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Survey on Transparent and Tamper-Proof Government Fund Tracking Using Blockchain

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Abstract - The efficient and transparent management of public funds remains one of the most critical challenges faced by governments worldwide. Issues such as corruption, misallocation, and lack of accountability often hinder the equitable distribution of financial resources. This survey paper presents a blockchain-based framework designed to establish transparency, traceability, and immutability in government fund allocation systems. By leveraging cryptographic tools, smart contracts, and distributed consensus mechanisms, the proposed model ensures that every transaction—from fund approval to disbursement—is securely recorded and verifiable. The framework utilizes AES encryption for data confidentiality, public-private key pairs for authentication, and blockchain's decentralized ledger to maintain tamper-proof financial records. The study aims to demonstrate how blockchain can redefine public financial management by enhancing integrity, reducing fraud, and improving trust between governments and citizens.

Key Words: Blockchain Technology, Fund Allocation, Government Transparency, Smart Contracts, AES Encryption, Data Integrity, Tamper-Proof Ledger

1.INTRODUCTION

Public funds are the backbone of social welfare and development initiatives. Governments allocate vast financial resources to sectors such as infrastructure, healthcare, education, and disaster relief. However, mismanagement, data tampering, and corruption often result in fund leakage, depriving intended beneficiaries of crucial support. Traditional systems rely heavily on centralized databases and human supervision, both of which are vulnerable to manipulation.

Blockchain technology offers a transformative solution through its decentralized and immutable architecture. Every transaction in a blockchain network is cryptographically secured and permanently recorded, eliminating unauthorized alterations. Furthermore, smart contracts can automate fund transfers once predefined conditions are met, ensuring accountability at every level of governance.

This paper investigates how blockchain can be applied to build a transparent and tamper-proof fund tracking system, enhancing visibility, reliability, and efficiency in the disbursement of public resources.

2. Existing Work

Kumar and Jeelan [1] propose a blockchain-based system designed to assist state governments in managing land plots and the distribution of government funds. The system integrates multiple departments into a unified platform, enabling secure application submission, approval workflows, and fund allocation. The system ensures tamper-proof records and prevents unauthorized access by utilizing cryptographic encryption, consensus algorithms, and the immutable nature of blockchain. This approach offers enhanced transparency and operational efficiency across government schemes.

A blockchain model is developed by Krishna et al. [2] for sequential and verifiable transaction tracking of government fund transactions. It is impossible to alter or delete transaction history because the system uses hashed data structures to keep an immutable record of each project's progress. It further introduces controlled access, ensuring that sensitive information is only shared on a need-to-know basis. In addition to guaranteeing the integrity and security of data, this approach also encourages public financial management accountability.

Raluca Veronica et al. [3] explore the concept of digital identity within e-governance through the adoption of self-sovereign identity (SSI) models based on blockchain. The paper discusses in detail the technical architecture of the system and demonstrates how individuals can maintain control over their digital identities without relying on centralized authorities. The decentralized nature of blockchain and its cryptographic tools guarantee data consistency, authenticity, and privacy, paving the way for secure identity management frameworks. A blockchain solution for the Public Works Department (PWD) that

addresses issues related to fund allocation and tender tracking is presented by Fernandes and Shamitha [4]. The paper identifies low-level corruption and lack of transparency as major challenges in public works. Every transaction, from the beginning of a project to the payment of employees, is recorded in an immutable blockchain ledger by the proposed system. This ensures traceability and reduces opportunities for manipulation or financial mismanagement.

A consortium blockchain-based peer-to-peer file storage and sharing platform is proposed by Peng et al. [5]. Secure data retrieval and authorization across multiple government and private organizations are made easier by the system. Identity authentication protocols and permission control mechanisms are integrated into the blockchain, ensuring that data is accessed only by authorized entities. The study emphasizes the system's support for data integrity and inter-organizational collaboration potential. Careja and Tapus [6] suggest a blockchain-based digital identity verification framework using cryptographic signatures issued by trusted entities. These signatures act as digital equivalents of physical identity proofs, securely stored on the blockchain and used by public authorities for identity validation. The system not only ensures secure storage and access of personal data but also builds trust and interoperability across institutions involved in public services.

