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

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Content

1. • Introduction
2. • Literature Review
2. • Methodology
3. • Results
4. • Conclusions
5. • References
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, M bamali et al. 2005).

• Anderson et al. (2000) contends that buildability plan should be developed during the project definition phase.
- 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 Abeyegoonasekera 2001);

- Cultural, procedural, awareness and incentive barriers (CII 2016b)
One way to break the barriers to the successful implementation of buildability assessment is through value management workshops/studies.

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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 requirement consistent with lowest function to cost ratio and quality requirements.
Value Management Concept

Value Planning (VP) - Pre-Investment stage
- Concept
- Feasibility

Value Engineering (VE) - Investment stage
- Design
- Execution
- Monitoring & Control
- Documentation
- Close out

Value Analysis (VA)

Project definition
- Project definition approach
- Develop preliminary design
- Develop detailed design
- Procurement & Execution
- Post project evaluation

Feedback
- Next Project

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

- Buildability assessment can be 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).

<table>
<thead>
<tr>
<th>Pre-study Phase</th>
<th>Workshop/Study Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gathering and blending of information, agenda production and presentation, team building.</td>
<td>Information sub-phase</td>
</tr>
<tr>
<td>Workshop/Study Phase</td>
<td>Gathering, blending and sharing of information, task and process analysis.</td>
</tr>
<tr>
<td>Creativity sub-phase</td>
<td>Creativity sub-phase</td>
</tr>
<tr>
<td>Brainstorming by team members to generate a host of ideas.</td>
<td>Evaluation sub-phase</td>
</tr>
<tr>
<td>Evaluation sub-phase</td>
<td>Sorting and refining of ideas for further development, function analysis, cost/worth analysis.</td>
</tr>
<tr>
<td>Development sub-phase</td>
<td>Development sub-phase</td>
</tr>
<tr>
<td>Development of implantation of selected ideas.</td>
<td>Development sub-phase</td>
</tr>
<tr>
<td>Post-study Phase</td>
<td>Post-study Phase</td>
</tr>
<tr>
<td>Presentation of sketch drawings and cost calculations to project sponsor.</td>
<td>Post-study Phase</td>
</tr>
<tr>
<td>Feedback which involves giving the opportunity to test the designs and cost predictions.</td>
<td>Comments and/or criticisms about the study from all project stakeholders.</td>
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</table>
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

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Availability of cheap and affordable labour.</td>
<td>- Poor credit facilities and access to finance.</td>
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<tr>
<td>- Large labour force.</td>
<td>- Lack of suitably experienced and motivated professionals.</td>
</tr>
<tr>
<td>- Large number of foreign graduates.</td>
<td>- Poor integration of people with construction knowledge in the design process.</td>
</tr>
<tr>
<td>- Availability of local raw materials.</td>
<td>- Poor documentation of lessons learnt from previous projects.</td>
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<td></td>
<td>- Lack of research and development aimed at developing innovative construction approach.</td>
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<td></td>
<td>- Low quality standards and poor enforcement of construction specifications.</td>
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<td></td>
<td>- Poor inspection and control</td>
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<td></td>
<td>- Poor remuneration of indigenous staffs in comparison to expatriates.</td>
</tr>
</tbody>
</table>
### 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.
of the respondents were familiar with the concepts of buildability assessment.

were familiar with the concepts of VM/VE

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

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.
References


References


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