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REVIEWER'S REPORT

Manuscript No.: **IJAR-53455** Date: 22-08-2025

Title: Application of Linear Regression for Predicting Digital Trajectories of Beninese Municipalities"

Recommendation:
Accept as it is .....YES.....
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: Mr Bilal Mir

Reviewer's Comment for Publication.

1. Overview and Relevance

The paper addresses a highly topical and policy-relevant challenge: forecasting digital development trajectories within the municipal governance context of Benin. By embedding linear regression within a Decision Support System (DSS) framework and leveraging a structured indicator system, the study tackles both methodological and applied dimensions of digital planning.

The research stands at the intersection of:

- E-governance and local development
- Predictive analytics in public administration
- Evidence-based policy support for developing regions

Its relevance is reinforced by the scarcity of empirically grounded predictive studies in African digital governance, making this contribution timely and strategically significant.

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2. Objectives and Framing

The study's objective is clearly articulated: to develop a regression-based predictive framework for municipal digitization, informed by companion clustering and data infrastructure studies. The framing balances methodological rigor with applied intent. The background section situates the work within broader discourses on strategic planning, digital transitions, and capacity-limited governance contexts.

The inclusion of a standardized 45-indicator framework underscores a systematic and multidimensional understanding of "digital development," reflecting a mature conceptualization of the construct.

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3. Methodology

The methodological design is grounded in:

- A panel dataset of **462 municipality-year observations**
- Use of **linear regression models** with temporal and municipality-specific features
- Validation via **temporal** and **cross-sectional** approaches
- Integration of results with prior **K-Means clustering outputs**

The paper demonstrates solid statistical treatment of the data. The dual-level modeling—global (all municipalities) and municipality-specific—allows for both generalized and localized insights. The distinction between model types provides a layered understanding of predictive performance.

The reported performance metrics are transparent:

- **Global R^2:** 0.037
- **Municipality-specific R^2:** mean 0.320, range 0.0001–0.938
- **RMSE:** 10.2 (on 100-point scale)
- **Prediction accuracy:** 48.5 % within ±5 points, 80.1 % within ±10 points

This reflects methodological candor and allows for nuanced interpretation of the models' strengths and limits.

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4. Findings and Interpretation

Key empirical findings include:

- **Modest global predictive performance**, indicating limited explanatory power when municipalities are pooled.
- **Substantially stronger performance in municipality-specific models**, demonstrating heterogeneity and the potential value of localized modeling.
- **Average annual growth rate of 4.2 %** in digital development scores.
- Significant **variation across municipalities**, suggesting uneven trajectories and differentiated readiness or capacity.

The results underscore the complex and context-sensitive nature of digital transitions in municipal governance. The accuracy metrics (±5 and ±10 thresholds) offer practical benchmarks for real-world applicability.

5. Integration and Contribution

The paper positions itself as the final stage in an "integrated analytical suite" that includes:

1. **Data infrastructure construction**
2. **K-Means clustering of municipalities**
3. **Predictive modeling using linear regression**

This integrative framing strengthens the paper's value as both a methodological and applied contribution. It bridges diagnostic and forecasting functions, creating a cohesive framework for evidence-based digital planning.

The study's contribution lies in:

- Providing a **replicable framework** for municipal-level digital forecasting
- Demonstrating how **simple statistical models** can yield actionable intelligence, especially in resource-constrained environments
- Offering **empirical benchmarks** for digital development in a national context

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6. Scholarly Merit and Originality

The work exhibits originality in its:

- Application of regression modeling to **subnational digital governance**
- Use of a **comprehensive, multi-indicator framework**
- Contextual grounding in **Beninese municipalities**, an underrepresented area in the literature

It contributes to both academic discourse and practical governance, enhancing scholarly understanding of predictive analytics in developing contexts.

7. Clarity and Presentation

The abstract is concise and informative, presenting:

- Clear background and rationale
- Defined objectives
- Summarized methodology and results
- A coherent conclusion tied to strategic planning

The introduction provides a clear rationale for the work and situates it within broader governance and methodological challenges. Terminology is consistent and professional, and the quantitative reporting is precise.

Overall Evaluation

Criterion	Evaluation
Relevance to field	High
Conceptual framing	Strong and well contextualized
Methodological soundness	Robust, transparent, and appropriate
Data and analysis	Comprehensive, well-structured
Contribution to knowledge/practice	Significant in both methodological and applied dimensions
Clarity of communication	Clear, structured, and professionally written

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Summary Statement

This paper presents a thoughtful and empirically grounded application of linear regression to forecast municipal digital development in Benin. By embedding predictive analytics within a structured indicator framework and integrating the analysis into a broader decision-support architecture, it advances both scholarly and practical discourses on strategic digital governance. The nuanced reporting of results, especially the contrast between global and municipality-specific models, enhances the paper's transparency and credibility. Overall, it constitutes a valuable contribution to the literature on predictive planning, digital transformation, and subnational governance analytics.