than 1 indicates a favourable project situation. General schedule monitoring tools measure the schedule variation in time units, though, the earned value

management system calculates the schedule variance in terms of cost units. The following formula is used to calculate the schedule variance. Schedule Performance Index represents the schedule variance in the form of a ratio.

Schedule Variance = Earned Value (EV) – Planned Value (PV). **(3)**
Schedule Performance Index (SPI) = Earned Value (EV) / Planned Value (PV) **(4)**

Similar to the cost variance, a positive variance is associated with favourable project progress. Both the earned value and the planned value are measured in budgeted cost units. Earned value represents the completed work at a monitored time point while the planned value represents the work that should have been completed according to the baseline schedule by that time. Hence the difference between these two parameters relates to the deviation in the schedule, calculated in terms of cost units.

The forecasting indicators of the earned value metric provide the forecasted cost and duration at the project completion. Budget at Completion (BAC) refers to the predicted budgeted cost and time value at the project completion. Two levels of forecasting indicators are defined.

- Estimate to Completion (ETC): Estimate to Completion measures the cost and time value of the remaining work of the project.

- Estimate at Completion (EAC): Estimate at Completion provides the time and cost details at the completion of the project.

The relationship between EAC and ETC is given in equation (5).

EAC = ETC + Actual Cost or Time of the work completed.**(5)**

3.Simulated Earned Value Management Tool

Though many researchers have concluded EVM as a strong project monitoring tool, evidences on its strength as a project forecasting tool is not conclusive. Following highlight the limitations of earned value management as a forecasting tool.

- Standard forecasting indicators of EVM, ETC and EAT focus on the project completion point. The calculation algorithms can be used to forecast the time or cost estimates for a different time point other than the project completion, yet not a standard feature of the EVM.

- Cost forecasting methods and time forecasting methods of EVM are not interrelated. Several methods are used to forecast the cost at the completion, but only three methods are available for the foresting of the time at the completion. Each of these methods is based on specific assumptions which may not hold true.

- EVM forecasting methods follow mathematical models and consider only deterministic situations. These methods provide single value estimates for the time and cost EAT which could be the best estimate. As some researchers have concluded (Barraza et al 2004), the most likely estimate is more likely to never take place. Compared to the single value estimates, probabilistic estimation provides an accurate picture about the future outcome.

The main objective of the Simulated Earned Value Management (SEVM) framework is to develop a tool that counteracts these limitations of traditional EVM. It provides a platform to perform probabilistic forecasting with earned value management. The tool integrates the earned value management process with simulation based risk management process to eliminate the limitations discussed above. The SEVM tool uses Monte Carlo simulation to increase the forecasting strength of conventional earned value management process. The tool adds two components to the earned value management process, the simulation platform and the earned value distribution analyser. Figure 2 shows the process flow of SEVM.

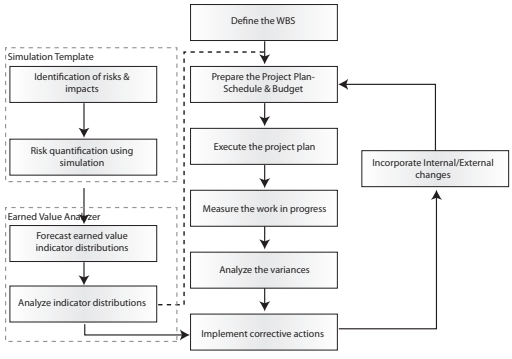


Figure 2: SEVM Process Flow

The first component is the Schedule – Cost network simulation template. This template was created using Simphony, a special purpose simulation capable computer application (Mohamed and Abourizk, 2005). Schedule - Cost network simulation template provides the environment to model the project network and carry out Monte Carlo simulation. User can model the project scheduling network within the template and input various information for each activity on the project network. These include the budgeted cost and duration, range estimates for cost and duration, the relationship and lag between activities. The Simphony simulation template stores all the output data in a Microsoft Access database.

