ASSESSING THE FEASIBILITY OF USING VALUE MANAGEMENT TO ACCELERATE THE IMPLEMENTATION OF SUSTAINABILITY

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ABSTRACT: The present demand for economically viable buildings in the Saudi Public Sector is coupled with the need to maximise the efficient use of Saudi Arabian natural resources. The lack of consideration paid to sustainability issues during the concept phase has resulted in higher consumption of materials and energy during both the construction and operational phases of many building projects. Although there is extensive Value Management (VM) knowledge and experience, many who work in the Saudi Public Sector appear to have less experience of sustainable development, consequently sustainable construction is all too often not a major consideration. This paper is part of an ongoing research which aims to exploit the VM experiences and skills of those in the Saudi Public Sector in order to accelerate the understanding and implementation of sustainable development in the country. It provides an overview of the current situation of VM and sustainability in the Saudi Public Sector by investigating in-depth the: application of VM and sustainability; clients' attitudes towards both subjects; identification of the barriers that impede their application and the determination of the level of existent knowledge about both topics in the Saudi Public Sector.

Keywords: Saudi Arabia, sustainability, value management

1. INTRODUCTION AND BACKGROUND

The quest towards sustainable development throughout the world has put a spotlight on the construction industry. Construction has being defined as *"the broad process/mechanism for the realization of human settlements and the creation of infrastructure that supports development. This includes the extraction and beneficiation of raw materials, the manufacturing of construction materials and components, the construction project cycle from feasibility and design to deconstruction, and the management and operation of the built environment"* (Plessis, 2002). If the construction industry is to provide the required buildings and infrastructure whilst minimising environmental degradation it must adopt more sustainable practices and policies (Ngowi, 2000). The construction industry has both positive and negative impacts on the environment and people. It can contribute to environmental problems through resources depletion; energy consumption; air pollution and waste creation (Ngowi, 2000). Sustainability principles advocate maximising the efficient use of resources and mitigating the negative environmental impacts. The construction industry's fragmentation creates many difficulties for its clients who must procure individual project elements from different sources (Egan, 1998). It is estimated that the construction industry in Europe is responsible for approximately 40% of energy consumption, 30% of CO2 emissions and 40% of total solid production waste (Hajek, 2002; Sjostrom, 1999). However, the construction industry constitutes 10-12% of GNP to the economy of the European Union (Sjostrom, 1999) and employs approximately 1.5 million people in the United Kingdom. It also contributes to the quality of life for humanity (DETR, 2000).

At the beginning of the 1970s, designers thought that the ability to achieve a task was restricted only by equipment; they thought that if one could invent a way to accomplish a goal, the required resources would be available. In today's economic environment, however, limited resources have again become a dilemma. Thus, effective VM programmes are needed

again, as they were with the shortage of materials during World War II (Land, 1997). The combination of economic and environmental assessment tools to obtain "value for money" has the potential to realise a considerable contribution to implement sustainable principles. Financial appraisal of building projects should take into account the whole life cost of building including its design, construction, operating and maintenance and deconstruction, rather than emphasising purely initial design and construction costs. Environmental impact cannot be measured on a monetary scale; it can be quantified by using life-cycle assessment or LCA (Estate Management and Building Service, 2005). The utilisation of VM brings substantial benefits for promoting sustainable construction principles. The principles and techniques of VM can provide the required quality to realise an optimal whole life cost and life-cycle assessment during the process of developing a project.

This paper is part of ongoing PhD research which aims to exploit the VM experiences and skills of those in the Saudi Public Sector to accelerate the understanding and implementation of sustainable development in Saudi Arabia. The scope of this paper is limited to provide an overview of the current situation of VM and sustainability by investigating in-depth the following issues in the Saudi Public Sector: the existing application of VM and sustainability; the clients' attitudes towards both topics; the identification of the barriers that may impede their application, and the knowledge of people who work in the Saudi Public Sector about VM and sustainability.

