

Leveraging Contemporary Technologies and Methodologies

TOWARD ACHIEVING SUSTAINABILITY IN THE NIGERIAN CONSTRUCTION INDUSTRY

A LECTURE DELIVERED BY

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2 – DAY NATIONAL WORKSHOP

THEME: INNOVATIVE AND SUSTAINABLE CONSTRUCTION PRACTICE: BUILDING A RESILIENT COST-BASED, KNOWLEDGE-DRIVEN INDUSTRY WITH INTEGRITY

ORGANISED BY

NIGERIAN INSTITUTE OF QUANTITY SURVEYORS

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CONTEXT ...



Nigerian CI Landscape.....

- The NCI contributes significantly to the economy
- Providing jobs (3 – 5% of total), infrastructure including housing (₦5.3tr 2023, ₦3.2tr 2024). ...
- Construction sector contribution to GDP: 2019 – 4.1%, 2020 – 3.8%, 2021 – 7.2%, 2022 – 9%,



Nigerian CI Landscape.....

- However, it faces substantial challenges in achieving sustainable growth

Global Statistics

- It is one of the lowest in the **Corruption Perception Index** environment
- Notorious for inefficiency and poor project delivery
- Corruption and lack of transparency are significant barriers to the industry's sustainable development

2020 – 149 out of 180

2021 – 154 out of 180

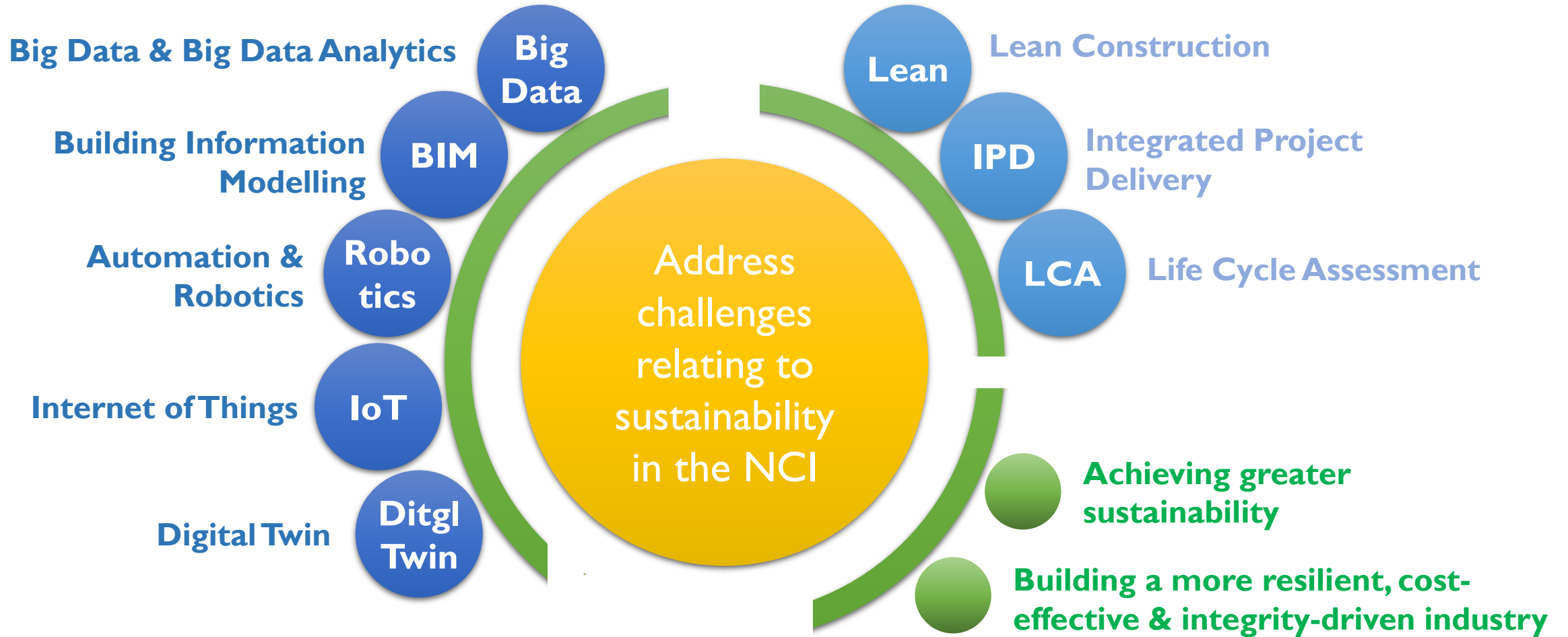
2022 – 150 out of 180

2023 – 145 out of 180



Presentation Objective

Methodologies for Sustainable Construction



Contemporary Technologies in Construction

Challenges & Opportunities in Sustainable Construction



SUSTAINABILITY IN CONSTRUCTION ...



Sustainability in Construction.....

- Sustainability refers to **meeting the needs of the present without compromising the ability of future generations to meet their own needs**
- Three Pillars of Sustainability – **Environmental, Economic, Social.**
- In construction, sustainability involves **designing, building, and operating structures** in a way that **optimizes resource efficiency, reduces environmental impact, and enhances the quality of life** for all stakeholders throughout the building's lifecycle.



Sustainability in Construction – Importance ...

- **Environmental impact:** Resource Consumption (water, energy, raw materials), Waste Generation (environmental degradation), Carbon Emission (greenhouse gas).
- **Economic Benefits:** Cost savings, Improved Profit Margins, Regulatory Compliance & Incentives
- **Social Responsibility & Ethical Considerations:** Community Impact (displacement, Disruption of ecosystem, health risks), Worker Well-being (safe & healthy working conditions/environment, fair wages), Ethical practices (integrity, transparency etc)



CONTEMPORARY TECHNOLOGIES IN CONSTRUCTION...



Big Data & Big Data Analytics

- Big Data refers to the vast volumes of data generated from various sources, such as sensors, project management tools, and social media
- Data Analytics involves the techniques and tools used to analyze this data to extract meaningful insights.
