Available online at www.worldscientificnews.com

World Scientific News

WSN 54 (2016) 40-59 EISSN 2392-2192

Value Management – Creating Functional Value For Construction Project: An Exploratory Study

Timothy Oluwatosin Olawumi*, Ebunoluwa Bimbola Akinrata, Bamidele Temitope Arijeloye

[1]Department of Quantity Surveying, Federal University of Technology Akure, P.M.B. 704, Akure, Ondo State, Nigeria

*E-mail for the corresponding author: olawumitimothy01@hotmail.com
ORCID: orcid.org/0000-0003-3380-4702

ABSTRACTS

Value management is a process whereby the project is evaluated and scrutinised to obtain maximum value for money by following a prescribed methodology. It focuses on the value, rather than cost, in relation to the function of the element of the project. However, value relates to what an element does. The key benefit of VM is the financial benefits to the client; other benefits include a clearer brief, improved communication, use of local materials etc. However, there are barriers to its application such as inadequate training and education, the unwillingness to entertain new ideas, lack of regulatory framework etc. Also, the following drivers of VM approach were identified: establishment of a regulatory framework, client's awareness, establishment of a group support system on VM etc. This paper considers value management from a functional value perspective and argues for greater recognition for it to form an integral part of projects.

***Keywords*:** Value management (VM); barriers; benefits; drivers; VM methodology

1. INTRODUCTION

Value Management (VM) is a well-established methodology for defining and maximising value for money. It can be applied to any type of project regardless of size or timeframe and at all stages throughout the life cycle of the project from inception to

completion (OGC, 2007). Value management (VM) in broad terms according to Kelly and Male (1993) is a service which maximizes the functional development from concept to completion, through the comparison and audit of all decisions against a value system determined by the client or customer.

The Institute of Value Management (2002) stated that the concept of value relies on the relationship between the satisfaction of many differing needs and the resources used in doing so. The differing needs are likely to include aspects such as high quality, good indoor environment, durability, cheaper to maintain, user-friendly etc. (Abidin & Pasquire, 2005). It was noted further by Abidin and Pasquire (2005) that VM as a value enhancement technique, it should integrate the issues of sustainability as they affect the quality of the outcome. Jaapar (2006) defined VM, as a multidisciplinary; team oriented, structured, analytical process and systematic analysis function, which seeks the best value via the design and construction process. Odeyinka (2006) has further defined VM as a service, which maximises the functional value of a project by managing its development from concept to completion and commissioning through the audit (examination) of all decisions against a value system determined by the client.

Value management is a proactive, problems solving management system that maximizes the functional value of a project by managing its development from concept stage to operation stage of projects through multidisciplinary value team (Kelly & Male, 2006). The Value management procedure also encourages the development of a value culture within the organisation which eases the path to accomplishing desirable change. Value management is an integrated, organised and structured process, led by an experienced facilitator and broken down into various stages to enhance the value of a construction project, not necessarily only by cutting costs.

Value management (VM) is a service which maximizes the functional development from concept to completion, through the comparison and audit of all decisions against a value system determined by the client or customer (Rangelova & Traykova, 2014). It is regarded as an integrated, organised and structured process, led by an experienced facilitator and broken down into various stages to enhance the value of a construction project, not necessarily only by cutting costs (Rangelova & Traykova, 2014). VM is a systematic multidisciplinary effort made to enhance the value of a construction project in many other ways than just cutting on costs.

Value management (VM), as a technique for improving client value in projects, products, processes and systems, has been internationally recognized for almost forty years (Kelly, Male & Graham, 2004), although, Its links with engineering go back even further, through value engineering (VE), to the 1940s (Bowen, Edwards, Cattell, & Jay, 2010). VM, although clients tend to put pressure on cost reduction, their vision would still be the same, i.e. value for money, better quality, profitability and positive business image; and in rendering a service designed to improve the value of a project, VM considers various issues before proposing the best solution to clients (Abidin & Pasquire, 2005). They further noted that sustainability issues should be included as they affect the quality of the outcome. Meanwhile, Fong (2003) highlighted the strength of VM as an effective knowledge creation and transfer tool; that by gathering the participants in one place and at the same time, the process of giving and absorbing information is faster and more effective. Abidin and Pasquire (2005) held the view that the knowledge and importance of sustainability can be planted in the participants'

mind during the VM workshop, which can later be diffused further in future projects or workshops.

As one of the well-known techniques conducted to assist in decision-makings, Abidin and Pasquire (2007) noted that value management (VM) holds a strategic position to incorporate sustainability issues into construction projects; that although VM has many intrinsic capabilities, which heighten its potential as sustainability delivery mechanism, this potential has not been fully realised by the practitioners.

2. VALUE MANAGEMENT IN PERSPECTIVE: PAST AND PRESENT

The industry and its customers are broadening their interpretation of value, and beginning to appreciate the subjective nature of it by adding concerns surrounding environment and society (Thomson, Austin, Mills, & Devine-Wright, 2003). This assertion was corroborated by Karim, Rahmin, Danuri, and Mohamed (2014) & Fong and Shen (2000) which noted that value management (VM) practices have been expanded and became a well-received technique globally and that organisation are now progressing towards a better implementation of VM and should be assessing their strengths and weaknesses in order to move forward competitively.

At present, VM is widely accepted and practised in many countries (Karim et al., 2014). For example, the US government has mandated that all projects that cost USD2 million or more must adopt VM study whereas its Department for Transport (DfT) has been more stringent, making it compulsory for projects as low as USD100 thousands (Kaur, 2012). Meanwhile, Kim, Lim, Kim and Cheon (2010) asserted that the South Korean Ministry of Land, Transport and Maritime affairs has made it mandatory to apply VM for construction projects of KRW10 billion (USD10 million) or more.

The Japanese government has also mandated the use of VM for projects costs JPY175 million (USD2 million) or more and the Australian government implemented VM for its federal projects costs of at least AUD5 million (USD4.5 million) (Karim et al., 2014). Kelly et al. (2004) observed that VM in the UK construction industry has evolved to become ‘an established service with commonly understood tools, techniques, and styles’. Ellis, Wood and Keel (2005) describe VM as ‘widely accepted as an important tool in the management of projects’. While this may be so for construction industries in developed countries, the situation is by no means so clear for developing nations (Bowen et al., 2010).