2. DEFINING SUSTAINABILITY

There has been increased awareness of the importance of sustainable development since the Rio Earth Summit of 1992 within the construction industry. Sustainable development is "*development that meets the needs of the present without compromising the ability of the future generations to meet their own needs*" (WCED, 1987). It integrates a variety of subjects: environmental quality, economic constraints in addition to social equity and cultural issues (Hajek, 2002). Development implies change and should lead to an improvement in the quality of life for humanity. It encompasses not only growth, but also general services and welfare. Furthermore, development involves the transformation of natural resources into productive output. Sustainable development is the balance between economic progress and environmental conservation, given that both are imperative to our future survival. Sustainable development thus implies using renewable natural resources in a way which does not eradicate or degrade them or otherwise decrease their usefulness to future generations. It also implies using non-renewable natural resources at a rate slow enough to ensure a high probability of an orderly societal transition to new alternatives (Langston and Mackley, 1998).

Sustainable construction is generally used to describe the application of sustainable development in the construction industry. In 1994, the Conseil International du Batiment (CIB) defined sustainable construction as *"...creating and operating a healthy built environment based on resources efficient and ecological principles"* (Kibert, 1994). Hill and Bowen (1997) extend the definition to four pillars: social, economic, biophysical and technical. Plessis (2002) defined it as *"a holistic process aiming to restore and maintain harmony between the natural and built environments, and create settlements that affirm human dignity and encourage economic equity"*. The CIB postulated seven principles of sustainable construction which inform decision makers during each stage of the design and construction process persisting throughout the whole life cycle of a building which are: reducing resource consumption; reusing resources; using recyclable resources; protection nature; eliminating toxics; applying life-cycle costing; and emphasising quality (Kibert,

2005). To obtain optimal solutions to current difficult construction and infrastructure problems, it is vital to consider environmental technical, social, political and economic aspects, their synergies and the inevitable balances between them. Sustainability in this way expresses solutions with regard to a whole system, with an entire combination of outcomes as expressed by a variety of comments and conclusions (Ferng and Price, 2005). A sustainable construction industry does not simply mean to continue its business and growth, but also needs to meet the principles of sustainable development, which mean it may need, in some cases, to stop growing or grow in different ways (Plessis, 2002).

3. DEFINING VALUE MANAGEMENT

Value management (VM) originated from value analysis, which was developed by Lawrence Miles during the Second World War due to the shortage of materials. Though there is a difference between VM and other terms such as value engineering (VE) and value analysis (VA), VM in the construction industry is increasingly seen as the approach to delineate the whole process of improving a project value from concept to operation. A number of studies see the terms of VE and VA as a subset of the generic approach of VM. For the sake of ease, VM will be used in this paper as an umbrella that covers all value methodologies whether they are called VA or VE. VM is defined *"as a proactive, creative, problem-solving or problem-seeking service which maximises the functional value of a project by managing its development from concept to use. The process uses structured, team-oriented exercises that make and appraise existing or generated solutions to a problem by reference to the value requirements of the client"* (Male, Kelly *et al*, 1998).

VM has come to be considered as an effective methodology for achieving "best value for money" for clients since its initial application in the construction industry: many countries around the world have observed the successful application of VM in the construction industry (Shen and Liu, 2003). It is an essential mechanism that can be employed in realising sustainable construction in building projects. All stakeholders of the project are brought together in the VM workshop, where diverse views and perspectives can be explicitly discussed; thus many of the problems that typically happen in building projects can be evaded. There are two advantages in applying VM: firstly, the supportive and comprehensive nature of the workshop, which involves individuals discussing with each other and moving in the same direction; and secondly, the systematic process for considering and weighing the alternatives available to the client for a building project. At the present, there is no substitute management approach or technique accessible that can be used for the purpose of VM, or to obtain the benefits gained from rigorous VM processes (Best, 1999).