- **Relevance to Construction:** Big Data and Data Analytics can improve decision-making, enhance project management, and optimize costs
- **Application in Construction:** Predictive Analysis (predict delays, cost overruns and risks), Cost Management (identify inefficiencies and waste in supply chain), Resource Optimisation (optimise allocation and reduce waste).



Building Information Modelling

- BIM is a digital representation of the physical and functional characteristics of a building
- It serves as a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its lifecycle.
- **Relevance to Construction:** BIM is crucial for improving collaboration among stakeholders, reducing errors, and enhancing project efficiency
- **Application in Construction:** Design and Visualization (reduce likelihood of design changes), Clash Detection (Identifies potential conflicts thereby preventing delays), Lifecycle Management (provides data for facilities management towards efficient building operates).



Automation and Robotics

- Automation and robotics in construction involve using machines and software to perform tasks that were traditionally done manually.
- This includes robotic bricklaying, 3D printing of structures, and automated site monitoring.
- **Relevance to Construction:** These technologies improve precision, reduce labor costs, and increase safety on construction sites.
- **Application in construction:** Robotic Bricklaying (reduce construction time & costs), 3D Printing (print entire building, preventing delays & reducing waste), Drones for Site (used to monitor sites in real-time, providing valuable data on progress, safety & compliance).



Internet of Things (IoT)

- IoT refers to a network of interconnected devices that communicate with each other to collect and exchange data.
- In construction, IoT devices can include sensors, smart machinery, and wearable technology.
- **Relevance to Construction:** IoT enables real-time monitoring, predictive maintenance, and enhanced safety on construction sites.
- **Application in construction:** Smart Sensors (monitors conditions & reduce incidences of failure), Predictive Maintenance (reduces breakdowns & downtimes), Worker safety (detecting unsafe conditions, alerting on potential hazards).



Digital Twins

- A Digital Twin is a virtual model of a physical asset, process, or system.
- In construction, it can represent a building or infrastructure project, allowing for real-time simulation and analysis.
- **Relevance to construction:** Digital Twins enable continuous monitoring and optimization of a project, both during construction and throughout its lifecycle
- **Application in construction:** Real-Time Simulation (enabling proactive adjustments), Performance Optimization (used to monitor the building's performance), Lifecycle Management (provides comprehensive facilities performance over time).