Value management also known as value engineering in the United States is a structured and analytical process that seeks to achieve value for money by providing all necessary functions at the lowest cost consistent with required levels of quality and performance (AS/NZS, 1994). Bowen et al. (2010), Ellis, Wood, and Keel (2005), and McElligott and Norton (1995) also acknowledged the fact that the original concept of VM originated in the USA during the Second World War at a company named “General Electric Company”. Priority “war production” resulted in shortages of raw materials and companies were forced to use substitute materials. Over time, it became evident that this forced substitution often resulted in improved product performance and costs were also lower in most instances. The basic philosophy of value management as stated by the in May (1994) was therefore to eliminate costs which did not contribute to the performance of the required function; however,

as noted by Abidin and Pasquire (2005), the attention on sustainability issues within value management (VM) practices is uncertain due to the scarcity of information.

Rangelova and Traykova, (2014) opined that the best time to implement it is in the early development phases on a project and that optimal benefits will be obtained if utilized on larger and more complex projects. The most commonly used stages and phases into which VM is divided is the: Pre-study phase, Information stage, creative phase, evaluation phase, development phase, presentation phase and post-study phase (Rangelova and Traykova, 2014).

There are various definitions for value management. Some of the definitions are (Cloete, 2008; Green & Liu, 2006; Kelly & Male, 1993): The Australian and New Zealand Standard AZ/NZS 4183:1994 defines VM as "a structured and analytical process which seeks to achieve value for money by providing all the necessary functions at the lowest total cost consistent with the required levels of quality and performance". Value management is a systematic and structured process of team-based decision making (figure 1). It aims to achieve the best value for a project by defining those functions required to achieve the value objectives and delivering those functions at the least cost (whole life cost or resource use), consistent with the required quality performance. VM can also be described as a systematic, multi-disciplinary effort directed towards analysing the functions of projects for the purpose of achieving the best value at the lowest overall life cycle costs.

The Value management definition in last decades is can be identified with five keywords or phrases (Rangelova & Traykova, 2014), as:

Systematic process: It has a definite beginning and end and it differs from cost reduction exercises which are normally unstructured and conducted in an informal way. This process is referred to as the job plan which consists of a sequence of steps that guide the VM team through the problem-solving process.

Multi-disciplinary effort: A group of individuals is brought together to analyse all aspects of the project that are studied. They all work together as a group under the leadership and guidance of the VM facilitator. Most projects make use of various disciplines because no one individual is an expert in every area of the construction project.

Functions: Function analysis is at the basis of VM and this is what separates VM from other 'cost-cutting' programs. But in VM, the question of what does it do, and what is the function that it seeks to achieve is asked. VM must be undertaken without compromising the quality, reliability, safety and aesthetic features that the client requires.

Value: The main function of VM is not to reduce costs but to improve value. Value is made up by balancing cost, time and function/quality of the product/project. Value can also be seen as the benefit the client or the occupants of such a building or structure enjoys.

Life cycle costs: It is the present value of the total cost of the building/asset over its entire operating life and includes the initial capital and construction costs, operating and maintenance costs and the cost or the benefit of eventual disposal of the asset.

According to Norton (1995) (as cited in Rangelova & Traykova, 2014), there are three major ways to improve value by applying VM: to provide for all the required project functions but at a lower cost; to provide additional functions without increasing the cost; to provide additional functions and at the same time to lower the cost.

2. 1. Value Management and Cost Management

Cost management does not make any major changes to the scope and concept of a project whilst VM looks holistically at the project as a whole and scope changes are often considered when conducting a VM study. The key differences are that VM is positive. It focuses on the value rather than the cost, seeking to achieve a balance between quality, life cycle costs and time. VM is also structured, accountable and seeks to maximise the creative potential of all project participants (Rangelova & Traykova, 2014).

VM, on the other hand, is beneficial to cost management because it lists ideas that could possibly save costs even if it is only at a later stage. The bottom line is that VM and cost management services should be integrated into a total project economics service to obtain optimal benefits from it (Ellis, Keel, & Wood, 2004).

Many confuse VM with mere cost reduction on a project. There is a fundamental difference which should be noted. Keeping costs low that has been commonly applied to traditional cost management is not enough. There is an increasing need for more efficiency, especially in the current competitive market conditions. Kelly (1993) defines VM as "a service which utilises structured functional analysis and other problem solving tools and techniques in order to determine explicitly a client's needs and wants related to both cost and worth" compared to cost management which he describes as "a service that synthesises traditional quantity surveying skills with structured cost reduction or substitution techniques using a multi-disciplinary team."

Both VM and cost management are important on a project and there are important links between them. When these two activities are combined the total combined effect is bigger than the sum of the individual effects. Cost management enhances VM in several ways such as for example it is the quantity surveyor who provides cost management that also produces the cost data that are necessary for VM studies. Data is required to make informed choices. If there is no on-going cost management, then VM proposals selected may not be incorporated into the design.

2. 2. Value Management: A Functional Value Analysis

2. 2. 1. Identifying Unnecessary Costs

Unnecessary costs can be defined as the costs that contribute nothing to the value of the product or to what are needed to achieve the required functional solutions. In essence, VM focuses on the value, rather than cost, in relation to the function of the element of the project. However, value relates to what an element does, while cost relates to what an element is. VM can improve the value of a project by providing the required project functions but at a lower cost; by providing additional functions without increasing the cost; and by providing additional functions and at the same time to lower the cost.

For instance, if two or more designs of a project are compared, each producing the same functional and aesthetic requirements, then the difference would most likely be an unnecessary cost. Unnecessary cost in a project could be:

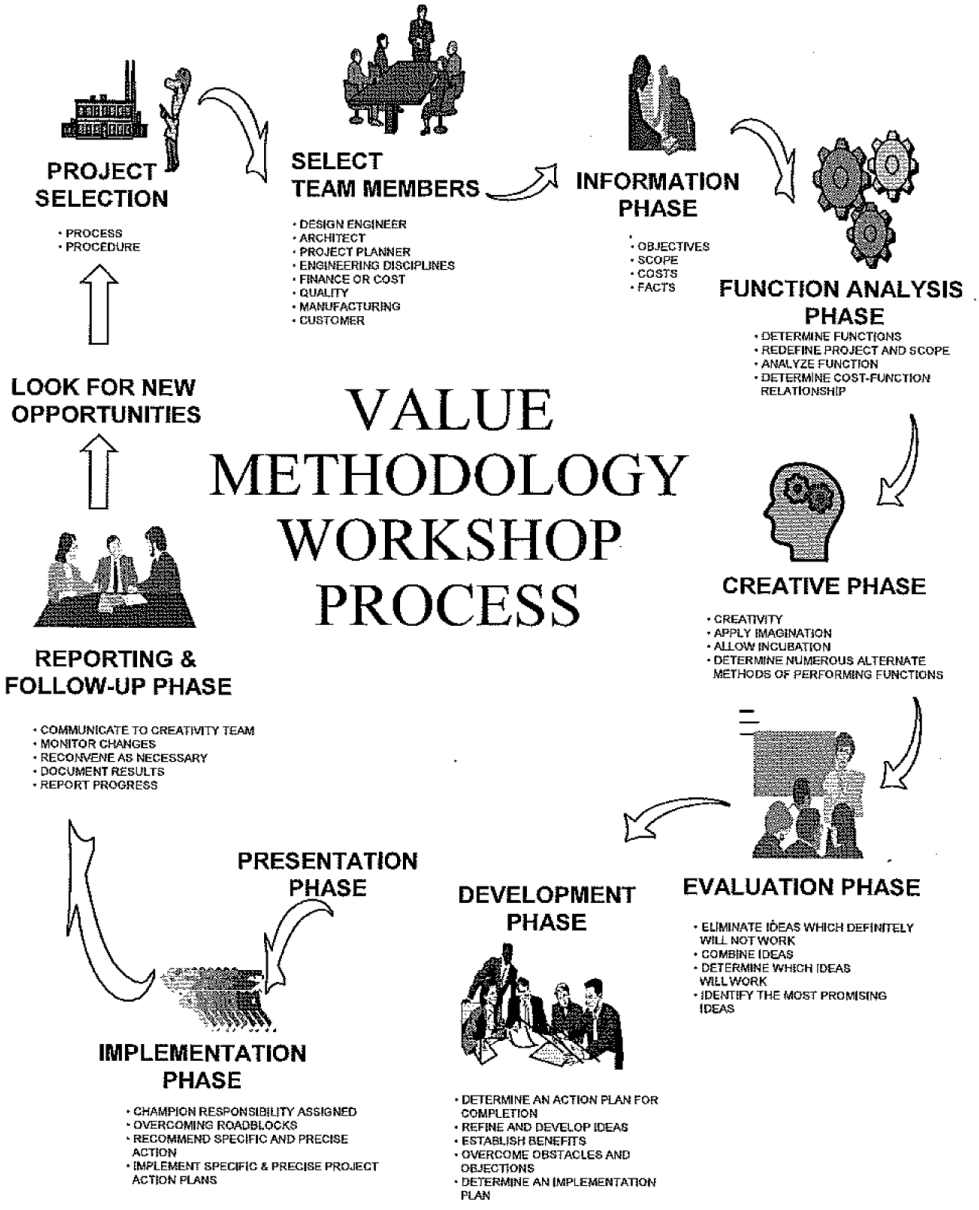
Unnecessary component: Take for an instance, a decorative feature on a column which does nothing for the function and has a dubious aesthetic effect.

Unnecessary materials: That is, materials that have been chosen without considering whether a less expensive material would have done the job just as satisfactorily.

Buildability: This relates in this study to the insufficient use of labour, equipment, and plant.

Life cycle costs: This include capital expenditure, running costs, maintenance, and salvage; therefore, by selecting materials, components or techniques that result in a lower net present value, significant overall savings may be achieved.

Opportunity cost: Unnecessary cost could include failure to identify opportunity costs, that is, neglecting to maximize floor space. Improving the function, even at increased cost, may result in opportunity costs which could reduce or eliminate certain unnecessary costs.



Source: Rains (2008)

Figure 1. Value methodology workshop process.

2. 2. 2. Factors to Consider When Initiating a VM Study

The following factors are to be given necessary consideration before initiating a VM study (Rangelova & Traykova, 2014): the potential for a value improved outcome that is perceived; the stage of the project development cycle; the need to have involvement and broad representation; the benefits that will be obtained from involving the key stakeholders; the availability of the stakeholders; and the costs of such a study.

2. 2. 3. Tests for Authentic VM Study

To test for authentic VM there are four criteria which must be satisfied (Coetzee, 2009): VM must follow an approved job plan, it should involve a multi-disciplinary team working together at the same place and time; the VM study must be led by a skilled/qualified facilitator (the UK has a certification procedure); VM does not pursue any design changes which are not in line with the projects required basic functions. This is where the functional analysis technique is used. According to De Leeuw (1998) working manual, VM is not: a conflict orientated design review; a cost-cutting exercise; neither is it a standardisation exercise.

2. 2. 4. Types of Projects Suitable for a VM Study

Extant literature (Norton, 1995; Rangelova & Traykova, 2014) identified the following types of projects that will benefit the most from VM:

Costly projects: VM can result in savings of up to 5-15% of the total costs involved on the project and therefore it is very cost effective to apply VM to higher cost projects although Karim et al. (2014) noted that VM should be applied on all projects irrespective of the project cost.

Complex projects: With a VM study one has the opportunity to get expert second opinions, especially, if there are members of the team that is independent of the original design team. On complex projects, it is vital to get expert opinions. By using VM, attention can be given to complex issues.

Repetitive projects: When the same type of building/asset needs to be built in many different locations, the utilisation of VM becomes very cost effective because cost reduction and ideas that add value to the project can be incorporated into all the buildings to be built later on.

Unique projects with new technology elements and few precedents: The reason for using VM in the above type of projects is similar to complex projects. It relates to the obtaining of expert opinions.

Projects with very restricted budgets: For these projects, it is imperative to get maximum value for the least amount of money. VM seeks to eliminate unnecessary costs.

Projects with compressed design programmes: VM should be properly coordinated with the construction programme to minimise time spent on it. VM can come up with innovative ideas to relieve pressure on design programmes and accelerate programmes.

High visibility projects: These are projects sponsored by the government or environmentally sensitive projects. It is important that as little as possible goes wrong on these projects to avoid the media embarrassing the parties involved on the project.

VM is not restricted to the types of projects mentioned above, but can be applied to any project/building or asset. VM can be applied to parts of buildings or subdivisions of projects. The general feel is that VM is more beneficial on larger projects due to the fact that there are certain costs associated with a VM study (Rangelova & Traykova, 2014).

