## REVIEWER'S REPORT

Manuscript No.: IJAR-53632                          Date:1/9/25

**Title:** Blockchain-Enabled Transparency in Artificial Intelligence

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

| Rating | Excel. | Good | Fair | Poor |
|---|---|---|---|---|
| Originality | | Yes | | |
| Techn. Quality | | Yes | | |
| Clarity | | Yes | | |
| Significance | | yes | | |

Reviewer Name:Dr.Shaweta Sachdeva                  **Date:** 1/9/25

**Reviewer's Comment for Publication.Accepted with Minor Revision**

(*To be published with the manuscript in the journal*)

*The reviewer is requested to provide a brief comment (3-4 lines) highlighting the significance, strengths, or key insights of the manuscript. This comment will be Displayed in the journal publication alongside with the reviewers name.*

## Significance

- The paper addresses one of the **most pressing challenges in AI**—the lack of transparency in decision-making ("black box problem").

- It proposes **blockchain as a foundational technology** to enhance AI accountability, explainability, and trustworthiness, which is crucial for **high-stakes sectors like healthcare, finance, and autonomous systems**.

- The study is timely, given the **growing regulatory and ethical concerns** around AI governance (e.g., GDPR, AI Act).

## Strengths

1. **Novel Integration Perspective** – The manuscript effectively links blockchain's attributes (immutability, decentralization, transparency) with AI transparency needs.

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2. **Comprehensive Coverage** – It systematically explains AI's black-box challenges, blockchain fundamentals, integration frameworks, benefits, and limitations.

3. **Practical Relevance** – Case examples from healthcare, finance, and autonomous driving make the study **applicable and relatable** to real-world scenarios.

4. **Framework Proposition** – The paper proposes a **conceptual framework** for recording AI decisions, data provenance, and model management using blockchain.

5. **Balanced Discussion** – Alongside benefits, it openly discusses challenges such as **scalability, computational overhead, and privacy concerns**, showing critical awareness.

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## Key Insights

- Blockchain can provide **immutable audit trails** of AI operations, making decisions traceable and explainable.

- **Explainability tools (SHAP, LIME, counterfactual reasoning)** could be combined with blockchain to improve accountability across different AI model types.

- A **comparative view of blockchain architectures** (Ethereum, Hyperledger, Corda) offers practical insights for choosing suitable platforms for AI governance.

- Future directions include **hybrid solutions** (privacy-preserving smart contracts, PoS consensus, federated learning integration) to overcome scalability and privacy challenges.

## *Detailed Reviewer's Report*

1. The manuscript addresses a **timely and highly relevant problem**—the "black box" nature of AI and the role of blockchain in enhancing transparency.
2. Provides a **clear explanation of blockchain fundamentals** (immutability, decentralization, transparency) and links them convincingly with AI governance.
3. Includes **comparative insights** on blockchain architectures (Ethereum, Hyperledger, Corda), showing awareness of practical contexts.
4. Highlights **sector-specific applications** (healthcare, finance, autonomous driving, etc.), which makes the discussion practical and relatable.
5. The proposed framework connects **explainability tools (SHAP, LIME, counterfactuals)** with blockchain, which adds originality.
6. **Empirical Evidence** – While the theoretical framework is strong, the manuscript lacks **case studies, experiments, or simulations** that validate the claims. Including even a small-scale implementation or benchmark comparison would strengthen the contribution.

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7. **Clarity in Framework Presentation** – The proposed blockchain-AI integration framework would benefit from a **more detailed architectural diagram or workflow illustration** to help readers visualize the interaction between AI models and blockchain components.
8. **Scalability and Efficiency Discussion** – The challenges section mentions scalability, but the **trade-offs between security, decentralization, and speed** could be elaborated with concrete metrics or references to real-world systems.
9. **Ethical and Legal Considerations** – The discussion of GDPR and "right to be forgotten" is good but could be expanded with **solutions such as privacy-preserving smart contracts, zero-knowledge proofs, or differential privacy**.
10. **Literature Gap Positioning** – The paper cites important works, but the **unique novelty** of this study compared to existing surveys/reviews could be more clearly emphasized.
11. **Stylistic Improvements** – The writing is generally clear, but some sections are dense. Shorter paragraphs and **more concise summaries** at the end of major sections would improve readability.
12. Include a **comparative analysis of blockchain frameworks** (e.g., PoW vs. PoS vs. DAG) specifically for AI use cases.
13. Explore **hybrid models** (AI + blockchain + federated learning) to address both transparency and privacy.
14. Provide **quantitative benchmarks** for blockchain-enhanced AI systems (latency, transaction cost, energy efficiency).
15. Suggest **policy recommendations** or industry guidelines to strengthen the practical impact of the research.