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(57) Abstract :

The invention discloses a decentralized blockchain framework (100) designed for enhanced supply chain transparency. It integrates a blockchain ledger (101), smart contracts (110), IoT modules (120), consensus layer (130), interoperability interfaces (140), and analytics dashboards (150). The framework provides tamper-proof, real-time transaction recording, automation of compliance, IoT-enabled monitoring, and predictive analytics. Experimental validation demonstrates improved scalability, energy efficiency, and fraud prevention. The invention ensures transparency, accountability, and trust among stakeholders, making it adaptable for industries such as pharmaceuticals, agriculture, and logistics.

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