Value Management (VM) is not what good planners and designers do as a matter of routine, it's not part of the typical design development process. A VM analysis is more rigorous than the typical project review. Each VM effort brings together an impartial team of professionals with a common purpose, improving the project design. The format and structure of the value management methodology serve to aid both the owner and designer with achieving their objectives (GPG, 1997). Similarly, a VM analysis is not a traditional cost reduction approach. In a VM analysis, cost reduction is achieved *by making a design more efficient without reducing essential performance, reliability, or maintainability*. Conversely, traditional cost reduction efforts *will concentrate on material substitutions, and reduce or eliminating specific elements*. This approach frequently results in reduced quality, or diminished performance (GPG, 1997).

Performing a VM analysis is not the same as a typical Quality Assurance (QA) review. The traditional QA review will answer questions such as: *does the design meet code requirements? will the design work?*; and *does the design conform to accepted standards of practice?* The VM analysis will answer these questions: *what else will achieve the same function for lower life-cycle cost?* & *what functions are not germane to project performance?* (GPG, 1997).

3. BENEFITS OF INITIATING A VM STUDY

Value management (VM) is widely accepted as an important tool in the management of projects (Ellis et al., 2005) and it has a lot of advantages ranging from financial benefits to helping to build the morale of the professional team. VM will affect everyone associated with the project, otherwise known as stakeholders. The client seeks to achieve value for money, whilst the users want a product that meets their needs as effectively as possible. The project managers are to ensure that the project is on time and falls within the budgetary constraints, the contractor wishes to provide a service which will afford them an adequate profit and the designers are keen to meet the expectations of the client whilst complying with certain standards and performance criteria (Cha & Connor, 2006; Ellis et al., 2005). VM can address most of these needs directly or indirectly, thus bringing a degree of satisfaction to all the stakeholders involved (Rangelova & Traykova, 2014).

3. 1. Financial (Primary) Benefits of VM Study

A brief list of some of the benefits of VM that is somehow directly or indirectly connected with optimising the value for money for a project (Locke, 1994; Rangelova & Traykova, 2014): VM creates a clearer focus on the project objectives; VM works towards arriving at a more effective design; identification of alternative methods of construction and favourable adjustments to the construction timeline; discovery and discussion of project issues, constraints and risks involved; clearer project brief and decision making; identifies and removes unnecessary costs associated with the project (Abidin & Pasquire, 2005).

Value management (VM) has the capability to assist the absorption of sustainability at the conceptual and design stage of project process (Abidin & Pasquire, 2003). VM also deals with lifecycle costs, not only initial project cost and provides an authoritative review of the project in its totality and not just a few elements (future profitability can also be assessed if the lifecycle costs are known); decisions are made with greater confidence because it can be supported by data and defined performance criteria; all options, alternatives, and innovative ideas are considered. VM seeks to obtain maximum efficiency ratios; over specification is addressed and an improved building programme can be developed leading to time being saved and ultimately savings in cost (Karim et al., 2014); if properly implemented it can identify possible problems early on in the project.

It provides management with authoritative evaluations and supporting information of the project brief or design and their related capital and operation costs (Abidin & Pasquire, 2007). Savings in costs of between 10-15% of total project costs can be achieved with the correct implementation of VM. It is important to note that for these benefits to be fully realised it is important to implement VM as soon as possible on a project. The costs of change are much lower when the project is still in its development/design phase and the cost reduction potential is the highest early on in the project development stages.

3. 2. Secondary and "Unquantifiable" Benefits of VM Study

One of the successful ingredients of value management (VM) is its utilization of diverse knowledge resources, drawing upon different organizational functions, professional disciplines, and stakeholders, in a facilitated team process (Fong, Hills, & Hayles, 2007). Some of the more "invisible/unquantifiable" advantages that VM has, which is just as important as the above-mentioned benefits are the following (Coetzee, 2009): VM provides the structure for the team to collaborate and gain the benefits of partnering; mutual understanding and consensus between the stakeholders are enhanced; improved communication and team spirit that is built between members of the professional team ensures that other objectives of the client are met (e.g. a project that is delivered on time, meets the business plan etc.); clear definition of roles and responsibilities (Coetzee, 2009).

VM also improves team and client relationships boosting morale of the team; higher efficiency can be achieved due to the multidisciplinary and multitask teamwork (Abidin & Pasquire, 2007); joint ownership of solutions and commitment to implementation; VM challenges the established views and private agendas that some of the project team members may have; enhanced client involvement during the development stages of the project (Coetzee, 2009).

3. 2. 1. Cost Reduction and Achieve Value for Money

The Institute of Value Management (2008) and the Department of Housing and Works (2005) observed that other than value management act as a cost reduction tool (i.e. cost savings), the most visible benefits arising out of the application of value management is the elimination of unnecessary cost that may arise during the design and execution of the project. It provides a way of measuring value, taking into account nonmonetary benefits and demonstrating that value for money has been achieved. Value engineering identifies items of unnecessary costs in a project and develops alternative ways of achieving the same functions at the lowest possible cost, without impairing on the quality, aesthetic, image, safety and

functional performances of the building and at the same time improves the project schedules (Flanagan & Jewell, 2005).

3. 2. 2. Early Identification of Problem in Project

One of the major significant benefits of Value Management techniques is the early detection of a problem, which may be critical to the development of a project and ensures that necessary solutions are done; with significant improvement in value gained far outweighing the time and effort involved. This is particularly the case if applied during concept development and the initial design stages, with the ability to significantly influence final project outcomes diminishing rapidly, as the project progresses past the design development stage.

3. 2. 3. Cost Effectiveness on Project

Best and De-Valennce (2003) asserted that VM ensures that the project is carried out in the most cost-effective way of delivering the business benefits and provides a basis for refining the business case. Meanwhile, VM addresses both the monetary and non-monetary benefits involved in the project. If properly conducted, it can be a very low-cost, high-benefit exercise when integrated into the project management methodology early in the project lifecycle.

3. 2. 4. Challenging Assumptions and Developing Innovative Design Solution

Value management practices support good design through improved communications, mutual learning and enhanced team working, leading to better technical solutions with enhanced performance and quality, where it matters (Leung, Chu & Lu, 2003). The VM workshop sessions provide also the platform that encourages challenging the status quo and developing innovative design solutions.

3. 2. 5. Eliminate unnecessary design and reduce waste

VM is an organized set of procedures and processes that are introduced, purposely to eliminate unnecessary design, reduce waste and defects and also enhance the function of a designs, services, facilities or systems at the lowest possible total cost of effective ownership. This taken into cognizance helps to improve the client's value system for quality, reliability, durability, conformance, durability, aesthetic, time, and cost (Olanrewaju & Khairuddin, 2007).