The second component is the earned value analysis and reporting module. The output data from this module is used to carry out further analysis and generate various reports. Earned value analysis and reporting module carries out the secondary calculations utilizing the data generated from the Monte Carlo simulation. This module was developed as a separate stand-alone application from the simulation module. Microsoft Visual Basic was used as the programming language for the development of this application. Output generated through this module is categorized into four categories. Under each category, a different set of information is provided in various forms which can be used for decision making throughout the project life cycle. In addition to generation of these outputs, this module carries out detailed calculations which transform Monte Carlo simulation output data into a different set of information which can be used to provide additional outputs. The four main categories of output are as follows:

1. Simulated Time – Cost distribution for the entire project
2. Project finish parameters
3. Earned Value Variances and Indices distributions
4. Activity performance information

Figure 3 and 4 provide the list of information collected from the simulation. Utilizing the data generated from the simulation, the application calculates the cumulative cost at each time point of the project for the baseline network and also for each simulated network. The cumulative earned value at each time point is also calculated for all the networks. The underlining assumption made in this method of calculation is that the progress rate of work for a given activity is uniform throughout the activity duration. This implies that for a given activity in a certain simulation run, the amount of work completed and the cost incurred during a single time unit remain the same throughout the activity duration. The calculated budgeted cost, actual cost and the earned value of each simulation run are used to generate all the outputs of the application. Figure 3 and 4 provide graphical representations of following information according to the Activity on Arrow network notations.

1. Information relating to the Baseline
   - Budgeted Duration : BD
   - Budgeted Cost : BC
   - Early start time on the baseline network : ESB
   - Early finish time on the baseline network : EFB
   - Late start time on the baseline network : LSB
   - Late finish time on the baseline network: LFB

2. Information collected for each simulation run
   - Actual Duration: AD
   - Actual Cost: AC
   - Early start time on the simulated network: ESA
   - Early finish time on the simulated network: EFA
   - Late start time on the simulated network: LSA
   - Late finish time on the simulated network: LFA

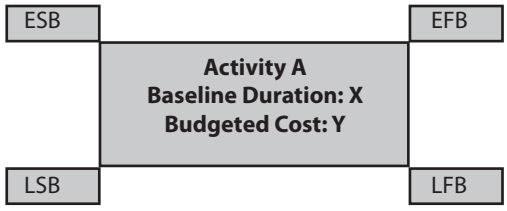


Figure 3: Baseline Data collected for each Activity

- Weather the activity is on the critical path: CI`

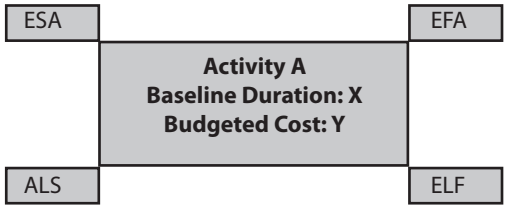


Figure 4: Simulated Data Collected for Each Activity

Calculation of earned value data is based on three assumptions:

- Activities are continuous,
- Activities start on the early start date,
- The work progress rate of an activity is uniform for the activity duration.

The application is designed in such a way that it can compare two simulations carried out at different time points for the same project. The user can select the time point of these two simulations. All the output information provided in this paper relates to a project selected for verification purpose of the application. The project duration is 100 weeks. Simulations were carried out at two different time points. The first simulation was conducted prior to commencement of the project and the second simulation was carried out after completion of 20 weeks. Throughout this paper, the "*original simulation*" refers to the simulation conducted prior to the project start and the "*updated simulation*" is referred to as the updated simulation. ***(to be continued)***

ACKNOWLEDMENTS:

The authors wish to acknowledge the support and funding for this research project provided by Bantrel Inc. and the expert guidance provided by Mr. Roger Mapp, Executive Vice President of Bantrel Inc. The authors also acknowledge the Canada Research Chair Program as this research was conducted under one core pillar areas of the Canada Research Chair in Project Management Systems hosted by the second author of the paper.

