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-55095

Title: CONTRIBUTION TO MODELING AND IMPROVING QUALITY CONTROL OF FINISHED PRODUCTS IN PRODUCTION SYSTEMS BY USING BAYESIAN NETWORKS AND LEAN SIX SIGMA.

Recommendation:
Accept after Minor revision .....

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

Reviewer Name: Dr.K.Arumuganainar **Date:** 08.12.2025

Detailed Reviewer's Report

DETAILED REVIEW REPORT

1. Title and Abstract

Evaluation:

- The title clearly reflects the core methodology (Bayesian Networks + Lean Six Sigma) and the application area (quality control in production systems).
- The abstract summarizes the study, methodology, results, and key findings, but it is **long and slightly descriptive instead of concise**.
- Important numerical results (sigma level, customer dissatisfaction %, main causes) are well included.

Suggestions:

- Shorten and refine the abstract for clarity.
- Add explicit statements on novelty and contribution.

---

2. Introduction

Strengths:

- Clearly explains the industrial context: challenges in Sub-Saharan production systems including instability, variability, and poor quality control.
- Identifies research gaps, particularly limited integration of Lean Six Sigma with Bayesian Networks in African industries.
- Good literature background with references.

Weaknesses:

- Introduction is lengthy and could be better structured.
- Citations sometimes appear clustered.
- Novelty statement can be highlighted more strongly.

Overall: The introduction provides a strong foundation but needs more focused flow.

---

3. Literature Review

Strengths:

- Covers Lean Six Sigma (DMAIC method), Bayesian Networks (BNs), and multiple regression analysis.
- Provides mathematical definitions of BNs and regression models.

Weaknesses:

- The review is merged with methodology; separating them would help clarity.
- Missing recent references from 2022–2024 on industrial analytics, AI-based quality control, hybrid LSS approaches.

---

4. Methodology

This is the **strongest part of the paper**, presenting a structured six-step combined approach.

4.1 Lean Six Sigma (DMAIC)

- Correctly describes steps and tools.
- Table 1 clearly summarizes the methodology.

4.2 Bayesian Networks

- Mathematical representation is correct.
- Factors joint probability formulas are accurate.

4.3 Multiple Regression Analysis

- Provides equation form, testing framework (T-test, F-test).

4.4 Proposed Combined Approach

- The integrated framework is well illustrated in Figure 1.
- The approach is systematic, practical, and replicable.

Strengths:

- The stepwise integration of LSS + BN + Regression is innovative.
- Clear mapping of tools to objectives.

Weaknesses:

- Some diagrams are too small; readability needs improvement.
- No algorithmic pseudocode for BN construction.

---

5. Case Study Implementation

Evaluation: Excellent practical application to an industrial tissue manufacturing line (RN-04).

5.1 Production System Description

- Machine details, capacity, process flow, and station-level breakdown are clear and well-structured.
- Tables 2, 3, 4 offer strong technical detail.

5.2 Data Collection

- Covers both qualitative (customer satisfaction) and quantitative (machine logs).
- Good 4-month data period.

5.3 Stepwise Implementation

- CTQ diagram, SIPOC, 5-Whys, and project charter are correctly developed.
- Root causes identified using Ishikawa diagram.

5.4 Statistical Diagnosis

- Conformity rate calculations are correct.
- Sigma Level: **3.727σ** (accurate estimation).
- DPMO calculation correct.

5.5 Pareto Analysis

- Figures show machine-related issues dominate (>80%).
- Well-aligned with LSS principles.

5.6 Bayesian Network Modeling

- BN1 (machine factors) and BN2 (production factors) are well-structured.
- Shows impact of improving node availability.
- Simulation results successfully show reduction in defect probabilities.

5.7 Multiple Regression & PCA

- PCA used to reduce multicollinearity—technically correct approach.
- Selection of the best regression models is justified.
- Final predictive models for scrap & waste rates are mathematically sound.

Weaknesses in Case Study:

- Some charts lack axis labeling and units.
- No validation dataset for prediction models.

---

6. Results & Discussion

Strengths:

- Results are deeply analyzed.
- Shows quantitative improvements when model improvements are simulated.
- Bayesian Network outputs are well-interpreted.

Weaknesses:

- Does not compare results with previous methods.
- Discussions could be expanded to broader industrial implications.

---

7. Conclusion

Strengths:

- Clear summary of findings.
- Emphasizes success of integrating LSS + BN + Regression.
- Good direction for future research.

Weaknesses:

- Conclusion could present measured improvements more explicitly.

Technical Quality Evaluation

Criterion	Evaluation
Originality	Very good – Hybrid methodology is novel for regional application.
Scientific Rigor	Good – Strong data, statistical methods, BN modeling.
Clarity & Structure	Moderate – Needs reorganization in some parts.
Figures/Tables Quality	Good but readability improvements needed.
Literature Coverage	Moderate – Missing recent references.
Practical Relevance	Excellent – Real industrial case with quantifiable outputs.

Overall Recommendation

Verdict: Minor to Moderate Revision

Reasons:

1. Structure needs improvement.
2. Abstract and introduction must be shortened and sharpened.
3. Figures require clarity.
4. Additional recent literature should be added.

Score (0–10)

Final Score: 8.4 / 10

Decision Category: *Minor Revision*