The clients are increasingly ensuring that their new building projects represent value for money. The advocates of VM claim that its application results in the provision of the required functions with minimal cost without sacrificing the quality and performance (Dell'Isola, 1997; Kelly and Male, 1993; Miles, 1972). VM techniques enable the participants to draw up the project objectives (value for money) and develop appropriate solutions to satisfy the client's requirements and needs. The objectives could be to minimise whole life cost and maximise the efficient use of financial, manpower and material resources. VM comprises a series of processes fluctuating from five to eight phases. The basic difference lies in the synthesis of its phases or splitting them, but the VM job plan remains the same in each (Al-Yami and Price, 2005).

4. THE FEASIBILITY TO IMPLEMENT SUSTAINABILITY IN SAUDI ARABIA

Saudi Arabia is currently experiencing a construction boom due to strong oil prices and ongoing reforms in the country. The boom is also spurred on by major government construction activities and the development of building projects as well as a rapidly expanding tourism sector. The Saudi Arabian construction sector has been a major factor in the non-oil economy. It is accounting for 5.4% of nominal GDP in 2005 (Ministry of Economy and Planning, 2005) and employing 14.4% from 7.3 million of the workforce (Bnoon, 2003).

The present demand for economically viable buildings for the Saudi Public Sector is coupled with the need to maximise the efficient use of Saudi Arabian natural resources. However, awareness of sustainability within the construction industry could be improved within the Saudi Public Sector. Moreover, the lack of consideration paid to sustainability issues during the design process has resulted in higher consumption of materials and energy during both the construction and operational phases of many building projects. Consumption of water and energy will rise significantly over the coming decades and resources become scarce. Extreme economic development in the countries of the Arabian Peninsula has caused a significant imbalance of exist water resources and demand. Between 1980 and 1990, demand was boosted from 9.95 billion to 22.6 billion m^3 of water. If the current situation continues, water demand may reach 35.4 billion m^3 by the year 2010 (Abdulrazzak, 1995). Moreover, the Saudi Government's plan for power calls for the installation of 50,500 MW of additional generating capacity that would require an investment of $117 billion in the next 20 years.

The Saudi Public Sector has considerable VM experience, also VM are mandatory in all projects financed by the Saudi's government. Utilisation of VM brings substantial benefits as a road map to be used for establishing sustainable construction principles. The experience and skills of people who work in the VM sector can be exploited and can be turned to accelerate the understanding and implementing of sustainable development. The principles and techniques of VM can provide the required quality at optimum whole life during the process of developing a project.

5. THE ADVOCACY OF VM TO SUSTAINABILITY

VM is a powerful tool that has the potential to become a crucial means for promoting sustainable issues in a project. VM can support the implementation of sustainability through multidisciplinary teamwork, forums for all stakeholders to exchange ideas and thoughts, systematic job plan can adopt sustainability schema, its tools and techniques which facilitate decisions taking and identify and solve problems, its strategic timing application during the early stages of a project and its aptitude to eliminate unnecessary costs. However, VM has weakness such as: time limitation, costs, the team should have knowledge, experience in both subject and high level skills. Although VM technique has few limitations, its strengths can not be ignored. Thus, implementing sustainability via VM is viable and advisable (Abidin and Pasquire 2003). VM is a dependable approach for creating visions of a new way and purifying objectives towards a platform of desired findings including formulating policy. Function analysis is most important tool to refine needs from wants and very quickly and co-operatively fundamental objectives can be outlined and definitions and principles can be handled. The same methodology of the VM technique can apply to similar themes and needs within sustainability initiative (Yeomans, 2002).

VM can be used to realise the sustainability principles in the construction industry (Abidin and Pasquire, 2005; Barton et al, 2000; Schneider, 1999). It has been confirmed that the consideration of sustainable construction in VM workshops remains an under exploited topic because of a shortage of information. VM is an appropriate technique to diffuse sustainable construction principles amongst its team members. However, sustainable construction is inherent in most VM workshops, but the level of consideration differs from workshop to another (Abidin and Pasquire 2005). The environment of the VM workshop can help to spread the knowledge of sustainability among the team through the facilitator or sustainable construction/environmental instructor; or through sharing the experiences between members.