REFERENCES

Barraza, G.A., Back, W. Edward, and Fernando, Mata (2004). "Probabilistic Forecasting of Project Performance Using Stochastic S Curves." *Journal of Construction Engineering and Management*, American Society of Civil Engineers, 130(1), 25 – 32

Hemachandra, P.S. and Ruwanpura, J.Y. (2008). "Probabilistic Earned Value Forecasting and Activity Performance Index Using Monte Carlo Simulation" Proceedings of the CSCE Annual Conferences, Quebec City, QC

Marshall, Robert A. (2006). "The contribution of earned value management to project success on contracted efforts: A quantitative statistics approach within the population of experienced practitioners." PMI (www.pmi.org). Retrieved on 2008-02-09

Mohamed, Y. and AbouRizk, S.M. (2005). Framework for Building Intelligent Simulation Models of Construction Operations, *Journal of Construction Engineering and Management*, ASCE, 131(3), 277-291.
National Defence Industry Association. (2004). *Integrating Risk Management with Earned Value Management.*

PMI Standards Committee (2004). *A Guide to the Project Management Body of Knowledge: PMBOK©* Guide, Third Edition, Project Management Institute, Newtown Square, Pennsylvania.

Vargas, Ricardo Viana, (2003), "Earned Value Analysis in Control of Projects: Success or Failure?" Association for advancement of cost engineering Transactions, CSC 21.1

Arbuthnot and Others -v- Feltrim and Others; Deeny and Others -v- Gooda Walker Ltd and Others (1993)

Lloyds' names sought damages from their underwriting agents for negligence. The court had to decide as a preliminary issue whether any duty of care arose to the names.

Held: Until 1990, names signed an agreement with a member's agent who in turn arranged for them to be served by an underwriting agency, who, and again in turn, wrote insurance business on their behalf. Some members combined these two functions and were known as 'direct' names, and others were known as 'indirect' names. The underwriting agents had absolute discretion as to what business was to be written, and could appoint sub-agents. This very wide discretion and the unlimited liability of names and payments made to underwriters, required the underwriters to exercise a duty to exercise reasonable care and skill. That could only be excluded by the clearest of contracts. Contractual obligations might replace common law duties of care, but in this case these obligations for direct names were identical. For indirect names, the obligation existed in negligence only. This case did not require any extension of the law of negligence. Any delegation to managing agents did not alter the implicit promise to members

Claims: Understanding of its Generation

Chaminda Jayasooriya *BSc(QS) Hons, MRICS, MBA*

Chaminda Jayasooriya, has been involved in some major mixed use developments projects. He is currently attached to Mace International Limited in their Abu Dhabi operations. Apart from his project related role; he is currently acting as a Mace internal trainer on claims related topics, a counsellor and panel member of the RICS Assessment of Professional Competencies.

Background

Claims is one of the most talked about topics being discussed in the Construction Industry. Various studies show that over 20% of the project team's time is spent directly or indirectly on claims or claims related events or issues. It is also revealed that over 50% of this time would result in achieving hardly any productive outcome. One of main reasons for this unproductive situation is the lack of understanding of the essence of contract by the parties involved in a contract. If the parties involved in a contract understand and appreciate those essential elements of contract and how they function, it would help to avoid protracted and unproductive negotiations that would unnecessarily cost money and time. This article attempt to demonstrate the importance of understanding the essence of a contract to the parties involved in a contract.

Essence of a contract

Allocation of Risks

Risks defined in the contract are allocated to either of the parties and will specify which of the parties bear the risks elements which might or might not occur. All efficiently written contracts will specify clearly the available provisions to each party if such matters occur.

For example, in traditional form of contracts such as FIDIC Red Book the Employer provides the design (the employer appoints another party to design the work). The risk of any design error and late issue of drawings are therefore attributed to the employer. On the other hand the contractor may provide both design and execution, as in the example, in which the 1999 FIDIC Yellow Book contractor bore the risks attributed to the design.
Therefore, it is vital to understand the risk elements of each party in a contract and how those operate.

Rights, obligations to perform and liabilities.

All efficiently written contracts will provide each party to a contract to enjoy rights, obligations to perform and liabilities incurred arising from failure to properly perform those obligations.

For an example, under 1987 FIDIC Red Book, the Contractor agrees to complete the Works within the Time for Completion. Conversely he is to have that time to complete the Works. The employer is not given the right to reduce the time of omitted work from the total time for completion. However, the Employer has a right to consider the impact of the omitted work to the programme of complete work when the Engineer determines any extension of time for any other Employer's risk events.

