



# PROJECT MANAGEMENT CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING  
Civil & Environmental Engineering Department



## EVALUATING THE IMPACT OF BUILDABILITY ASSESSMENT AND VALUE MANAGEMENT ON CONSTRUCTION PROJECT DELIVERY

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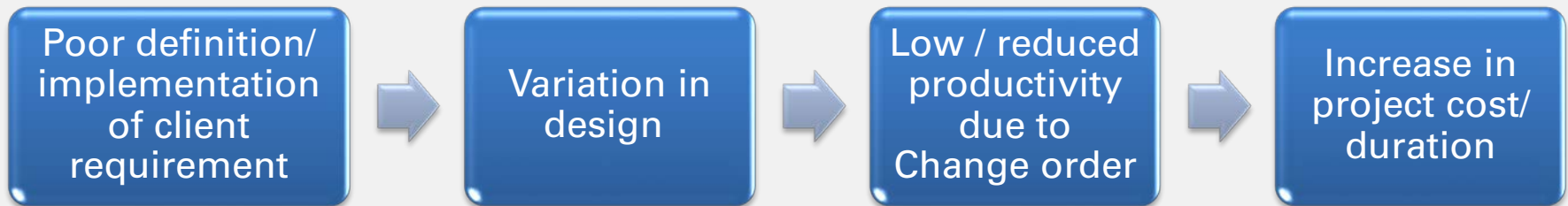
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# Introduction

- Achieving a balance between the key performance indicators of **time**, **quality** and **cost** has always been a source of concern to project stakeholders.
- **Minimizing duration** without compromising quality is critical to success in any construction project leading to buildability/constructability becoming a major requirement in building practice.
- **Schedule slippage** and **cost overruns** is a recurring decimal in the construction industry leaving lots of clients dissatisfied.
- **Defining and implementing client requirements** is crucial to the successful delivery of a project (Leeuw 2001).

- It is imperative to adopt a broader range of procedures and greater flexibility in seeking ways to meet the **expectations of clients**.



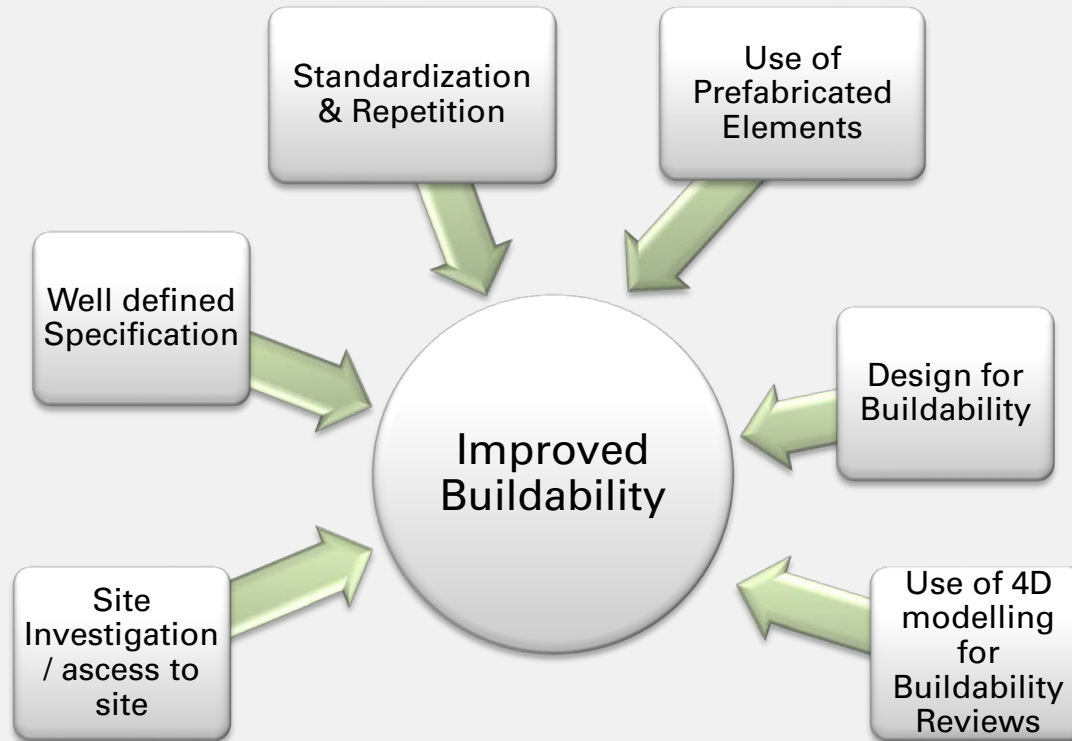
*Fig 1: Effects of poor definition of client requirements*

- Buildability assessment** and **value management** studies creates an excellent opportunity to meet client expectations.



