Team BUGS

# SMART INDIA HACKATHON 2025

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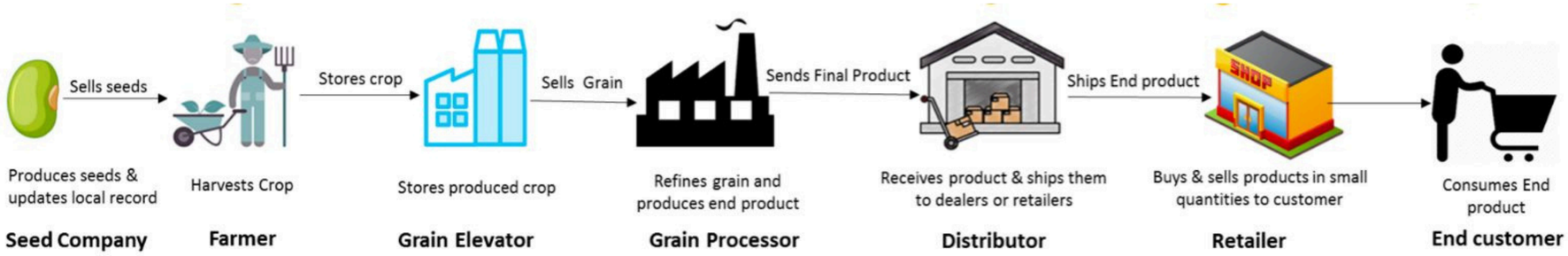
## SEED2SHELF

- **Problem Statement ID – 25045**
- **Problem Statement Title- Blockchain-Based Supply Chain Transparency for Agricultural Produce**
- **Theme- Agriculture, FoodTech & Rural Development**
- **PS Category- Software**
- **Team Name- BUGS**

# SEED2SHELF

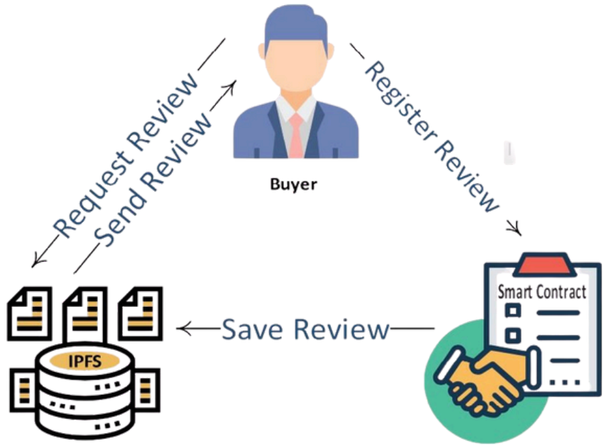
SMART INDIA HACKATHON 2025

- Agriculture employs 54% of India's population and contributes ~20% to GDP, yet food supply chains are long, complex, and opaque.
- Current systems rely on barcodes for pricing but lack true traceability of origin, safety, and quality.
- Issues: food fraud, middlemen exploitation, lack of trust, consumer safety risks.
- Blockchain's decentralized, tamper-proof ledger ensures secure tracking of:
  1. Origin (farm location, farmer identity, methods used)
  2. Certifications (organic, non-GMO, fair trade)
- Supply chain journey (farmer →processor → distributor → retailer → consumer)
- The solution: a blockchain-powered traceability platform with QR integration, enabling every stakeholder to verify produce at each step.
- Outcome: trust, fair pricing, improved food safety, and stronger consumer confidence.