The VM job plan is systematic approach, which helps team members to identify problems and find the right solutions in a scientific environment. It can help to raise sustainable construction principles during the workshop and there are sufficient tools and techniques to help decision-makers take the appropriate actions in order to realise value for many in a project. Furthermore, the function analysis phase enables the team members to apply sustainability issues in assigning the component of a project; it also helps define the drivers which consequently prioritised and rationalised to achieve Triple Bottom Line (TBL) dimensions. The creativity phase generates many alternatives for accomplishing objectives and avoiding the unsuitable alternatives in terms of sustainability (Yeomans, 2002).

6. RESEARCH METHODS

Interviews with construction industry practitioners play a crucial role during all stages of this research. The data for this study were obtained through conducting semi-structured interviews with twelve practitioners who work in the Saudi Public Sector. The questionnaire combined qualitative and qualitative methods. It comprised three sections: respondent information, VM assessment and sustainable construction exploration. It was designed to obtain an overall picture of the current practice of VM and sustainable construction by investigating in-depth the following issues in the Saudi Public Sector: the existing practice of VM and sustainable construction; the clients' attitudes towards both topics; the identification of the barriers that impede their application and the determination of the level of knowledge of people who work in the Saudi Public Sector about VM and sustainable construction. The logs of interviews fluctuate between 55 minutes to 2:32 hrs. Table 1 illustrates the interviewees' information.

Table 1. Illustrates the interviewees' information

Academic Qualification			Professional qualification			Experience (Av. years)		
PhD	MSc	BSc	CVS	AVS	Others	SPS	VM	SC
5	4	3	7	3	3	13.7	10.6	2.7

CVS: Certified Value Specialist; SPS: Saudi Public Sector; AVS: Associate Value Specialist; SC: Sustainable Construction

7. DATA ANALYSIS (Quantitative Data)

In this paper, only the quantitative data are analysed and reported upon because of time restriction. The figures below are findings of closed ended questions analysed by SPSS. The graphs below provide indications about the existing situation of VM and sustainable construction in the Saudi Public Sector. Figure 1 shows that the frequency of implementation of VM, in the Saudi Public Sector, is always (15%) and often (33%) whereas the frequency of implementation of sustainable construction is occasionally (24%) and rarely (48%). It is

concluded that the application of VM is significantly higher than the application of sustainable construction.

