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REVIEWER'S REPORT

Manuscript No.: IJAR- 59597

Title: Analysis of the Structure and Means of Production of Agricultural Value Chains: The Case of the Union of Rice Farms in Mboundoum Barrage in the Senegal River Valley.

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. ANAPANA GOPAL

Reviewer's Comment for Publication.

General Comments
The manuscript examines the relationship between producer organization, access to production factors, and the economic performance of rice farms in the Mboudoum Barrage Union, Senegal River Valley. The study uses data from 2,982 rice producers and applies descriptive statistics, Principal Component Analysis (PCA), Hierarchical Clustering on Principal Components (HCPC), and multiple linear regression.
The topic is relevant to agricultural economics, rural development, and food security. The large dataset and the combination of multivariate statistical techniques offer potential value for understanding differences in farm resources, financing, organizational participation, and income.
However, several important methodological and reporting issues need to be addressed before the manuscript can be considered for publication. These include inconsistencies in the reported data, unusual values in some variables, concerns about the interpretation of the statistical models, and insufficient clarity regarding the measurement of economic performance. The manuscript also requires improved consistency between the tables, statistical results, discussion, and conclusions.
Content and Originality
The manuscript addresses an important research question concerning how organizational integration and access to production resources relate to rice-farm economic performance. The use of a large operational database covering nearly 3,000 producers is a strength, and the classification of farms into distinct profiles could help inform targeted agricultural support programmes.
However, the authors should explain more clearly how the study advances existing research on agricultural value chains and producer organizations in the Senegal River Valley. The novelty of combining PCA, HCPC, and regression should be demonstrated

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through the specific insights generated rather than through the use of statistical techniques alone.

The manuscript would benefit from a stronger distinction between farm-level productivity, profitability, and annual income, as these are not equivalent indicators of economic performance. The authors should also explain how producer organizations influence access to credit, inputs, technical services, and markets, while distinguishing statistical associations from causal relationships.

The practical implications for smallholder farmers, agricultural financing institutions, and producer organizations should be developed further and linked directly to the findings.

Technical Quality

The manuscript requires substantial improvement in data validation, statistical reporting, and interpretation of the results.

1. Data consistency and validation: Several values require verification. In Table 1, the reported average and median for organizational membership year and the variable labelled "Former organization" appear inconsistent with their descriptions. In Table 8, Class 2 is reported to have an average farm area of 67.10 ha, while Class 3 has 1.06 ha; these values should be checked against the original dataset. Class 6 also reports an unusually high value of 2,026 years of organizational operation. The authors should verify these entries and correct any data-processing or labelling errors.

2. Measurement of economic performance: Annual income is used as the principal dependent variable, but the manuscript does not sufficiently explain how income was calculated or whether production costs were deducted. The authors should define the indicator clearly and distinguish gross revenue from net farm income and profitability.

3. Extreme values and outliers: Table 4 reports a coefficient of variation of 2,207.07% for selling price, together with extremely high skewness and kurtosis. These findings suggest substantial dispersion and potentially erroneous or atypical observations. The authors should verify the units, identify possible data-entry errors, and explain how outliers were handled.

4. PCA suitability and interpretation: The reported overall Kaiser–Meyer–Olkin index is 0.60, with individual measures as low as 0.46. The authors should discuss the implications of these relatively weak suitability measures and justify the selection and interpretation of the principal components. The first three components explain only 49.15% of the total variance, which should be considered when interpreting the farm typology.

5. Farm classification using HCPC: Table 8 identifies seven farm classes, including classes containing only one or a few observations. The authors should justify the selection of seven clusters, evaluate their stability, and explain how atypical observations influence the classification. The classification procedure and the treatment of extreme values should be documented more clearly.

6. Statistical validation of clusters: The manuscript uses ANOVA to compare annual income across farm classes, but annual income is also included among the variables used to construct the PCA-based classification. This creates a risk of circular interpretation. The authors should acknowledge this limitation and consider independent variables or external criteria when validating the usefulness of the typology.

7. Regression analysis: Table 9 reports several coefficients for credit amounts and input expenditures rounded to 0.00, despite statistically significant p-values. The

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coefficients and confidence intervals should be presented at sufficient precision, with appropriate scaling of monetary variables where necessary. The authors should also report the model's sample size, \(R^2\), adjusted \(R^2\), and relevant diagnostic results.

8. Interpretation of regression coefficients: The reported coefficient for total cultivated area is negative and statistically significant, whereas the conclusions broadly associate greater access to productive resources with higher income. The authors should investigate this result, assess possible confounding or multicollinearity, and ensure that the interpretation reflects the estimated model. The coding and reference categories for categorical predictors should also be specified.