Claims is one of the most talked about topics being discussed in the Construction Industry. Various studies show that over 20% of the project team's time is spent directly or indirectly on claims or claims related events or issues. It is also revealed that over 50% of this time would result in achieving hardly any productive outcome.

It is very important to understand and abstract the above essence discussed in every clause of the Contract. Following table attempts to identify the rights, obligations and liabilities of each party under 1987 FIDIC Red Book for payment as well as time for completion clauses. It is very important to understand that most of the above essences are not written into each clause but are interlinked in the Contract as a whole. Therefore, if anyone attempts to abstracts the above essences from the contract, he has to first try to highlight the clearly written provisions in the clause and then try to view that in relation with the Contract as a whole.

Event	Payment (Clause 60)		Time for Completion (Clause 43)	
	Employer	Contractor	Employer	Contractor
Rights	To have a defined duration for payment upon receiving the Payment Certificate from the engineer	To receive the payment within the specified duration	Receive the project on Time for Completion	Having defined Time for Completion
Obligations	Pay within the specified duration	To submit the payment application on time	Refrain from changes to the defined scope which leads to Extension of Time	Complete within the Time For Completion
Liabilities	Pay interest / face Termination of the Contract	Late submission of the application / improper submission will delay the payment	Late receipt of the project and/or pay cost for extension	Pay Liquidated Damages / Penalties

What is a 'claim'?

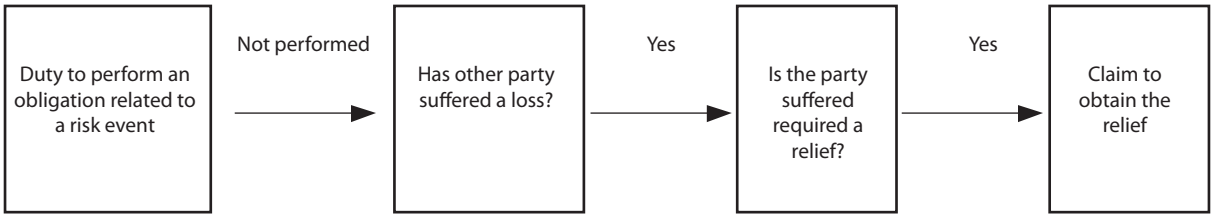
A claim can be defined as a "submission by the contractor concerning any matter for which the contract expresses explicit entitlement for his benefit, whether as to time or as to money, or for which he reasonably considers the contract to afford him implicitly or tacitly such entitlement".

Claims usually arise where the employer has undertaken a risk (an obligation to perform) and he/she or his/her agent has failed to perform that obligation related to the risk undertaken. For example, under FIDIC Red Book the Employer provides the design. The risk of a late issue of drawings which would result in an extention of the Time for Completion and extra cost are therefore attributing to the Employer and will often result in the contractor submitting a claim.

Following flow chart would demonstrate the graphical representation of the proposed framework for claim generation discussed under the above paragraph.

Conclusion

It is essential that parties to a contract must understand the risks, rights, obligations to perform and resultant liabilities to be faced arising from failure to properly perform those obligations. It is also noted that every single clause of a contract describes the parties risks, rights, obligations to perform and resultant liabilities. Therefore, it is recommended that the parties would read the contract clauses to understand its essence inline with those essential elements discussed above.



Framework for claim generation

It is very important to understand that in order to obtain a successful claim determination or award, the claimant must demonstrate that the party who assumed the risk of the event failed to perform his obligations under the Contract and therefore, the clamant has suffered a loss which cannot be reversed or completely mitigated. The next step of the claim process then would be the demonstration of the claimant's rights to receive a relief under the provisions of the Contract or beyond the contract where necessary. Based on the above basic rules a claim can be prepared and submitted to the engineer for his decision.

Need for an Effective Contracts Management in Execution Phase of Projects

By Hilary Fernando *MBA* (Aus)

26 Years experience in the Middle East, engaged in many different roles such as an Estimator, Quantity Surveyor, Project Coordinator, Project Manager, and Contracts Manager. He is presently working in Special Projects section of Contract Department of Qatar Petroleum.