3. 2. 6. Enhanced value and benefits for end users

VM is a tool for optimising the balance between differing project stakeholder needs and expectations. It forms a basis for creating a clear project brief that reflects the project sponsor's priorities and expectations, expressed on the basis of value and function. It defines what the owners and end-users mean by value, and provide the basis for making decisions, throughout the project, on the basis of value.

3. 2. 7. Assessment of Future Profitability

Kiyoyuki, Sugisaki, and Kobayash (2005) explained that life-cycle cost (LCC) is the present value of the total cost of the building/asset over its entire operating life and includes the initial capital and construction costs, operating and maintenance costs and the cost or the benefit of eventual disposal of the asset. LCC is a technique that is used by the facility management organization or team to procure value for money invested (Flanagan & Jewell, 2005).

In other words, LCC enables value/ facility managers to make informed decisions on how much to invest today for future economic benefits. VM examine the client's business case to establish what type of "projects" a client required. Project in this stage is not necessarily a construction project, but any alternatives that would provide the best return on the client's investment in terms of money, time and other criteria of their value system. VM deals with lifecycle costs also, not only initial project cost and provides an authoritative review of the project in its totality and not just a few elements.

3. 2. 8. Reduce Project Abandonment

The construction industry is an important field for VM at the international level. As it is also critical to the success of projects since it provides a basis for improving value for money in construction (Ashworth & Hogg, 2000), because value management brings about the best value for each function which brings about a reduction in project abandonment.

3. 2. 9. Competitive Edge for the Contractors

It enhances the competitive edge for the contractors who are into value management practices, and it also enhances their competitive advantage by facilitating technical and organizational innovation gained. All clients want maximum value for each money spent.
Other benefits includes a better understanding of needs and the functions necessary to meet those needs; a better definition of program or project objectives; a better definition of quality and performance standards (Cha & Connor, 2006); clearer briefs; reduced wastage of resources; capital funds savings; improved operational efficiencies among others (NSW Treasury, 2004).

The 'less obvious' advantages of VM such as those mentioned above greatly contribute to the success of a project. It is important to make a qualification on all these benefits that can be achieved with VM. It is that these advantages are dependent on the correct implementation and facilitation of the VM study.

4. BARRIERS AND IMPEDIMENTS TO VM STUDY

Value management (VM) has been widely used to meet challenges arising from the construction industry. However, it has also encountered some problems such as passive participation in VM workshops and a lack of time and information to complete all tasks in the workshops (Fan, Shen, & Lin, 2007). Several challenges have been identified by literature (Abidin & Pasquire, 2005; Fan & Shen, 2011; Fan et al., 2007; Noor *et al*, 2015) as impediments to VM studies, these are divided into:

4. 1. Practical Barriers

These include time limitation- this means that it is impractical and difficult to address all issues regarding the project within VM studies. Also, the absence of formal guidelines has resulted in a scenario in which different VM teams possess different standard practice; without a standard guidance, the requisite delivery through VM is difficult.

4. 2. Behavioural Barriers

Barriers and impediments to the applications of value management in construction project in Nigeria are:

4. 2. 1. Lack of awareness about VM

It is due to the lack of knowledge being disseminated in VM studies. A recent research by Noor *et al* (2015) reveals a low level of awareness of VM studies and its applications by clients and construction industry practitioners. Oke and Ogunsemi (2011) further argued that another contributing factor to the problem faced was due to lack of input from the related specialists' as well as poor facilitation skills during the VM workshops.

4. 2. 2. Misperception about integration of sustainability and VM

Seeing sustainability and VM as two separate issues, which it becomes a burden to the VM participants as additional tasks when applied in the studies

4. 2. 3. Passive behaviour among VM practitioners

VM practitioners remain passive to forward VM knowledge to client's attention; due to the fact that they may not have adequate knowledge to drive the novel idea. In Nigeria, the mind of the client and the professionals in the construction industry are hardened to the old ways (the resistance to change by the involved parties during the VM workshops sessions as well as the conflicting objectives of the project by different parties) and method of executing the project. This brings a barrier to value management implementation in Nigeria construction industry.

4. 2. 4. Lack of Training and Education in VM

The main Impediment to the application of value management in a construction project in Nigeria is inadequate training and educating of professionals that will involve in value management approach. It is necessary for professional institutions and universities to add VM to their curriculum in order to educate people in the construction industry so that they will not reject this new concept out of fear and will come to appreciate the true value of Value Management.

This was also stressed by Che Mat (1999), who stated that it is important to make people understand the practice and the concept of VM. Many important stakeholders are not even aware of the concept of value management and so are naturally resistant to change.

4. 2. 5. The high cost of VM study

Another major impediment to the application of value management in a construction project is the inability to fund the value management. It is believed that the additional cost of setting up a VM team and their attendant resources may increase the cost to the clients and therefore are avoided. Even after considering the costs and barriers to VM, the advantages still far outweigh the cost of VM. Jaapar (2006) urged that VM should be commonly practiced on projects, especially on larger and more complex projects to increase value for money and meet the client's expectations.

Jaapar (2011) stated that most of the client thinks VM is another way of wasting money or enriching the pocket of the professional involve, not knowing that the costs associated with VM compared with the benefits are almost dismissible. The costs of conducting a VM workshop rarely ever exceeds 1% of total project costs, whilst potential savings of between 10 and 15% of total project costs are possible.

4. 2. 6. Procurement issues

Undue emphasis on lowest price rather than best value impacts negatively on industry performance in terms of time, cost and quality. It affects the sustainability of enterprises and their ability to develop and retain a skilled workforce, and to actively promote safety, health and the environment.

4. 2. 7. Regulatory barriers

Public policies and regulatory frameworks do not encourage the development of the construction sector.

Having realized the existence of several barriers to VM studies, it can be deduced that these barriers might still exist in the current practice of VM in government projects, mostly, especially in the developing countries.

5. DRIVERS OF VM STUDY

It is important to look at ways to improve VM, especially after considering the risks and costs involved. This eliminates the few excuses that a person could have for not wishing to use VM on a project. There are a vast number of methods and techniques to enhance VM which can become a study on its own. This treatise will briefly discuss and focus on only five relatively new initiatives which guarantee to improve VM as a whole (Coetzee, 2009).