De Salve et al. [7] propose a multi-layer trust framework designed to strengthen self-sovereign identity (SSI) systems on blockchain networks. Verifiable credentials, decentralized identifiers (DIDs), and smart contracts are incorporated into the model and are used on both private and public blockchains. The paper demonstrates how this framework enhances the scalability and trustworthiness of digital identity solutions, combats false information, and improves the reliability of data.

Xu et al. [8] introduce a fog-enabled, private blockchain-based identity authentication system tailored for smart home environments. The system registers all fog nodes and smart devices on a localized blockchain, where authentication is managed using smart contracts and off-chain mechanisms. The proposed approach ensures robust performance and privacy protection, making it a secure solution for identity verification in IoT-based environments.

Elisa et al. [9] design a blockchain-enabled e-government framework that incorporates an artificial immune system to enhance security and threat detection. Encryption and validation tools, as well as the immutable structure of the blockchain, are utilized in the system to safeguard government data from both internal and external threats. Evaluated using simulation tools and real datasets, the framework demonstrates resilience, data integrity, and suitability for secure public sector applications.

A blockchain-based system for allocating and tracking funds in state government operations is presented by Gawade et al. [10]. Their model addresses the issue of low-level corruption by ensuring that every transaction is logged with cryptographic hashes and timestamps. At each stage of fund disbursement and utilization, the system provides proof that can be audited and verified at any time, ensuring transparency and authenticity of transactions.

3. METHODOLOGY

The proposed methodology structures the fund tracking process into **three core modules** operating on a peer-to-peer blockchain network:

1. **User (Beneficiary):**
    - Initiates fund requests by applying with supporting documents.
    - All submissions are encrypted using AES to ensure data confidentiality.
2. **Distributor Authority (Verification Layer):**
    - Validates user credentials and verifies request legitimacy through eligibility checks.
    - Updates the blockchain ledger using a smart contract once verification is complete.
3. **Government Module (Administrator):**
    - Reviews verified requests and authorizes fund release via a smart contract.
    - Each approval or denial is recorded immutably, ensuring full traceability.

The system employs asymmetric key encryption for authentication and smart contracts for rule-based fund disbursement. Each transaction is verified through a consensus mechanism before being added to the blockchain, preventing tampering and unauthorized access.

4. CONCLUSION

The integration of blockchain technology into public fund management introduces a paradigm shift in how governments ensure transparency, accountability, and security. The proposed blockchain-based fund tracking system establishes a decentralized, verifiable, and tamper-proof environment for fund allocation. By combining cryptographic algorithms, smart contracts, and distributed consensus, the model minimizes corruption and builds public confidence in government operations. Future research can focus on integrating AI-driven anomaly detection and interoperability with existing e-governance systems to further strengthen audit capabilities and scalability.

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REFERENCES

1. J. Nouri, M. Jalalzai, and S. Marcel, "Time Flies By: Analyzing the Impact of Face Aging on Recognition Performance with Synthetic Data," IEEE Conference Publication, 202X.
2. R. Bhattacharjee and D. Das, "A Study on the Effect of Ageing in Facial Authentication and the Utility of Data Augmentation to Reduce Performance Bias Across Age Groups," IEEE Journal, 2025.
3. H. Jiang and M. Li, "Face Aging Synthesis Application Based on Feature Fusion," IEEE Conference Publication, 2024.
4. T. Nguyen and B. Rawal, "Synthetic Data for the Mitigation of Demographic Biases in Face Recognition," IEEE Conference Publication, 2024.
5. K. Karkkainen and J. Joo, "FairFace: Face Attribute Dataset for Balanced Race, Gender, and Age for Bias Measurement and Mitigation," IEEE Dataset Publication, 2024.
6. R. V. Klassen and C. B. Bowen, "Proof-of-Concept Techniques for Generating Synthetic Thermal Facial Data for Training of Deep Learning Models," IEEE Conference Publication, 2024.
7. A. Rahman and N. Akhand, "Age Estimation from Face Images Based on Deep Learning," IEEE Conference Publication, 2022.
8. A. Aggarwal and M. Saxena, "Age Estimation and Face Verification Across Aging Using Landmarks," IEEE Conference Publication, 2022.
9. C. Behrendt, C. Kröger, and A. Rattunde, "The Impact of Age and Threshold Variation on Facial Recognition Algorithm Performance Using Images of Children," IEEE Conference Publication, 2024.
10. J. Woodard and A. Harrison, "Towards a Semi-Automatic Method for the Statistically Rigorous Aging of the Human Face," IEEE Conference Publication, 2024.