CONTEMPORARY METHODOLOGIES IN CONSTRUCTION...



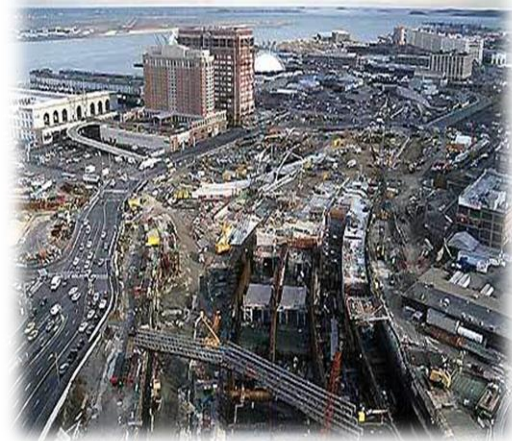
Lean Construction

- A methodology focused on minimizing waste and maximizing value in construction processes. It emphasizes efficiency, collaboration, and continuous improvement.
- **Relevance to Sustainability:** By minimizing waste and maximizing efficiency, it contributes to both environmental and economic sustainability
- **Applications in construction:** **Just-In-Time (JIT) Delivery** (reducing storage costs and material waste), **Integrated Project Teams** (Collaboration among all stakeholders from the start).



Integrated Project Delivery (IPD)

- A collaborative approach that aligns the interests of all stakeholders (owners, designers, contractors) through shared risk and reward, promoting teamwork and transparency..
- **Relevance to Sustainability:** fosters collaboration and early involvement of all parties leading to better decision-making, reduced waste, and enhanced project outcomes.
- **Applications in construction:** **Sustainability Integration** (integrates sustainability considerations into planning stage), **Efficient Use of Resources** (reducing waste & ensuing meeting sustainability goals).



Life Cycle Assessment (LCA)

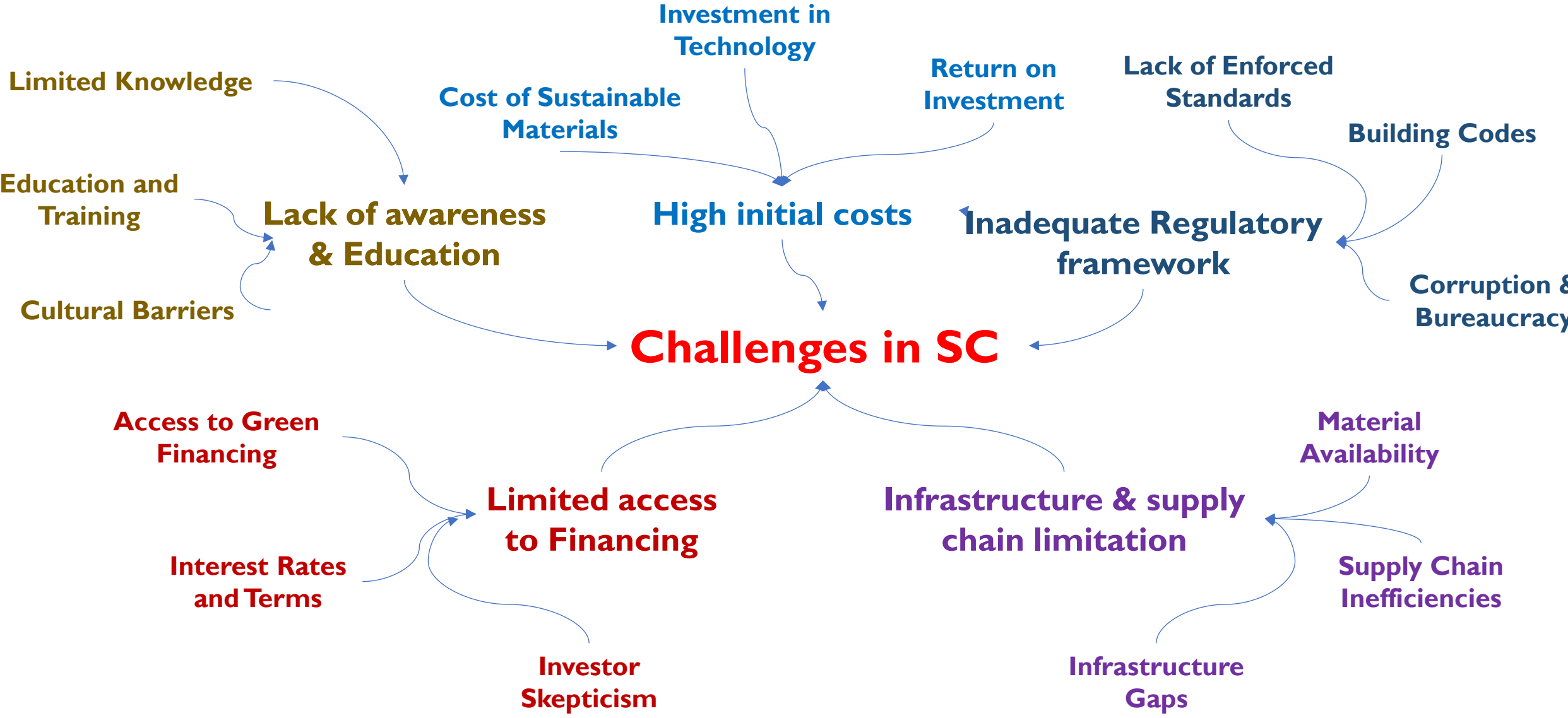
- A systematic methodology for evaluating the environmental impacts of a product, process, or system over its entire lifecycle from raw material extraction through production, use, and disposal.
- **Relevance to Sustainability:** provides a comprehensive view of the environmental impact of a construction project, helping to make informed decisions that minimize the overall carbon footprint.
- **Applications in construction:** **Material Selection** (focuses on recycled/locally sourced materials), **Energy Efficiency** (reducing consumption/increasing energy efficiency), **Waste Management** (focusing on recycling, reusing,, reducing waste).