# TECHNICAL APPROACH






**Frontend: React.js**

**Backend: Node.js + Express.js**

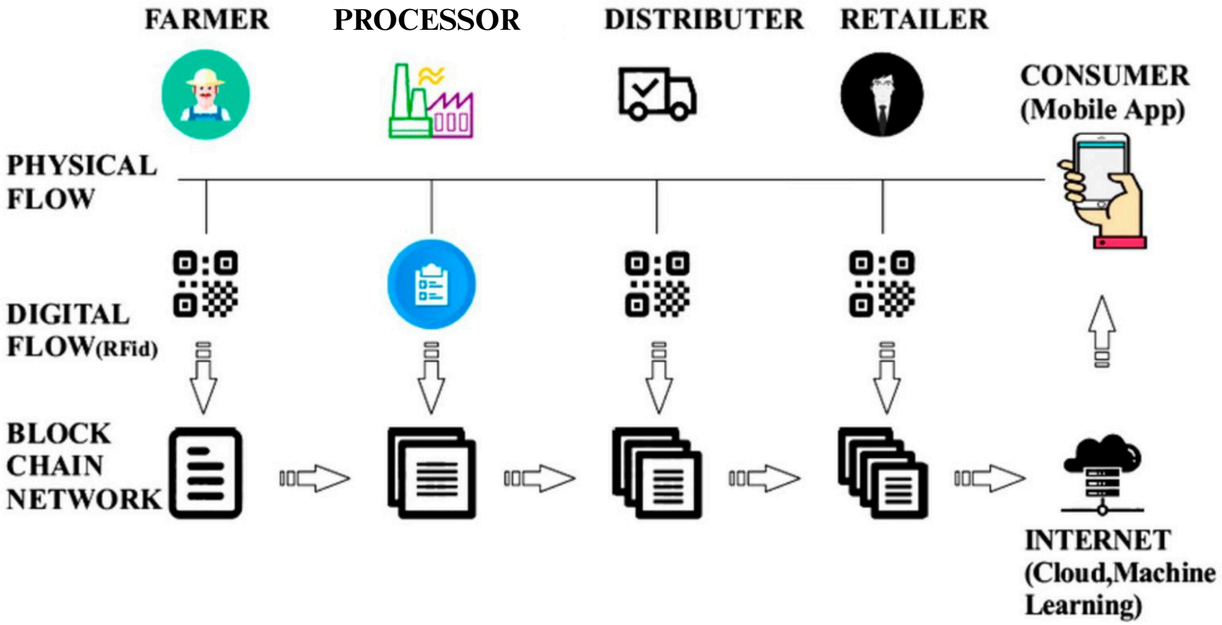
**Backend + Blockchain Integration: Ethers.js, web3.js**

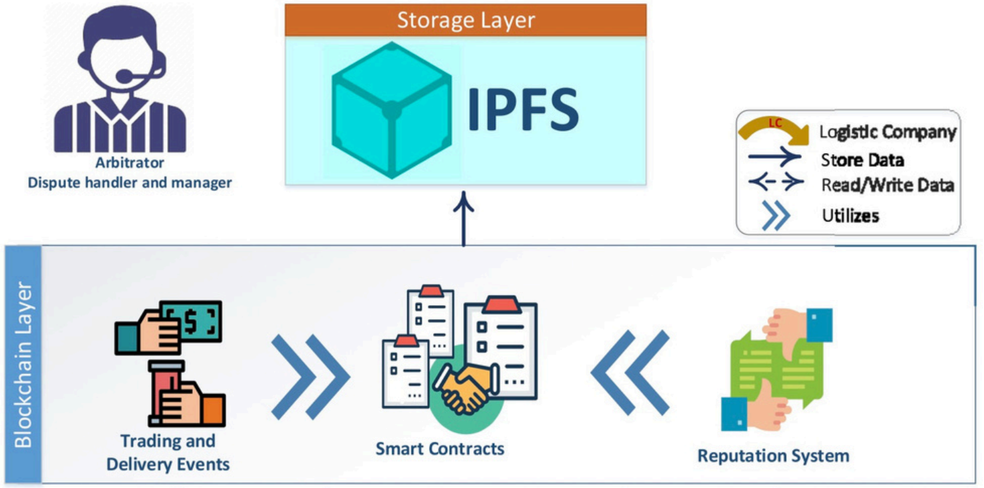
**Database: MongoDB**

**Blockchain: Ethereum (Solidity, Ganache, Metamask)**

**Storage: IPFS**

**Integration: QR codes**



# FEASIBILITY AND VIABILITY



## Feasibility in India

- Agriculture: 55% workforce, ~20% GDP.
- Govt. support: Digital India, AgriStack, eNAM.
- Farmers already use QR, UPI, mobile apps.
- Deployable on low-cost cloud/servers.

## Challenges & Risks

- Low blockchain awareness, limited internet & digital literacy.
- Resistance from supply chain middlemen.
- Smart contract risks: call stack, time dependency, concurrency, re-entrancy.

