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REVIEWER'S REPORT

Manuscript No.: **IJAR-55499**

Title: Characterization and potential use of Dingui clay material as partial substitute for clinker in the manufacture of construction cement.

Recommendation:
Accept as it is .....
Accept after minor revision.....
Accept after major revision .....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity			✓	
Significance		✓		

Reviewer Name: Dr.P.Manochithra

Detailed Reviewer's Report

Manuscript Title

Characterization and Potential Use of Dingui Clay Material as Partial Substitute for Clinker in the Manufacture of Construction Cement

Overall Assessment

The manuscript presents an experimental investigation into the physicochemical, mineralogical, and mechanical characterization of Dingui clay from the Republic of Congo, with the objective of evaluating its suitability as a partial clinker substitute in cement manufacturing. The study aligns well with global efforts to reduce CO_2 emissions associated with clinker production and contributes to sustainable construction material research.

The topic is **relevant, timely, and environmentally significant**, particularly for developing economies seeking to valorize local raw materials. The experimental work is extensive and standards-based. However, the manuscript requires **major revisions** to improve scientific clarity, language quality, analytical depth, and presentation before it can be considered for publication.

Strengths of the Manuscript

1. **Strong environmental relevance**
   The study directly addresses CO_2 reduction through clinker substitution, an important issue in cement and materials research.

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2. **Use of local raw materials**
   Valorization of Dingui clay contributes to regional industrial sustainability and reduces dependency on clinker imports.
3. **Comprehensive experimental characterization**
   - Particle size analysis
   - Atterberg limits
   - XRD and XRF analyses
   - Pozzolanic activation through calcination
   - Mechanical testing at 2 and 28 days
4. **Standards compliance**
   Testing procedures follow recognized standards (EN 197-1, EN 196-3, EN 196-6, NFP standards).
5. **Practical applicability**
   The study provides concrete formulation ratios (A1, A2, A3), facilitating industrial replication.

Major Comments (Critical Issues)

1. Language and Scientific Writing Quality

- The manuscript contains **numerous grammatical errors**, awkward phrasing, spacing problems, and inconsistent terminology.
- Examples include:
  - Repetitive sentence constructions
  - Missing articles and verb agreement issues
  - Overly long and complex sentences reducing readability

☞ **Recommendation:**
Professional English language editing is **strongly required**. Poor language quality currently obscures the scientific contribution.

2. Abstract Requires Restructuring

- The abstract is overly descriptive and lacks:
  - Quantitative highlights
  - Clear statement of novelty
  - Concise presentation of key results
- Environmental benefits (30% CO_2 reduction) are mentioned but not contextualized.

☞ **Recommendation:**
Rewrite the abstract to include:

- Objective
- Methods
- Key results (strength values, substitution limits)
- Main conclusion and environmental implication

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3. Insufficient Critical Discussion of Results

- Results are mostly **reported, not critically interpreted**.
- Examples:
  - Why does early-age strength increase for some substitutions but decline at 28 days?
  - How does fineness influence pozzolanic reactivity quantitatively?
- Comparisons with previous LC3 or calcined clay studies are limited.

☞ **Recommendation:**
Enhance the **Results and Discussion** section by:

- Explaining trends using cement chemistry principles
- Comparing findings with recent international studies
- Discussing limitations of high substitution levels (A3)

4. Mineralogical Analysis Needs Clarification

- The identification of smectite, montmorillonite, anatase, rutile, and feldspar is **tentative**.
- No semi-quantitative phase estimation is provided.
- Calcined clay XRD patterns are not shown.

☞ **Recommendation:**

- Clearly distinguish confirmed phases from inferred phases
- Include XRD of calcined clay to demonstrate amorphization
- Discuss how mineralogy affects pozzolanic reactivity

5. Methodology Section Is Overly Descriptive

- Several test procedures are explained in textbook style.
- Equations and standards dominate the section without justification.

☞ **Recommendation:**
Condense standard descriptions and focus on:

- Why each test is relevant
- How it supports clinker substitution evaluation

6. Environmental Impact Claims Need Support

- The statement "30% clinker reduction = 30% CO_2 reduction" is **over-simplified**.
- No life-cycle or emission calculation is shown.

☞ **Recommendation:**
Rephrase environmental claims more cautiously or support them with:

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- Literature-based emission factors
- A simplified comparative CO_2 estimation

Minor Comments (Presentation & Technical Issues)

1. Figures lack:
    - Scale bars
    - Clear captions
    - Consistent formatting
2. Units are sometimes missing or inconsistent (cm^2/g, MPa).
3. Table numbering and referencing should be standardized.
4. References contain:
    - Formatting inconsistencies
    - Repeated DOI links
    - Mixed citation styles
5. Conclusion section is lengthy and repetitive; it can be more concise.

Originality and Contribution

While the concept of calcined clay substitution is well-established, the **use of Dingui clay** and its detailed characterization provides **regional originality and applied value**. The manuscript contributes incremental but meaningful knowledge to sustainable cement research.

Ethical and Technical Compliance

- No ethical concerns identified.
- Experimental work appears to follow standard laboratory practices.

Final Recommendation

Decision: MAJOR REVISION REQUIRED

The manuscript has **strong experimental foundations and practical relevance**, but requires substantial improvement in:

- Language and clarity
- Depth of scientific discussion
- Data interpretation
- Presentation quality

With careful revision, the paper has good potential for publication.