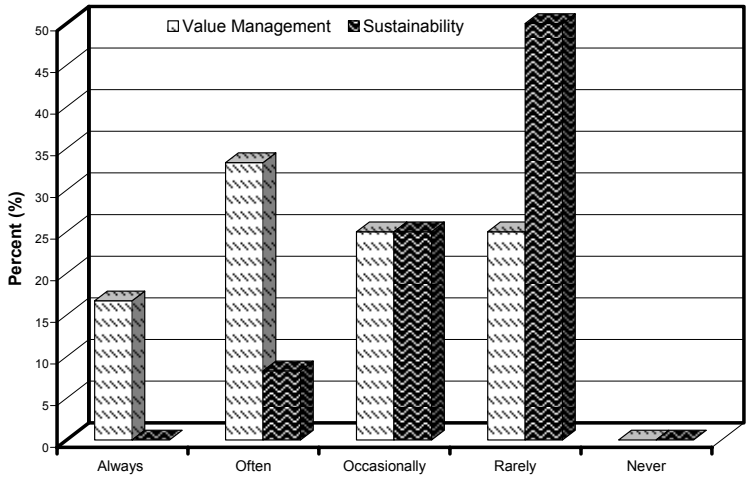

Figure 1. VM application comparison with sustainable construction

Figure 2 elucidates the major barriers that impede the application of VM and sustainability in the Saudi Public Sector. The barriers are ranked according to the interviewees' perspective of their potential impact on the application of VM and sustainability. Five choices written can be selected by the interviewee: "very high=5", "high=4", "moderate=3", "low=2", "very low=1". Thereafter, SPSS software is used to analyse the data by calculating the descriptive variables. The five major obstacles that hinder the application of VM, as they appear in Fig 2, are; lack of information (4.08), leadership (3.83), time (3.75), awareness (3.75) and client commitment (3.67). Whereas, the five major barriers that impede the implementation of sustainable construction are; lack of awareness (4.9), leadership (4.5), client commitment (4.5) information (4.4) and training (4.3). It is clear that all the mean of sustainability barriers are considerably higher than the mean of VM barriers; in other words, the people who work in the Saudi Public Sector are more familiar with VM than sustainability.

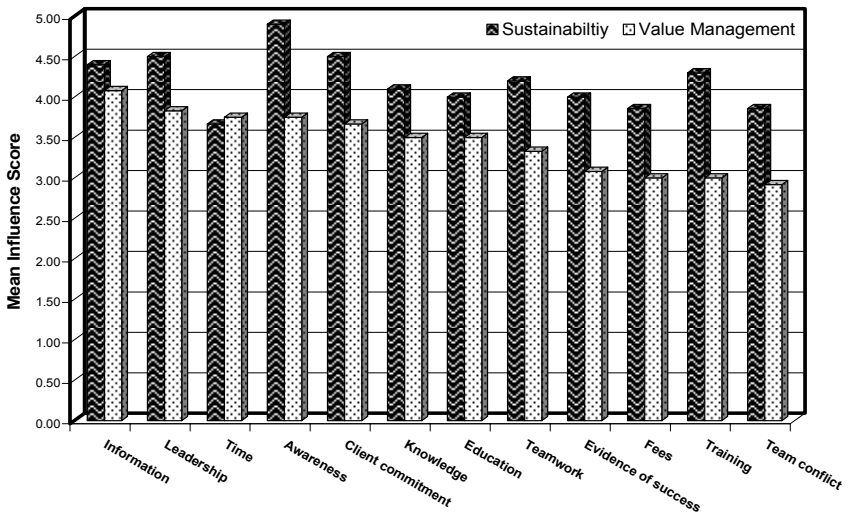

Figure 2. Barriers to the application of VM and sustainability in Public Sector

Figure 3 shows the importance of the application of VM and sustainable construction from the perspective of interviewees for the Saudi Public Sector. It is clear that the implementation of VM and sustainable construction is "very important" and "important" for the Saudi Public Sector.

