EXPLORING THE RELATIONSHIP BETWEEN CONSTRUCTION PHASES AND SUSTAINABLE CONSTRUCTION PRINCIPLES
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Background

• The construction industry has been criticised for those of its activities that conflict with SD principles (Pearce, 2005).

• Construction consumes 50% of natural resources (European Commission, 2001).

• There is need for resource efficiency and alternative construction approaches

• Sustainable construction (SC) is seen as the industry’s approach to achieve sustainable development (SD) (Abidin, 2010, Hoffman and Henn, 2008).
• Construction phases are generally viewed as sequential, they may alternate sequences as possible

• Common phases are: conception, planning, design, tender, construction and operation (Ahadzie et al., 2006, Lim and Mohamed, 1999, Takim et al., 2003)

• Construction professionals’ decisions are important in achieving SC
  • Their understanding and interpretation of these principles may be an hindrance
• Professionals have treated SC principles in isolation (Kibert, 1994)
  • *compromises understandings of their interconnectivity*

• Few studies address the links between sustainable principles and their application during construction processes.
Sustainable Development

• Most definition of SD emphasises the importance of striking a balance between environmental conservation, social equity and economic profitability.

• Sustainability is the action taken to strike a balance between social, economic and environmental factors in achieving present and future demands (Ogunmakinde et al., 2016)
• Four levels of construction (Irurah, 2001)
  • Site activity
  • Comprehensive project cycle
  • Business of construction
  • Human settlement creation

• Construction phases are similar but depend on:
  • Size
  • Scope

 SD
 Sustainability
 Construction
 Construction Phases
 SC
• SC is generally used to describe pre-construction, construction, and post construction processes.

• SC remains one of the ways industry meets present needs without compromises.

• Resource efficiency, construction activities and construction phases are critical to SD.
• Relationship between SC, SD and Sustainability
Sustainable Construction Principles

• Seven simplified principles of SC  (Kibert, 2012: 8)
  • Reduce resource consumption
  • Reuse resources
  • Use recyclables resources
  • Protect nature
  • Eliminate toxics
  • Apply life-cycle costing
  • Focus on quality

• These principles inform stakeholders’ decisions at each phase of design and construction  (Kibert, 2012)
# Methodology

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Findings

Framework for the relationship between SC principles and construction
### SC Principles

- **Reduce**: aimed at decreasing resource and energy input in the consumption and production processes (Yong, 2007, Su et al., 2013)
  - material reduction,
  - use of fewer resources
  - minimising the input of primary energy

- **Reuse**: It is where components used before are used again for the same purpose they were initially used for (European Union, 2008)
  - It has considerable environmental benefits including reduced energy consumption, fewer resources and less labour (Castellani et al., 2015, James, 2011)

### Construction Phases

- Pre construction
- Actual construction
- Post construction
### SC Principles

- **Recycle:** It is a recovery operation (Ghisellini et al., 2016) applied to products that cannot be recovered or reused.
  - Fundamental & mandatory to achieving sustainability (Murray et al. (2015; Van den Berg and Bakker, 2015)
  - Reduces the consumption of virgin materials (Shi et al., 2006, Su et al., 2013)
  - Reduces waste from usable and potential materials (Birat, 2015; Lazarevic et al., 2012)

- **Protect Nature:** It is associated with protecting and preserving the natural environment and its ecological systems

### Construction Phases

- Actual construction
- Post construction
- Pre construction
- Actual construction
- Post construction
## SC Principles

- **Eliminate toxics:** use of non-toxic materials is as important as sustainable resource consumption is to SC (Pacheco-Torgal and Jalali, 2011)

- Air and water pollution in buildings results from materials releasing toxic fumes and contaminating water (Pacheco-Torgal and Jalali, 2011, Liang and Ho, 2007)

## Construction Phases

- Pre construction
- Actual construction
- Post construction

## Life Cycle Costing

### SC Principles

- **Quality**: It can be defined in terms of a building’s aesthetic, functional and stability characteristics.

- Its purpose is to meet the requirements set by clients, design teams, constructors, and regulatory bodies (Arditi and Gunaydin, 1997)

- It must be ensured throughout a project including its visible and non-visible portions.

- Good quality construction improves durability, economic viability, and resource efficiency whilst reducing maintenance.

### Construction Phases

- Pre construction

- Actual construction
Conclusion

- The framework developed could improve professional’s understanding and implementation of SC principles.
- The relationship between SC principles and construction phases is mutually inclusive and critical in achieving SC.
- It is recommended that construction professionals first understand the context of sustainability, SC, SD and then familiarize themselves with the relationship between SC principles and construction phases.
Thank you

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