ISSN(O): 2320-5407 | ISSN(P): 3107-4928

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

REVIEWER'S REPORT

Manuscript No.: **IJAR-55186**

Title: Sizing protocol of solar power plant based on knowledge of the solar irradiation database and the panels parameters

Recommendation:
Accept after major revision .....

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

Reviewer Name: Dr.K.ARUMUGANAINAR **Date: 13.12.2025**

Detailed Reviewer's Report

DETAILED REVIEW REPORT

1. General Evaluation

The manuscript presents a procedure for sizing a photovoltaic (PV) solar power plant using solar irradiance data, experimental validation of PV module parameters, numerical simulation via SAM software, and economic analysis. The topic is relevant, particularly for regions with high solar potential such as Togo. The study is technically sound and experimentally supported, with a structured methodology and well-presented results.

However, the manuscript requires **significant improvements** in organization, clarity, scientific rigor, formatting, referencing style, and language quality.

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2. Originality and Novelty

Strengths

- Proposes a **protocol that combines experimental I–V characterization, irradiance validation, and SAM-based techno-economic sizing**.
- Provides real measurement data and compares them with NASA/NSRDB datasets.
- Demonstrates the sizing approach for a practical setting (training center).

Limitations

- The concept of PV system sizing is well-established in literature.
- The study resembles a **case study with standard methodologies**, not a fundamentally new protocol.
- More comparison with other sizing methods and optimization models would improve novelty.

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3. Scientific and Technical Quality

3.1 Experimental Work

- I–V measurements and derived efficiency values (e.g., experimental efficiency ≈18% vs. nominal 16.03%) are useful.
- Measured data is presented clearly in Table 3

  However, there is **no uncertainty analysis, calibration details, or error propagation**.

3.2 Simulation Work (SAM)

- The use of SAM for PV system sizing and LCOE estimation is appropriate.
- The configuration (30 panels, MPPT strings, inverter rating) is clearly stated.
- Various losses are considered reasonably.

Missing elements:

- No sensitivity analysis for irradiance, degradation, or module temperature.
- No validation of SAM results with real-world data.

3.3 Energy Requirement Assessment

- Energy demand calculated in Table 4 (26.61 kWh/day)

  However:

  - Operational hours should be justified.
  - Some power ratings appear unrealistic (e.g., router 70 W).
  - Peak demand vs. average demand not addressed.

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4. Structure and Organization

Positive Aspects

- Sections are structured (Introduction, State of the Art, Methodology, Results, Conclusion).
- Figures and tables are numerous and helpful.

Issues

- Many paragraphs are long, lacking flow.
- Literature review is descriptive rather than analytical.
- Figures need clearer captions.
- Section numbering occasionally inconsistent.

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5. Literature Review Quality

- The authors cite multiple relevant sources (2023–2025), especially for hybrid systems and optimization.
- However:
    - Citations are inconsistently formatted.
    - Some references are incomplete or incorrectly placed (e.g., “Error! Reference source not found.” in Table 1 description).
    - Need more citations for:
        - PV temperature modeling
        - Loss calculation methods
        - Standard sizing guidelines (IEC standards, NREL protocol)

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6. Language and Clarity

Major edits required.

The manuscript contains:

- Grammar mistakes
- Long, unfocused sentences
- Typographical errors
- Inconsistent usage of commas, spaces, units (e.g., “10 :30”)

The English needs **professional proofreading**.

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7. Technical Errors and Points Requiring Clarification

1. **Unit inconsistencies**
    - Mixed use of Wh/m²/day and W/m².
    - "Emoy 536.26 W/m²" should be clearly described whether it is irradiance or illuminance converted.
2. **Data source mismatch**
    - Table 1 claims to show solar radiation values for "Lomé, Tabligbo, etc." but formatting is broken.
3. **Panel Efficiency Calculation**
    - Equation uses instantaneous power; should include uncertainty.
4. **Economic Analysis**
    - The manuscript claims an LCOE of 56.89 FCFA/kWh vs. grid price of 103.20 FCFA/kWh
    - However, cost components, interest rates, and capital required are not shown.
5. **System Lifetime**
    - Claims a 12.5% decline over 25 years, but degradation model is not shown.
6. **Storage System**
    - Mentioned but not described (battery type, capacity, efficiency missing).
7. **Figures Missing or Improperly Embedded**
    - Figure 1, Figure 2, Figure 5 require high-quality resolution.

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8. Strengths of the Manuscript

- Real experimental validation of PV module data.
- Practical and realistic application for a real site.
- SAM-based simulation adds credibility.
- Comprehensive content from irradiance to economic indicators.
- Useful procedure for teaching or practical PV implementation.

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9. Major Weaknesses

- English language and writing quality need improvement.
- Missing crucial technical details (storage sizing, economic parameters).
- Tables/figures need reformatting.
- Literature review lacks depth and critical comparison.
- Needs better discussion of limitations of the method.
- Formatting errors throughout the manuscript.

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10. Recommendation

FINAL DECISION: ***Major Revision***

The manuscript has potential but requires **significant improvements** before acceptance.