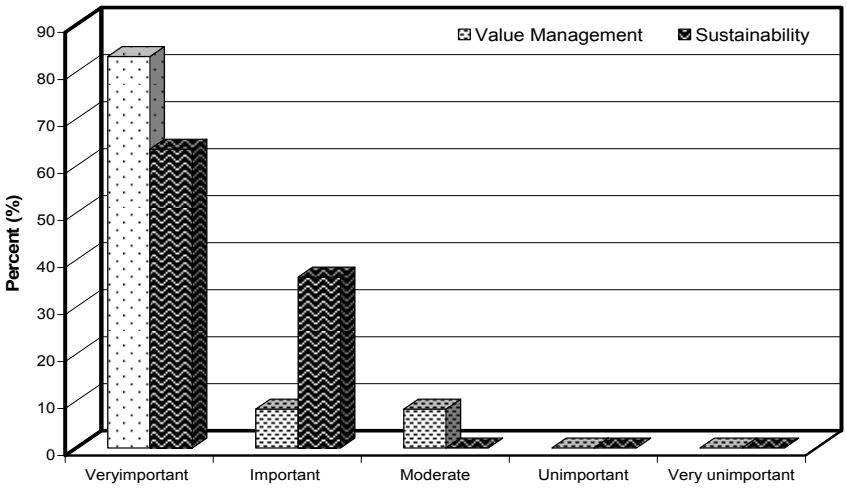

Figure 3. Importance of VM and Sustainable Construction for Saudi Public Sector

Figures 4 and 5 demonstrate the knowledge and satisfaction of people, who work in the Saudi Public Sector, about VM and sustainable construction. Figure 4 shows that the knowledge of people about VM is "very good" and "good", while sustainability is "poor" and "very poor". Although there is extensive VM knowledge and experience, the knowledge of sustainability within the construction industry would appear to be a problem across people who work in the Saudi Arabian Public Sector. Many who work in the Saudi Public Sector appear to have less experience of sustainable development, and sustainable construction is all too often not a major consideration. This can be justified because VM was introduced to Saudi Arabia in 1975 (Al-Yousefi *et al*, 1999) whereas sustainability has not been implemented yet in the Saudi Public Sector. Because of this, it would be extremely beneficial to exploit and turn the VM experiences and skills to accelerate the understanding and implementing of sustainable development in the Saudi Public Sector.

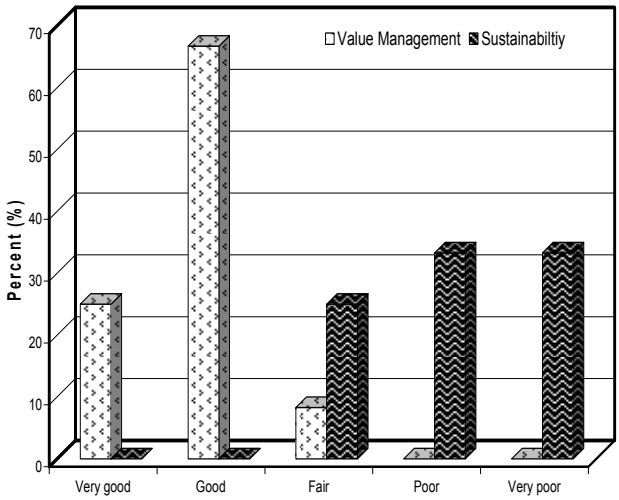

Figure 4. Knowledge of VM and Sustainability

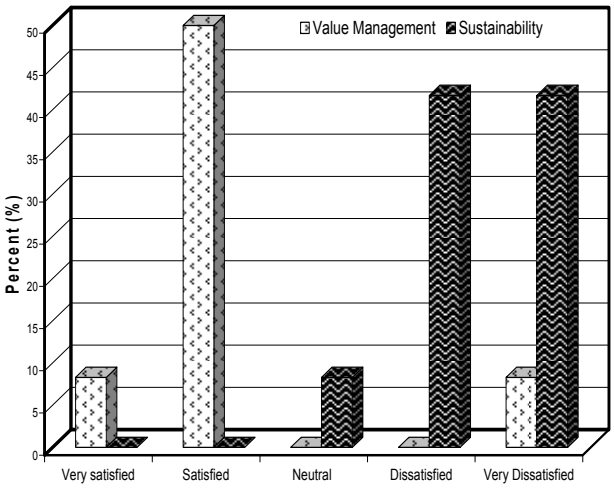

Figure 5. Satisfaction about VM and Sustainability

8. CONCLUSIONS

This paper assesses the feasibility of using VM to accelerate the implementation of sustainability. It provides an overview of the current situation of VM and sustainability in the Saudi Public Sector by investigating in-depth the: application of VM and sustainability; clients' attitudes towards both subjects; identification of the barriers that impede their application and the determination of the level of existent knowledge about both topics in the Saudi Public Sector. It is part of an ongoing research which aims to exploit the VM experiences and skills of those in the Saudi Public Sector in order to accelerate the understanding and implementation of sustainable development in the country

There has been increased awareness of the importance of VM and sustainable development within the construction industry. Both subjects play important roles in realising quality, reliability and durability as well as enhancing performance throughout the life of a project. They also help to improve service-related outcomes within budget constraints, maximise the efficient use of resources; and accomplish an optimal combination of whole-life cost and quality to satisfy the user's requirements and needs. VM is a rigorous approach applied at all stages of a project from concept to deconstruction. Sustainable development implies using renewable natural resources in a way which does not eradicate or degrade them or otherwise decrease their usefulness to future generations. It also implies using non-renewable natural resources at a rate slow enough to ensure a high probability of an orderly societal transition to new alternatives. Sustainable development involves quality of life issues as well as general services and welfare. Integrating sustainable construction themes early in the VM job plan, all processes such as function analysis, ideas evaluation and development can be used to help implement these principles. However, VM has a weakness which should not be treated as significant obstacles of its utilisation to implement and accelerate understanding of sustainability principles.

