ABSTRAK

Program Bantuan Sosial (Bansos) di Indonesia masih terus menghadapi tantangan besar terkait masalah transparansi, akuntabilitas, dan tingginya potensi kecurangan administratif yang muncul akibat lemahnya mekanisme audit konvensional yang bersifat terpusat. Penelitian ini menawarkan solusi komprehensif melalui pengembangan *Decentralized Application (DApp)* berbasis *Smart Contract Ethereum*, yang memanfaatkan karakteristik desentralisasi, imutabilitas, dan keterlacakan *blockchain* untuk memotong celah manipulasi data internal serta mencegah praktik pencairan ganda *(double-dipping)*. Rekayasa perangkat lunak ini dirancang menggunakan metode *Agile* dengan pemodelan *Unified Modeling Language (UML)* dan divalidasi secara fungsional melalui *Black Box Testing* beserta simulasi distribusi. Hasil pengujian membuktikan bahwa Smart Contract *Solidity* yang dijalankan pada *Ethereum Virtual Machine (EVM)* mampu secara konsisten menolak upaya pendaftaran ganda *(double-dipping)* secara otomatis melalui instruksi *Revert* pada lingkungan pengujian lokal *Ganache Testnet.* Bagi institusi pemerintah daerah, implementasi sistem ini memberikan manfaat strategis berupa otomatisasi pelaporan audit yang akurat secara *real-time*, efisiensi alokasi anggaran dengan menekan risiko salah sasaran, serta penguatan kredibilitas tata kelola birokrasi *(Good Governance)*. Sementara itu, perlindungan privasi penerima bantuan tetap dijamin secara ketat melalui penerapan arsitektur hybrid; di mana data sensitif kependudukan diisolasi sepenuhnya secara *off-chain,* sedangkan jaringan *on-chain* hanya mencatat representasi anonimitas samaran *(pseudonymity)* berupa alamat dompet digital *(wallet address)* dan *hash* transaksi. Secara keseluruhan, sistem ini berhasil memberikan kontribusi positif terhadap peningkatan standar akuntabilitas dan transparansi tata kelola distribusi bantuan sosial pada lingkup prototipe implementasi.

Kata kunci: Anti-Kecurangan, Aplikasi Terdesentralisasi (DApp), Bantuan Sosial (Bansos), *Smart Contract Ethereum.*

ABSTRACT

The Social Assistance Program (Bansos) in Indonesia continues to face significant challenges regarding transparency, accountability, and the high potential for administrative fraud arising from the weaknesses of conventional, centralized auditing mechanisms. This research offers a comprehensive solution through the development of an Ethereum Smart Contract-based Decentralized Application (DApp), leveraging the decentralized, immutable, and traceable characteristics of blockchain technology to eliminate internal data manipulation vulnerabilities and prevent double-dipping practices. This software engineering project was designed utilizing the Agile methodology with Unified Modeling Language (UML) modeling and functionally validated through Black Box Testing alongside a distribution simulation. The test results prove that the Solidity Smart Contract executed on the Ethereum Virtual Machine (EVM) is able to consistently and automatically reject duplicate registration attempts (double-dipping) through the Revert instruction within the local Ganache Testnet testing environment. For local government institutions, the implementation of this system provides strategic benefits in the form of accurate, real-time automated audit reporting, budget allocation efficiency by mitigating the risk of mistargeting, and the strengthening of bureaucratic governance credibility (Good Governance). Meanwhile, the privacy protection of beneficiaries is strictly guaranteed through the implementation of a hybrid architecture; where sensitive demographic data is fully isolated off-chain, whereas the on-chain network only records pseudonymous representations (pseudonymity) consisting of digital wallet addresses (wallet address) and transaction hashes. Overall, this system successfully makes a positive contribution toward improving the standards of accountability and transparency in the governance of social assistance distribution within the scope of a prototype implementation.

Keywords: *Ant-Fraud, Decentralized Application (DApp), Ethereum Smart Contract, Social AssistanceBansos).*