CHALLENGES & OPPORTUNITIES IN NIGERIA...



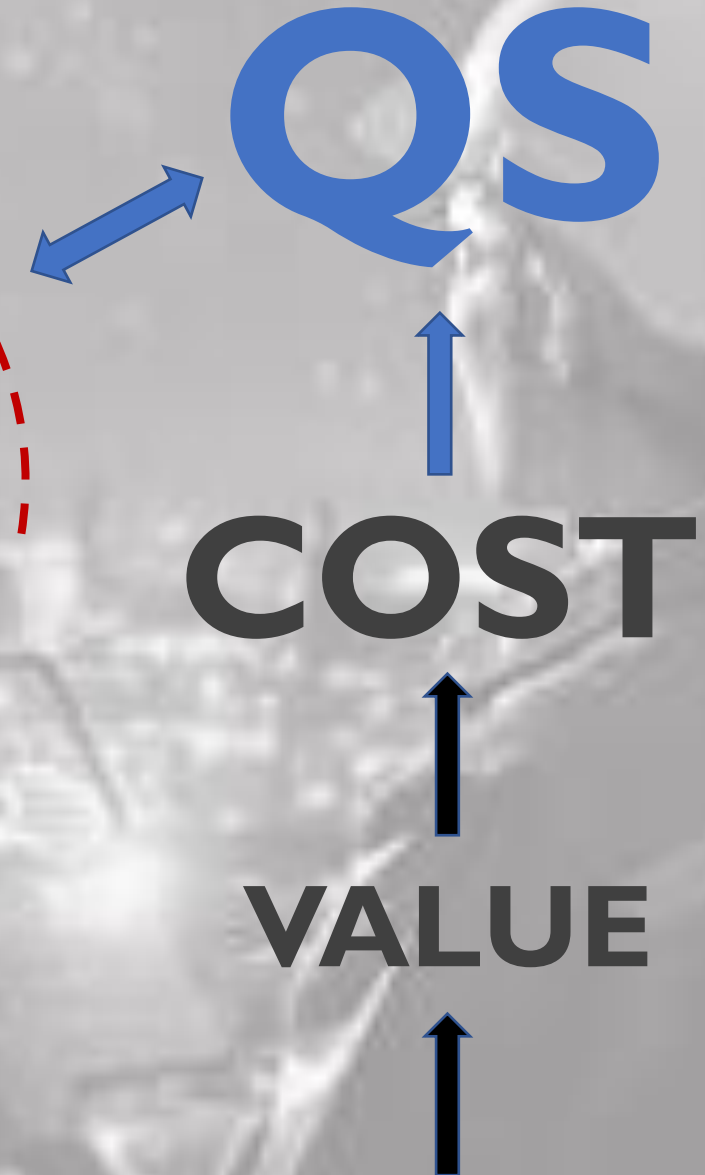
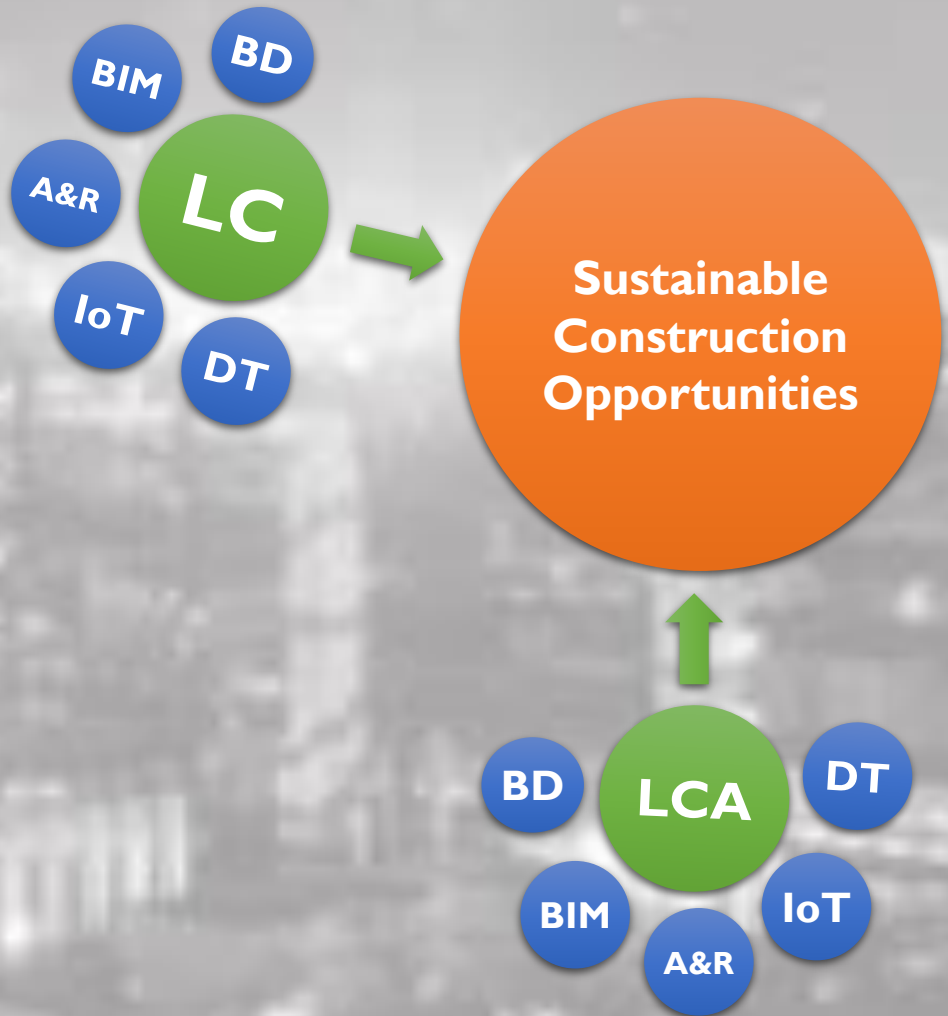
Challenges in Sustainable Construction in Nigeria



Opportunities in Sustainable Construction



Bringing it All Together



What is common to the 3 pillars of Sustainability?



**BRILLIANT MINDS...
THANK YOU FOR LISTENING**