5. 1. Electronic VM

In order for VM to survive the world where there is limited finance, time constraints and team members that may be geographically dispersed, it must embrace the technology that allows it to be a quick, flexible, easy and a cost-effective methodology (Coetzee, 2009); this assertion was earlier stressed by Fan et al. (2007) who noted that one possible way to improve the efficiency of VM workshops is to utilize information technology to develop a web-based system to empower the VM workshops.

Electronic VM makes optimum used of technological advances such as video conferencing, etc. to create a new VM delivery process that differs significantly from the

traditional physical team workshop (Coetzee, 2009). Electronic VM makes use of concepts of 'Delphi' (a systematic interactive method based on independent inputs of selected experts) and virtual teams together with more traditional VM concepts of structured problem solving, functional analysis and the utilisation of a VM facilitator to coordinate the whole process. The teams will work over the internet and make use of the latest technology. During the structured problem-solving stages, the team members will be given tasks which must be fed back to the facilitator. The facilitator must then analyse and prepare the data before it is sent back to the team members in the next iteration (Coetzee, 2009; Devonport *et al*, 2007).

Some of the most significant advantages and disadvantages of electronic VM is listed below (Devonport *et al*, 2007): Advantages of Electronic VM include- it does not require physical meetings, thus, geographical constraints are eliminated; takes a very short time to set up; no booking of accommodation/refreshments, therefore, saving cost; very flexible in terms of time; more data is produced therefore more thinking time is available; team members not restricted by other commitments, these can now overlap

Disadvantages of Electronic VM include- written words can be misunderstood and it can take time to clarify the meaning; conflict can be increased because people tend to be more honest when they are not face to face confronted with other team members (they may be less tactful); the team members must have IT competence and the right software is required.

Electronic VM reduces two major 'costs' of VM, namely the time taken to conduct the sessions and the financial costs involved with hiring the venue, paying for transport for attendees. It will probably still be a while before electronic VM is fully implemented, but advances and availability of specific VM software which is being developed should make it a popular new approach to VM (Coetzee, 2009).

5. 2. Establishing a Group Support System

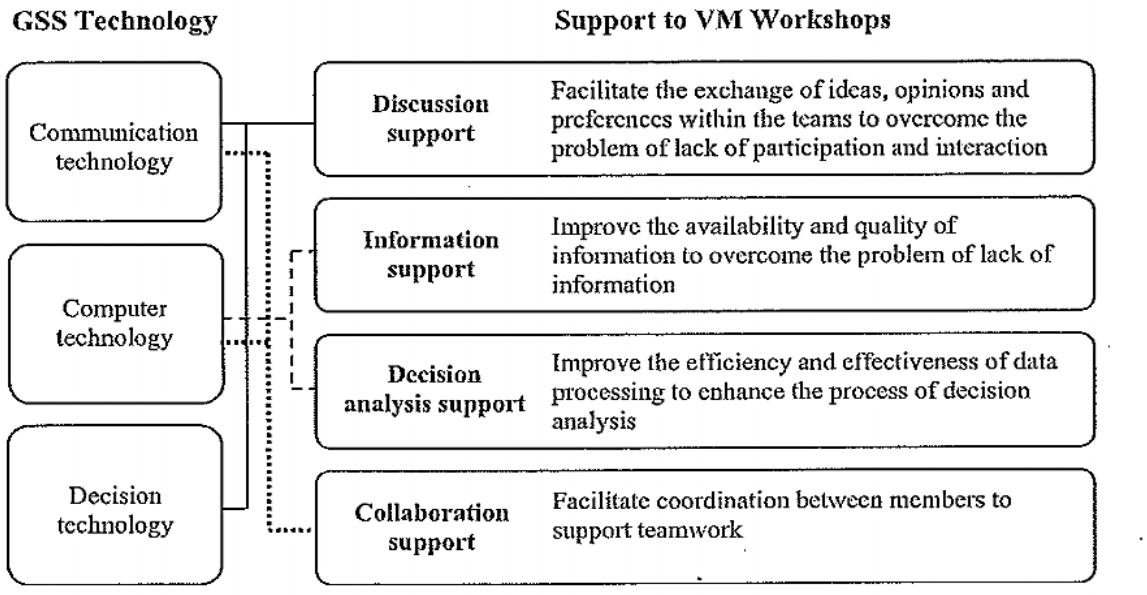


Figure 2. GSS support to VM studies. (Adapted from Chung and Shen (2004))

A group decision support system (GDSS) can be helpful to VM users overcome difficulties in value management (VM) workshops (Fan & Shen, 2011). Group Support System (GSS) is a set of techniques, software, and technology designed to focus and enhance the communication, deliberations, and decision-making of groups (Chung and Shen, 2004). It is an interactive computer-based system that facilitates the solution of unstructured problems by a group of people that must make decisions. A group decision support system (GDSS) or group support system (GSS) combines communication, computer and decision support technologies to facilitate the formulation and solution of unstructured problems by a group of people (DeSanctis & Gallupe, 1987)

Chung and Shen (2004) identify three main problems when implementing VM namely: lack of information; lack of participation and interaction; the difficulty of conducting evaluation and analysis. All of these problems can be overcome by making use of GSS. Figure 2 illustrates how GSS technology supports VM.

5. 3. Developing a Knowledge Management System

Abourizk, Mao and Zhang (2009) proposes a VM knowledge management system to support the knowledge creation process, to code and retain ideas from historical VM studies and share this information with the rest of the team members and the industry. A VM study is only as good as the quality of information on which decisions are based (Coetzee, 2009).

5. 4. Using Value Added/Based Strategies

For VM to be sustainable a value culture must be established within the organisation. The way in which such a culture is established is when the VM is managed in such a way that the value-adding results are the consistent outcome of such studies (Coetzee, 2009). The main factors that are considered when evaluating value-added strategies are the number and timing of workshops, the duration of the workshops, the number of team members and the expertise of the VM participants (Coetzee, 2009). When all of the above factors are satisfactory during a VM study it will deliver favourable results. Kirk and Garret (2008) (as cited in Coetzee, 2009) suggests two more strategies that should be used to gain more value from the VM study.

Firstly, that the VM methodology should be followed as an entire decision-making system and that no shortcuts should be taken. *Secondly*, that the users of VM should apply techniques of functional analysis, quality modelling, risk modelling, choosing by advantage (CBA) and lifecycle costing. This is very important especially for larger and more complex projects. (Robinson, 2008).