Data collection was based on questionnaire interviews with people who work in and have experience in the Saudi Public Sector. As pointed out above, the frequency of application of VM in the Saudi Public Sector is "always" and "often", whereas the frequency of implementation of sustainable construction is "occasionally" and "rarely". This encourages that sustainable construction principles could be integrated during VM workshop. Thus, it is necessary to overcome the major barriers of the implementation of VM and sustainability. The barriers of VM were; lack of information, leadership, time, awareness and client commitment. On the other hand, the major barriers of the implementation of sustainable construction were: lack of awareness, leadership, client commitment, information and training. The level of knowledge of people who work in the Saudi Public Sector about VM is "very good" and "good", while sustainability is "poor" and "very poor".

It appears that there is extensive VM knowledge and experience, whereas the knowledge of sustainability within the construction industry would appear to be a problem across the Saudi Arabian Public Sector. These findings can be explained as having resulted from VM being known in Saudi Arabia for more than two decades whereas sustainability has not been implemented yet in the Saudi Public Sector. Because of this, it could be beneficial to exploit and apply the VM experiences and skills to accelerate the understanding and implementing of sustainable development in the Saudi Public Sector. However, on the basis of the findings of research and related literature, it is clear that several governmental organisations in the Saudi Public Sector, particularly those who have not established

divisions of VM and do not have practitioners, have a long way to go, before they can effectively apply VM techniques. Practical solutions to the aforementioned problems from the perspectives of the interviewees require further research, which could involve developing an integrated approach to VM and Sustainability. It involves developing a tool to be used in Evaluation Phase during Value Engineering (VE) to select the sustainable and suitable alternatives as early as possible.

9. REFERENCES

Abdulrazzak, M.J. (1995) Water supplies versus demand in countries of Arabian Peninsula. *Journal of Water Resources Planning and Management,* **121**(3), pp227-234.

Abidin, N.Z. and Pasquire, C.L. (2005*)* Delivering sustainability through value management. *Engineering, Construction and Architectural Management*, **12**(2), pp168-180.

Abidin, N.Z. and Pasquire, C.L.(2003) *Moving towards sustainability through value management,* The Joint International Symposium of CIB Working Commissions W55, W65 and W107, Singapore*,* 22-24 October, pp258-268.

Al-Yami, A. and Price, A.D. (2005) *Exploring conceptual linkages between value engineering and sustainable construction*, proceeding of the 21st annual conference of the association of researchers in construction management (ARCOM), September 2005, SOAS, pp375-384.

Al-Yousefi, A.S., Al-Kuwaiter, A., Al-Oshaish, S. And Shublaq, E. (1999) *Value Engineering in Saudi Arabia: Overview & Application in Public and Private Sectors*, SAVE international conference*,* pp. 9-17.

Barton, R. (2000) *Initiating sustainable projects*, The International Symposium, Shaping the Sustainable Millennium, November 2000.

Best, R. and De Valence, G., eds, (1999) *Building in Value.* London: ARNOLD.

Bnoon, J. (2003) *The Saudi construction industry is predicted to increase its value to $19 billion in the next 3 years*, Asharq Al-Awsat*,* London.

Bryman, A. (2003) *Business research methods*. Oxford: Oxford University Press.

Dell'isola, A.J. (1997) *Value engineering: practical applications for design construction, maintenance & operations*. Kingston, Mass: R. S. Means Company.