The construction industry in the Middle East is becoming competitive and is suffering from low margins and the Contractors are having difficulties in making projects profitable due to various reasons. Therefore, the need for an effective Contracts Management setup is very important from the initiation to the closeout process of a construction project and this discipline is observed from a different perspective depending upon the requirement of various role players in the industry such as Clients, Consultants, Project managers, Contractors, etc. In most occasions, due to the Clients urgency for an early start of a Project, the decision of project execution falls under different calcifications based on the available Contract Management standards. Purpose of writing this letter is to highlight the need of an effective Contracts Management function, specifically during execution phase of the Project.

Regardless of the type of contract being executed, it is the general tendency that the Engineer and Contractor do always argue about the compensations in variations for additional work that occur during a project. In construction projects today, the project management has to deal with a large amount of variations and additional work due to several causes, probably the major cause resulting from parallel design changes. Consequence of early starts is the concentration of project time. The lack of time might result in poor revision of contractual documents e.g. if the drawings are not updated, will cause a problem in the construction phase, since a fundamental assumption of contracts is that drawings are valid. Since the amendments or variations are so frequent in contractual documents, there is a significant risk that this fundamental rule is neglected because there is no time or routines to update drawings and responsibility is spread among different functions. In most occasions, it is difficult to make a detailed planning in the initial phase of the project, since the conditions for the construction keeps changing everyday. In this busy environment important contractual issues may be ignored. A better Contracts Management practice could be a way of handling the changing conditions in a constructive way.

Repeated revisions to contractual documents due to never ending changes have become a fact of life. The Contractor has to be aware of how to handle all these changes in an effective and timely manner and the project management also needs to be aware of all obligations and opportunities the contract states. One of the key solutions is to work more efficiently and effectively with the governing contract by appointing a Contracts Manager. The responsibilities of a Contract Manager is to follow up all contractual circumstances between the parties such as Client and the Contractor, to establish contract administration systems, identify critical contractual issues, to manage variations and additional work and to release notifications to concerned parties. A Contract Manager should establish understanding for and raise awareness of contractual issues within the project organization. In general, a Contract Manager will ensure that all variations and additional work are taken care with due diligence.

Regardless of the type of contract being executed, it is the general tendency that the Engineer and Contractor do always argue about the compensations in variations for additional work that occur during a project.

Contracts Manager should effectively support the role of Engineer, strengthen the relation between different role players and prevent conflicts and misunderstanding through better contract awareness. In the event of unforeseen circumstances on site, there is always a tendency to find urgent solutions in order to allow rest of the work to continue. A delay in work means loss of time and money. Most occasions, the course of the delays are mainly due to changes, which result in many variations and additional work even to the extent of remobilization of labor and machinery from on-going work. Out come of this would be the time extensions and re-programming of work. The use of contracts to make proper valuations of additional work, so that adequate compensation is paid out, could help management to handle the situation effectively. When

a deviation is discovered, it demanded attention. If contractors do not notify clients when variations occur in full extent and its rightful compensations would be lost. Sometimes this is caused by insufficient contractual knowledge or lack of time could be another reason. Therefore there is a need for a resource that has profound contractual knowledge, i.e. the Contracts Manager.

Proper documentation enables the Contractor to prove what has really been produced. This proper documentation is essential for a Contract Manager when the function shall ensure right compensation for all the work executed including variations and additional work. Good communication is seen as the most fundamental factor to succeed, making routines for communication is of importance for all parties involved in a construction project, both internal and external. Communication is not only a tool for getting knowledge it is also a tool for the Contracts Manager to inform other parts of the organization about contractual issues and legal matters.