5. 5. Training and Education in Value Management

Requisite training and education in value management practices and applications can enhance the furtherance of the acceptability of VM study for capital projects. Training and education can come in forms of workshops, seminars, professionals' forum, higher education and in-house mentoring. In Africa, value management is not yet a concept well known and practiced by all the parties involved in the building industry.

Training and educating the professionals in the industry in value management practices hopes to prove that VM is truly beneficial and a worthwhile practice to enhance the value of any building project. It is important for African built professionals to become aware of and

familiarize themselves with VM. The continent Africa is just a few steps behind with VM compared to some of the developed countries like Britain, Australia, North America and China.

5. 6. Clients Commitment and Involvement

Clients such governmental bodies, educational or religious organisations, corporate bodies who are knowledgeable of VM practices or have seen VM studies applied to their past or on-going projects should further encourage its practice and insist on its application on their projects. The involvement of the clients and the consultants is an important driver in value management since they are the key players who play an active role in order to produce the specified buildings and other facilities during the construction process (Olanrewaju & Khairuddin, 2007).

Therefore, their input must be considered through a thorough understanding of the outcome of the specified construction project, by analysing the information gathered from the various parties from the perspectives of value management; thus it would enhance the implementation of value management services in the construction industry in procuring the projects. The Client commitment will be very important due to their contribution to the development and growth of Nigeria construction industry.

5. 7. Government Involvement through Introduction of Policy and Regulations

The government at all levels been the biggest clients to the construction industry can further enhance the face value of VM procedure by introduction and enactment of policies and regulations enforcing the application of VM studies on certain projects. Also, the government should ensure that it utilizes the VM procedures and practices in its own projects so as to shore up interests in VM utilization across the board.

Government involvement through the introduction of value management policy, regulations, guidelines and enforcement of VM will make the practice one of the important activities carried out by the Nigeria construction industry.

6. CONCLUSION

Value management (VM) is a process whereby the project is evaluated (elemental evaluation) and scrutinised to obtain maximum value for money by following a certain methodology; the process is led and coordinated by an independent and experienced facilitator who must have a comprehensive and considerable knowledge of the construction industry. Meanwhile, the changing global economy over the past few decades and intensifying competition has placed a growing importance and demand on *increased efficiency, effectiveness* and *value for money*; and most importantly in developing countries of the world. VM addresses these three facets effectively and directly.

Value management is a truly beneficial practice that should form an integral part of a project (especially larger and more complex projects) and that it is worth investing some time and effort in organising the workshop and process as a whole. Further research works can inquire into its applicability to specific projects whereby information on the impact of the application of value management to such projects is quantified in cost, time and quality.

References

[1] Abidin N.Z., & Pasquire C.L., (2003). Moving towards sustainability through value management. *In: Proceedings of the joint international symposium of CIB working commissions* W55, W65 and W107, Singapore, Vol. 2, p. 258-268.

[2] Abidin, N. Z., & Pasquire, C. L. (2005). Delivering sustainability through value management: Concept and performance overview. *Engineering, Construction and Architectural Management*, 12(2), 168-180. http://doi.org/10.1108/09699980510584502

[3] Abidin, N. Z., & Pasquire, C. L. (2007). Revolutionize value management : A mode towards sustainability. *International Journal of Project Management*, 25, 275-282. http://doi.org/10.1016/j.ijproman.2006.10.005

[4] Abidin, N.Z., Said., & I. (2006). Involvement of sustainability issues in value management: requisite factors. Paper presented at the *International Conference on Construction Industry*: Toward Innovative Approach in Construction and Property Development, Padang, Indonesia. http://fab.utm.my/files/2011/11/ICCI2006S1PP17.pdf

[5] AbouRizk, S.M. Mao, X. & Zhang, X. (2009). Developing a knowledge management system for improved value engineering practices in the construction industry. *Automation in Construction* p. 776-779.

[6] Ashworth, A., & Hogg, K. (2000). Added Value in Design and Construction. Essex: Pearson Education Limited.

[7] Australian/New Zealand Standard (AS/NZS). (1994). "Value management." AS/NZS 4183, Joint Technical Committee OB/6.

[8] Best, R., & De Valence, G., (eds) (2002), Design and Construction: *Building in value*, Butterworth - Heinemann, Woburn.

[9] Bowen, P., Edwards, P., Cattell, K., & Jay, I. (2010). The awareness and practice of value management by South African consulting engineers : Preliminary research survey findings. *International Journal of Project Management*, 28(3), 285-295. http://doi.org/10.1016/j.ijproman.2009.07.001

[10] Cha, H. S., & Connor, J. T. O. (2006). Characteristics for Leveraging Value Management Processes on Capital Facility Projects. *Journal of Management in Engineering*, 22(3). http://doi.org/10.1061/_ASCE_0742-597X_2006_22:3_135_

[11] Che Mat, M. M. (1999). Value Management: Towards Achieving Better Value for Your Money. Johor: *Professional Centre for Value Management* Sdn Bhd.

[12] Chung, J. K. H. & Shen Q. (2004). A group supports system for improving value management studies in construction. *Automation in Construction*.p. 209-212.

[13] Cloete, C.E. (2008). Class notes- Value management and life cycle costing. The university of Pretoria. Pretoria.

[14] Coetzee, C.E. (2009). Value management in the construction Industry: What does it entail and is it a worthwhile Practice. BSc Thesis, University of Pretoria.

[15] De Leeuw, C.P. (1998). Value management internal working manual. Pretoria. C.P. de Leeuw (Pty) Ltd.

[16] DeSanctis, G., & Gallupe, R.B., (1987). A foundation for the study of group decision support systems. *Management Science* 33(5), 589-609.

[17] Devonport, Gronqvist, Kelly & Male, (2007). Electronic value management for the 21st century. Value solutions Ltd. England.

[18] Ellis R.C.T., Keel D.A., & Wood G.D. (2004). Value management practices of leading UK cost consultants. *Construction Management and Economics*, p. 484, 489, 491.