Department of the Environment, Transport and the Regions (DETR), (2000) *Building a Better Quality of Life: a strategy for more sustainable construction.* London.

Egan, J. (1998) *Rethinking construction.* London: Department of the Environment, Transport and the Regions (DETR).

Estate Management and Building Service, 11 Feb 2005, 2005-last update, *The Design and Construction of Environmentally Sustainable New Building*. Available: http://www.admin.cam.ac.uk/offices/environment/guidance/building.html [November 29, 2005].

Fellows, F. and Liu, A. (2003) *Research Methods for Construction*. 2nd ed. Oxford: Blackwell Science.

Ferng, J. and Price, A.D.F. (2005) *An exploration of the synergies between Six Sigma, total quality management, lean construction and sustainable construction*. International Journal of Six Sigma and Competitive Advantage, **1**(2), pp. 167-187.

Hajek, P. (2002) *Sustainable Construction through Environment-Based Optimisation*, IABSE Symposium towards a Better Built Environment, London.

Hill, R.C. and Bowen, P.A. (1997) *Sustainable construction: principles and a framework for attainment*. Construction Management and Economics, **15**(3), pp. 223-239.

Hussey, J. and Hussey, R. (1997) *Business Research: A Practical Guide to Undergraduate and Postgraduate Students.* Macmillan Press, London, UK.

Kelly, J. and Male, S. (1993) *Value management in design and construction: the economic management of projects*. London: Spon.

Kibert, C., J. (2005) *Sustainable construction: green building design and delivery*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Kibert, Charles, K. (1994) *Principles of Sustainable Construction*. Proceedings of the First International Conference on Sustainable Construction*,* November, Tampa, Florida, pp. 1-9.

Land, R.R. (1997) Applications of Value Engineering and Life Cycle Cost in Project Management. *Value Manager,* **3**(2), pp. 9-11.

Langston, C. and Mackley, C. (1998) *The Role of Environmental Economics in the Cost Management of Projects.* AACE International Transactions.

Lippiatt, B.C. (1999) Selecting Cost-Effective Green Building Products: BEES Approach. *Journal of Construction Engineering and Management,* **125**(6), pp. 448-455.

Male, S., Kelly, J., Fernie, S., Gronqvist, M. and Bowles, G. (1998) *Value Management: The value management benchmark*. London, UK: Thomas Telford.

Miles, L.D. (1972) *Techniques of value analysis and engineering*. 2nd ed. New York: McGraw-Hill.

Ministry of Economy and Planning, 2005-last update, *Percent distribution of gross domestic product by economic activity at current prices*. Available: http://www.planning.gov.sa/statistic/sindexe.html [10 May, 2005].

Ngowi, A.B. (2000) Competing With Environment-Friendly Construction Practices. *Cost Engineering,* **42**(5), pp. 28-33.

Plessis, C. (2002) *Agenda 21 for Sustainable Construction in Developing Countries.* Pretoria, South Africa: The CSIR Building and Construction Technology.

Saunders, M. N. K., Lewis, P. and Thornhill, A. (2000) *Research Methods for Business Students.* Second ed. Pearson Education, London.

Schneider, M. (1999) Value management and sustainability: an opportunity to revolutionize the construction industry, *Managing Sustainable Value, Proceeding of the International Conference of the Institute of Value Management,* 6-7 May.

Shen, Q. and Liu, G. (2003) Critical Success Factors for Value Management Studies in Construction. *Journal of Construction Engineering and Management,* **129**(5).

Sjostrom, C. (1999) Sustainable Construction and Performance Standards and Codes, *1st Asia/Pacific Conference on 'Harmonisation of Durability Standards and Performance Tests for Components in Buildings and Infrastructure',* 8–10 September.

World Commission on Environment and Development WCED, (1987) *Our Common Future.* Oxford: Oxford University Press.

Yeomans, P.Y., (2002). *Environmentally sustainable development plus value management equals results minus rhetoric*, International Conference of the Institute of Value Management, 29-30 August 2002.