# Review of Literature

- Buildability is defined as the extent to which the design of a building **facilitates the ease** of its construction (CIRIA 1983).
- It aims at **enhancing the efficiency of the building process** through the development of **construction sensitive designs**.
- The implementation of buildability starts at the design stage (Aina & Wahab 2001, Mbamali et al. 2005).
- Anderson et al. (2000) contends that buildability plan should be developed during the project definition phase.



*Fig 2: Considerations for improving buildability*

- A 4D model (3D model linked to the construction schedule) shows the **logical**, **temporal** and **spatial information** of the construction process and can be used to enhance buildability (Koo and Fischer 2000)



# Barriers to Implementing Buildability

- “Review” Syndrome (CII 2016a);
- Difficulty inherent in **measuring its benefit** to the construction industry (Song and Chua 2006);
- Lack of **practical construction knowledge** by designers (Wong et.al 2004);
- Lack of systematic method of integrating the knowledge and experience gained overtime into the project development stage of new projects (Anderson et. al 2000);
- **Rigidity of clients and consultants** in accepting alternative construction methods (Pheng and Abeyegoonaasekera 2001);
- Cultural, procedural, awareness and incentive barriers (CII 2016b)

# Breaking the Barriers to Buildability



Fig 3 : Breaking barriers.

One way to break the barriers to the successful implementation of buildability assessment is through **value management workshops/studies**.





# Value Management

This is a **systematic process** which combines technical knowledge and common sense to identify and eliminate unimportant project costs (Chen et.al 2010).

Typically involves three techniques:

- **Value Planning (VP)**: Focus is on identifying project objectives and developing general approaches to meet the project objectives.
- **Value Engineering (VE)**: Focus is on quantifying and comparing alternatives for selected project components. Higher level of detail than VP.
- **Value Analysis (VA)**: Systematic, formal and organized process of analysis and evaluation of project requirements consistent with lowest function to cost ratio and quality requirements.