9. Normality and model assumptions: The manuscript reports a Shapiro–Wilk test on annual income before transformation. Since the regression uses logarithmic income, the authors should clarify that the relevant diagnostic assessment concerns model residuals and other regression assumptions rather than requiring the original income variable to be normally distributed.

10. Reproducibility and scope: The data cover one agricultural season, 2025. The authors should explain the limitations of drawing broader conclusions from a single season and provide sufficient information on missing data, variable definitions, data cleaning, and model implementation to allow replication.

Language and Presentation

The manuscript is generally understandable, but careful language editing and technical proofreading are necessary.

- Correct grammatical errors, inconsistent spacing, and awkward sentence constructions throughout the manuscript.
- Standardize the spelling of the study area, particularly "Mboudoum" and "Mboundoum," and use one consistent form throughout.
- Ensure that statistical abbreviations, mathematical symbols, units, and monetary values are presented consistently.
- Correct the formatting and numbering of tables and figures. For example, the table numbering and references to figures should be checked throughout the manuscript.
- Improve the readability of tables, especially where column headings are truncated or numerical values are difficult to interpret.
- Remove duplicated descriptions and unnecessary repetition in the presentation of the statistical results.
- Ensure that the abstract, results, discussion, and conclusion use consistent numerical values and terminology.

Particular attention should be paid to the distinction between income, investment, farm size, production efficiency, and economic performance.

Structure and Organization

The manuscript follows a conventional scientific structure, but several improvements are required to strengthen the presentation and logical flow.

- Abstract: Clearly state the study design, principal statistical findings, and key implications. Ensure that the reported values agree with the main text.
- Introduction: Strengthen the research gap and explain how the study contributes to understanding agricultural value chains and producer organizations in the Senegal River Valley.

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- Methodology: Provide clearer definitions of variables, data-cleaning procedures, PCA selection criteria, cluster formation, and regression diagnostics.
- Results: Organize the findings systematically, beginning with producer characteristics and access to production factors, followed by economic performance, PCA, HCPC, and regression results.
- Tables and figures: Correct inconsistencies in Tables 1, 2, 4, 8, and 9, and ensure that all figures and tables are correctly numbered and cited.
- Discussion: Compare the results with relevant studies and provide plausible explanations for unexpected findings, particularly the negative association between total area and income.
- Limitations: Expand the discussion of the single-season dataset, extreme observations, and the limitations of using income in both cluster construction and subsequent cluster validation.
- Conclusion: Ensure that the recommendations follow directly from the results and avoid causal claims that cannot be established by the observational study.

The manuscript would benefit from a clearer separation between descriptive findings, statistical associations, and recommendations for agricultural policy.

References and Citations

The manuscript includes references relating to agricultural value chains, rice production, farmer organizations, and agricultural development. However, the reference list and in-text citations require careful review.

- Verify that every in-text citation corresponds to an entry in the reference list and that all listed references are cited appropriately.
- Standardize the reference format according to the journal's requirements.
- Check author names, publication years, titles, publishers, journal details, and DOI information where applicable.
- Ensure that references supporting claims about rice production, agricultural financing, and producer organizations directly support those claims.
- Provide complete and traceable bibliographic details for institutional reports and academic dissertations.
- Review the methodological references supporting PCA, HCPC, and regression analysis and ensure that the selected procedures are adequately justified.

The references should be checked for accuracy and relevance before the revised manuscript is submitted.

Overall Recommendation

Minor Revision

The manuscript addresses a relevant agricultural development issue and benefits from a substantial dataset and the application of complementary statistical methods. The identification of different farm profiles may offer practical value for designing targeted financial, technical, and organizational support.

However, the inconsistencies in the reported data, extreme values in key variables, limitations in cluster validation, and insufficiently detailed regression reporting raise concerns about the reliability of the current interpretations. The authors should verify the underlying data, clarify the measurement of economic performance, strengthen the statistical analysis, and revise conclusions that are not fully supported by the reported results.

These revisions are essential to improve the scientific reliability, reproducibility, and practical contribution of the manuscript.

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Final Decision
Minor Revision.
The manuscript may be reconsidered for publication after the authors correct the data inconsistencies, justify the statistical procedures, improve the reporting of regression results, and strengthen the interpretation of the farm typology and its implications. The revised manuscript should undergo further evaluation to determine whether these concerns have been satisfactorily addressed.