[19] Ellis, R. C. T., Wood, G. D., & Keel, D. A. (2005). Value management practices of leading UK cost consultants. *Construction Management and Economics*, (June), 483–493. http://doi.org/10.1080/01446190500040711

[20] Fan, S., & Shen, Q. (2011). The effect of using group decision support systems in value management studies : An experimental study in Hong Kong. *International Journal of Project Management*, 29(1), 13–25. http://doi.org/10.1016/j.ijproman.2010.01.008

[21] Fan, S., Shen, Q., & Lin, G. (2007). Comparative Study of Idea Generation between Traditional Value Management Workshops and GDSS-Supported Workshops. *Journal of Construction Engineering and Management*, 133(10), 816-826. http://doi.org/10.1061/_ASCE_0733-9364_2007_133:10_816_

[22] Flanagan, R. & Jewell, C. (2005). Whole life appraisal for construction. Oxford: Blackwell Publishing Limited.

[23] Fong, P. S., Hills, M. J., & Hayles, C. S. (2007). Dynamic Knowledge Creation through Value Management Teams. *Journal of Management in Engineering*, 23(1), 40-50. http://doi.org/10.1061/_ASCE_0742-597X_2007_23:1_40_

[24] Fong, S. W. & Shen, Q. P. (2000). Is the Hong Kong construction industry ready for value management? *International Journal of Project Management*, 18. pp. 317-326

[25] Fong, S.W. (2003). "Value management – going all out for knowledge creation", The Value Manager, Vol. 9 No. 1, available at www.hkivm.com.hk/publications/03/TVM2003-1.pdf

[26] Good Practice Guide [GPG], (1997). Value Management: "It's not just a good idea...it's the law". Lifecycle Asset Management. GPG-FM-011. Department of Energy, Office of Field Management, Office of Project and Fixed Asset Management.

[27] Green, S.D.& Liu, A.M.M. (2006). Theory and practice in value management: a reply to Ellis et al. *Construction Management and Economics*. p. 650.

[28] Institute of Value Management (2002). What is Value Management?, IVM, available at www.ivm.org.uk/vm_whatis.htm

[29] Jaapar, A. (2006). The Application of Value Management in the Malaysian Construction Industry and Development of Prototype Value Management Guidelines. Universiti Teknologi MARA, Shah Alam, Selangor.

[30] Jaapar, A. (2011). Capacity Building for Value Management in Malaysia, Value Management Seminar, Putrajaya International Convention Center. 24 May.

[31] Karim, S. B. A., Rahmin, R. 'Adawiyah A., Danuri, M. S. M., & Mohamed, O. (2014). Developing the Value Management Maturity Model (VM3 ©). *Journal of Design and Built Environment*, 14 (June), 1-10.

[32] Kaur, G. (2012). The value management advocate. Malaysian Business. June 1, pp.36-38. Kuala Lumpur: Berita Publishing.

[33] Kelly, J., & Male, S. (2006). Value management. In Kelly, J., Morledge, R., & Wilkinson, S.(Ed.), Best value in construction, United Kingdom: Blackwell Publishing, pp. 77-99.

[34] Kelly, J., Male, S., & Graham, D., (2004). Value Management of Construction Projects. Blackwell, Oxford.

[35] Kelly. J, & Male, S. (1993). Value management in design and construction. The economic management of projects. Glasgow. E & FN Spon Inc.

[36] Kim, S., Lim, J., Kim, J., & Cheon, Y. (2010). Application of value analysis for SOC project in Korea. In SAVE International's 50th Annual Conference, 7-10 June 2010, Long beach, California.

[37] Kiyoyuki, K., Sugisaki, K., & Kobayashi, K. (2005), Statistical Deterioration prediction considering the non-uniformity of the visual inspection interval, In Proceedings of the International seminar on asset management. Jointly organized by Kulliyyah of Architecture and Environmental Design and Kyoto University Japan. Held in Kuala Lumpur, Malaysia.

[38] Leung, M. Y., Chu, H. Y. & Lu, X. (2003). Participation in value management. Report forRICS Education Trust Founded Project.

[39] Locke, M.B. (1994). Management of value in the British construction industry. SAVE International. London MARA, Shah Alam, Selangor

[40] May, S.C. (1994). Value engineering and value management. United Kingdom: The College Of Estate Management.

[41] McElligott, W.C. Norton, B.R. (1995). Value management in construction, a practical guide. London. Macmillan Press Ltd.

[42] Noor, N.F.M, Kamruzzaman, S.N. and Ghaffar, N.A (2015). Sustainability concern in value management: A study on Government's building Project. *International Journal of Current Research and Academic Review*, pp. 72-83.

[43] NSW Treasury, (2004). Value Management Guideline. *Total Asset Management*. ISBN 0 7313 32962

[44] Odeyinka, H. A. (2006). The role of the quantity surveyor in value management. Paper presented at the 22nd Biennial conference/general meeting on Quantity surveying in the 21st Century Agenda for the Future. Nigerian Institute of Quantity Surveyors.

[45] Office of Government Commerce [OGC] (2007). Value Management in Construction: Case studies. Office of Government Commerce, Trevelyan House, 26 - 30 Great Peter Street, London SW1P 2BY. www.ogc.gov.uk

[46] Oke, A. E. & Ogunsemi, D. R. (2011). Value Management in the Nigerian Construction Industry: Militating factors and perceived benefits. Proceeding of the second international conference on advances in engineering and technology. Faculty of Technology, Makerere University, Uganda, 30 January – 1 February, 353-359.

[47] Olanrewaju, A. A., & Khairuddin, A. (2007). Determining whether Value Management is practiced in the Nigerian Construction Industry, In Proceeding of Quantity Surveying International Convention (QSIC). KR and CIDB. 4-5th September, Kuala Lumpur.

[48] Rains, J.A. (2008). The integration of the Japanese Tear-down Method with a design for assembly and value engineering. *Value World* 31, p. 29.

[49] Rangelova, F. & Traykova, M. (2014). Value Management in Construction Project. First Scientific- Applied Conference with International Participation "Project Management in Construction" University of Architecture, Civil Engineering, and Geodesy

[50] Robinson, J.L. (2008).V alue added strategies to sustain a successful value improvement program. Value World 31, p. 19.

[51] The Department of Housing and Works (2005). Value Management Guidelines, Government of Western Australia. Retrieved June 7, 2015, from http://www.utm.my/staff/valuemanagement/

[52] The Institute of Value management (2008). What is value management? Retrieved June 7, 2015, from http://www.ivm.org.uk/what_vm.htm

[53] Thomson D.S., Austin S.A., Mills GR, & Devine-Wright H. (2003). Addressing the subjective view of value delivery. In: The proceedings of the RICS foundation construction and building research conference, the University of Wolverhampton, p. 197-213.

(Received 06 August 2016; accepted 23 August 2016)