# Value Management Concept

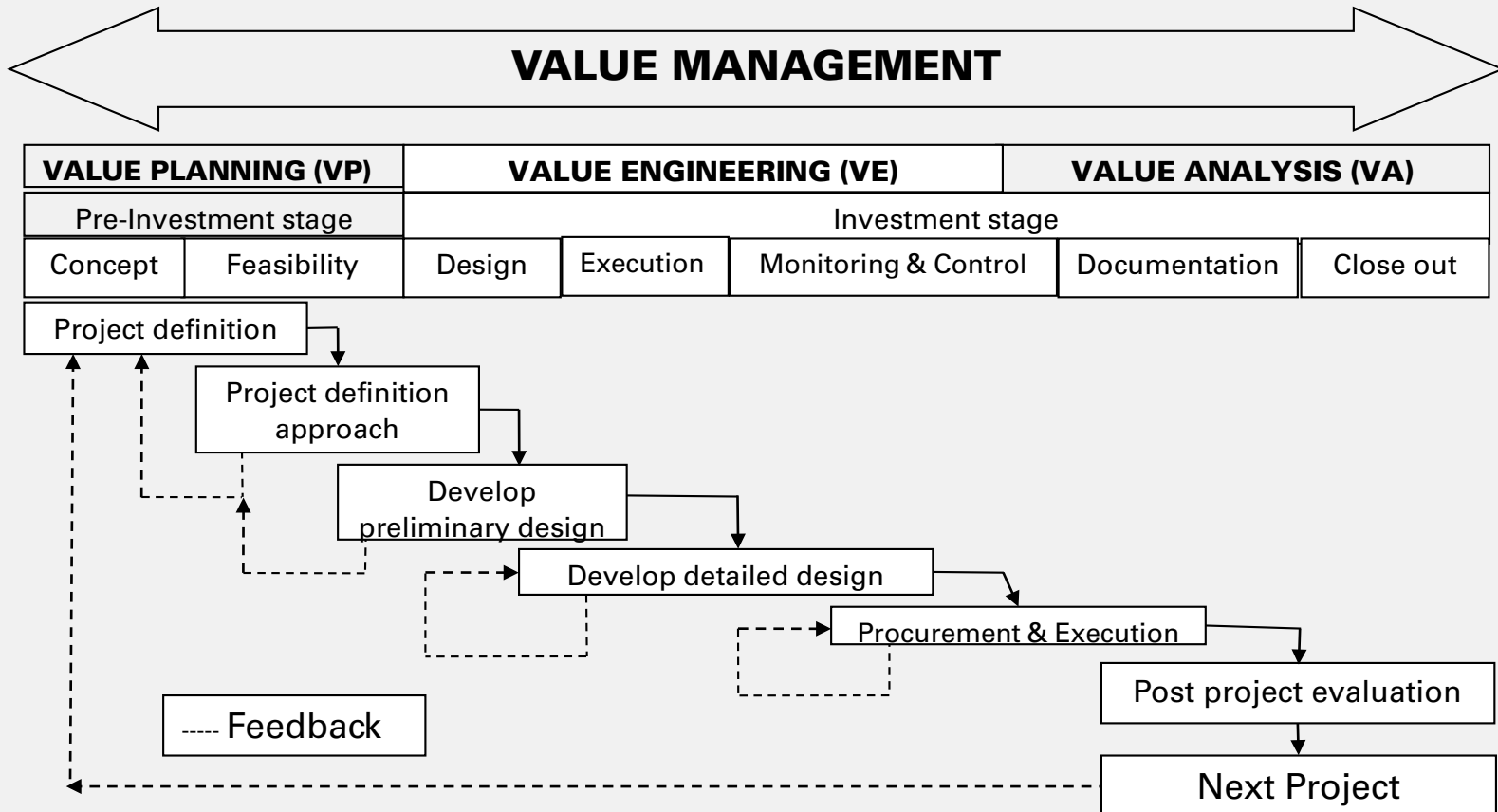


Fig 4 : Value management concept (Adapted from Merna and Al-Thani 2008).

- ❖ Buildability assessment can implemented as part of the value engineering process.



# Stages in Value Management Studies (VSM)

Table 1: Job Plan Procedure (Adapted from Kelly and Male 1993).

## **Pre-study Phase**

- Gathering and blending of information, agenda production and presentation, team building.

## **Workshop/Study Phase**

### Information sub-phase

- Gathering, blending and sharing of information, task and process analysis.

### Creativity sub-phase

- Brainstorming by team members to generate a host of ideas.

### Evaluation sub-phase

- Sorting and refining of ideas for further development, function analysis, cost/worth analysis.

### Development sub-phase

- Development of implantation of selected ideas.

## **Post-study Phase**

- Presentation of sketch drawings and cost calculations to project sponsor.
- Feedback which involves giving the opportunity to test the designs and cost predictions.
- Comments and/or criticisms about the study from all project stakeholders.

# Critical Success Factors for VMS

Kelly et.al (2004) lists the following critical success factors (CSF) for VMS:

- The **skill** of the study facilitator;
- Use of **multi-disciplinary team** with the correct skill mix;
- A **coordinated approach** through the VM process;
- A certain **level of VM knowledge** from the workshop participants;
- Presence of **key decision makers** in the VM workshop;
- Adequate **preparation before the commencement** of the VM workshop;
- The use of **functional analysis**
- Senior **management participation and support** in the VM process;
- Proper **implementation plan** for the workshop outcomes.

# Methodology

- Survey method was adopted using a questionnaire.
- Questionnaire was administered to construction professionals within the Nigerian construction industry.

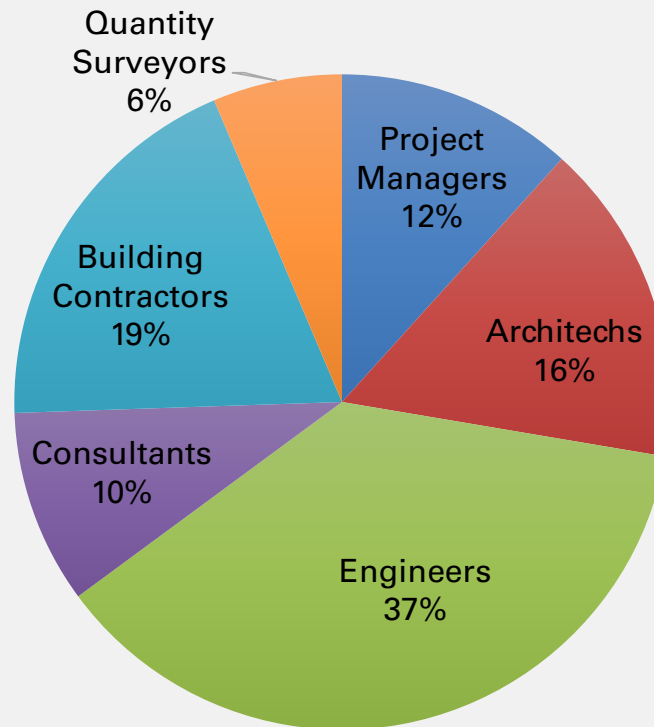


Fig 5 : Breakdown of valid questionnaire response



# Result

Table 2: SWOT Analysis of Nigerian Construction Sector

## STRENGTHS

- Availability of cheap and affordable labour.
- Large labour force.
- Large number of foreign graduates.
- Availability of local raw materials.