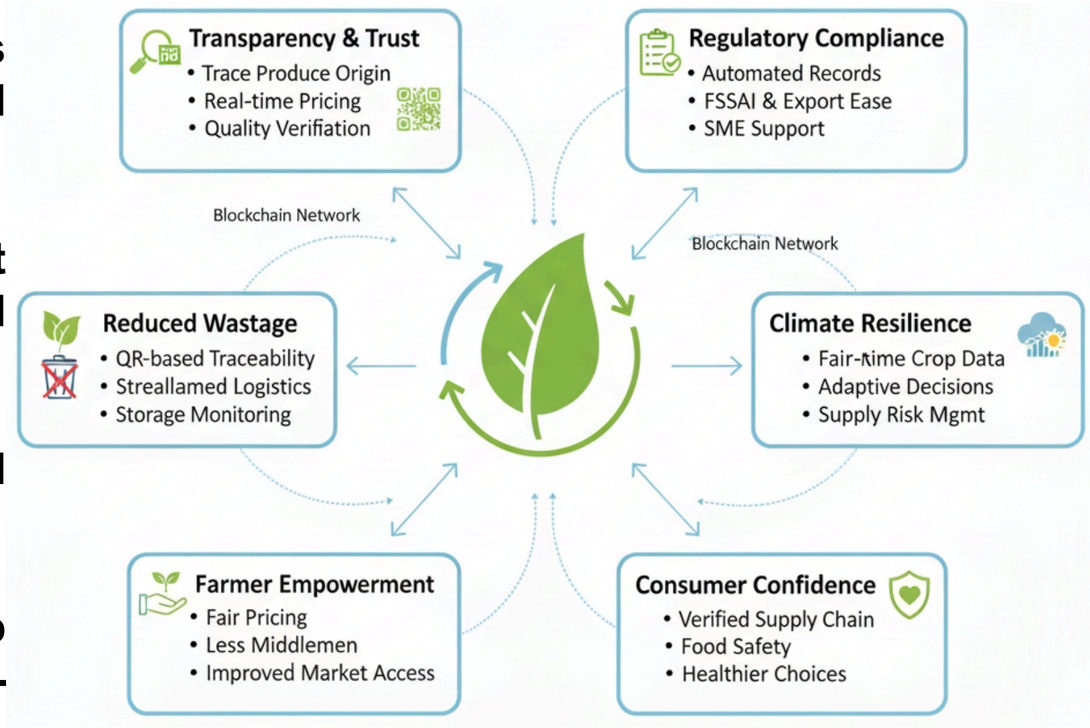
## Strategies

- Farmer training, multilingual UI, awareness drives.
- QR-based, offline-friendly traceability.
- Pilot projects → phased rollout.
- Govt. & cooperative partnerships.
- Secure coding, audits, formal verification.

# IMPACT AND BENEFITS



- **Transparency & Trust**: Blockchain ensures farmers, distributors, and consumers can trace produce origin, pricing, and quality in real time.
- **Reduced Wastage**: QR-based traceability + digital records minimize post-harvest losses by streamlining logistics and storage monitoring.
- **Farmer Empowerment**: Farmers get fair pricing through direct traceability, reduced middlemen exploitation, and improved market access.
- **Regulatory Compliance**: Automated records simplify FSSAI and export compliance for small-scale farmers and SMEs.
- **Resilience to Climate & Supply Risks**: Real-time data on crop conditions and storage supports climate-adaptive decision-making.
- **Consumer Confidence**: Verified supply chain builds trust, promoting food safety and healthier consumption.



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· *Smart Contract-Based Agricultural Food Supply Chain Traceability*
LU WANG 1,2,3, LONGQIN XU1,2,3,4,5, ZHIYING ZHENG1,2,4, SHUANGYIN LIU 1,2,3,4,5,6,XIANGTONG LI1,2,5, LIANG CAO1,2,3,4,5, JINGBIN LI6, AND CHUANHENG SUN 7

· *Blockchain-Based Soybean Traceability in Agricultural Supply Chain*
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· *Blockchain Application for Sustainable Supply Chain Management in Indian Agriculture*
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