In connection to scope changes, it is also important to make proper notifications, which are usually specified in the contract i.e. when, to whom and how the variation shall be notified. In connection with variations, additional work and notification the contractor needs to identify which parts of the executed work that has to be documented, in order to have proof when claming compensation for the work and to have back-up in a possible conflict situation. To avoid conflicts and misunderstandings it is essential to know what has been specified in the contract, that had been agreed with and having an open dialogue and good communication with all role players in a project. It is important to not see the increased focus on contractual matters as an aggressive form of action. The meaning is not to violate the trust culture that exists in the region, but rather to see the increased focus on the contract as an action for preventing conflicts and misunderstanding by a better contract knowledge, which would benefit Client and the Contractor. The contracts manager function would also work preventively with the contract in order to identify critical parts in the contract, would remedy these and by that would save money and time for all players in the project.

Today's construction industry recognizes the advanced function of Quantity Surveyor, better adapted to the present characteristics of the construction industry. In other words, the role of the Quantity Surveyor is widened to encompass the strategic function of managing contracts during the execution phase of the Project in particular, to handle the role of Contracts Manager. This function that works strategically and preventively with contracts should be a knowledgeable person who pioneered in quantity surveying field with thorough knowledge in commercial and legal matters in order to identify opportunities that would benefit the organization. The future for construction sector in the Gulf looks extraordinarily bright. Many countries in the Middle East is driven by its rapid economic growth, and sheer force of new ideas which powering an unprecedented surge in the construction activities. I strongly believe that an effective Contracts Management is one of the key elements in facilitating this goal to support Construction boom in The Middle East.

Hunter and Others -v- Canary Wharf Ltd; Same -v- London Docklands Development Corporation [1997]

The claimant, in a representative action complained that the works involved in the erection of the Canary Wharf tower constituted a nuisance in that the works created substantial clouds of dust and the building blocked her TV signals, so as to limit her enjoyment of her land.

Held: The interference with TV reception by an adjoining development is not capable of being nuisance to land in law. An action in private nuisance will only lie at the suit of a person who has a right to the land affected. When assessing damages for nuisance, loss of amenity was an appropriate measure where no capital loss was established and loss of use was an additional head. Nuisance is a tort directed at protection of interests in land only. (Lord Lloyd of Berwick) "Private nuisances are of three kinds. They are (1) nuisance by encroachment on a neighbour's land; (2) nuisance by direct physical injury to a neighbour's land; and (3) nuisance by interference with a neighbour's quiet enjoyment of his land".

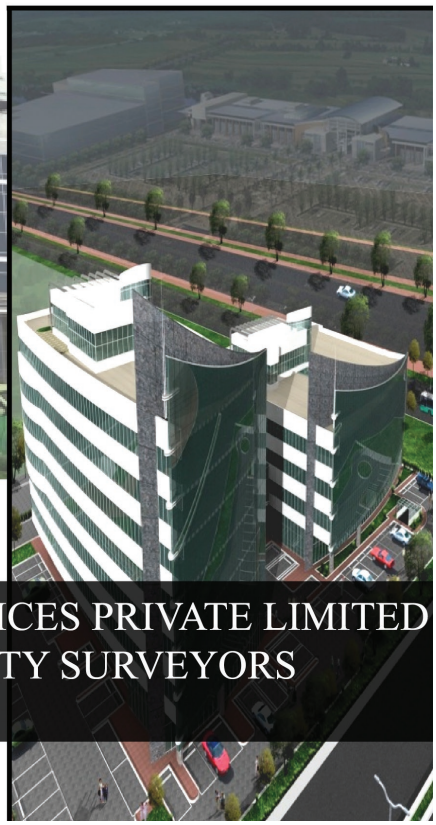
الخبراء العرب
arab experts
للاستشارات الهندسية
engg. consultants

Dubai, P.O. Box: 11057
Tel. :04 -3240444
Fax :04 -3240222
www.arexconsult.com
info@arexconsult.com
arexeng@eim.ae

ARAB EXPERTS ENGINEERING CONSULTANTS (AREX) – DUBAI, UAE

OFFERS

QUANTITY SURVEYING
&
PROJECT MANAGEMENT
CONSULTANCY SERVICES



IN ASSOCIATION WITH

CCS

COST CONSULTANCY SERVICES PRIVATE LIMITED
(CCS) CHARTERED QUANTITY SURVEYORS
COLOMBO, SRI LANKA

www.slqs-uae.org
journal@slqs-uae.org