## WEAKNESS

- **Poor credit facilities** and access to finance.
- Lack of **suitably experienced** and motivated professionals.
- Poor **integration of people** with construction knowledge in the design process.
- Poor **documentation of lessons learnt** from previous projects.
- **Lack of research and development** aimed at developing innovative construction approach.
- Low **quality standards** and poor enforcement of construction specifications.
- Poor inspection and control
- Poor **remuneration of indigenous staffs** in comparison to expatriates.



### **OPPORTUNITY**

- Large construction market.
- Adoption of lean thinking.
- Collaboration with foreign construction companies presents opportunities for technology transfer.

### **THREATS**

- Harsh and **unpredictable** business environment.
- High level of **extortion** by local communities.
- Lack of social security.
- Over reliance on foreign expatriates.
- High **inflation** levels.

95%



of the respondents were familiar with the concepts of buildability assessment.

90%

were familiar with the concepts of VM/VE

20%

drawings

claimed the use of VM workshops on projects they have been involved in within the last 10 years.

45%

revealed carrying out buildability assessment on designs prior to commencement of construction.



# Integrated Conceptual Framework For The Implementation of Buildability Assessment & Value Management

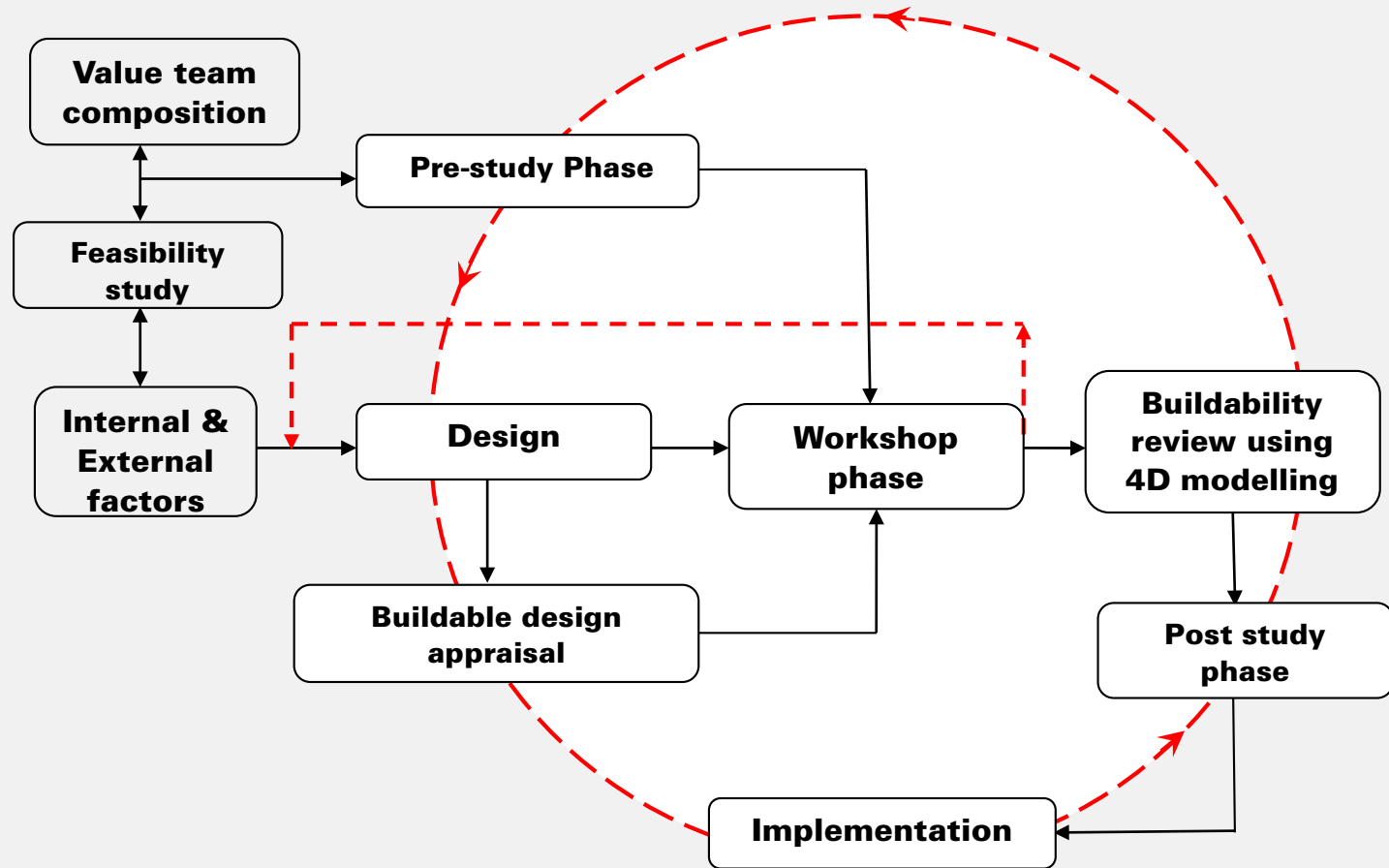


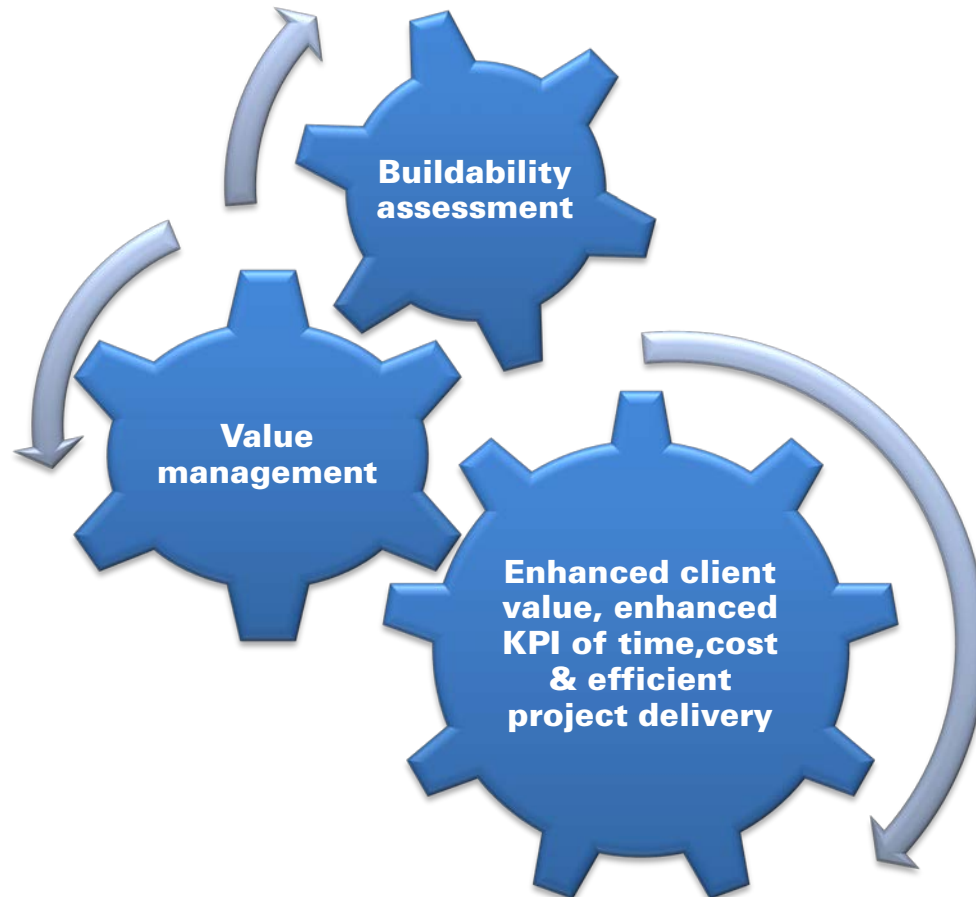
Fig 6 : Integrated VM and BA framework



# Conclusion

- The use of BIM plays an important role in answering the question of buildability to some extent.
- BIM does not take the place of a formal buildability review with input from construction personnel.
- Integrating buildability assessment and value management would help in enhancing project delivery.
- BA and VE are carried out differently using different teams.

- Integration of BA and VE would lead to immense gains for the construction industry.





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