

AgroSense

AI-Powered Agricultural Monitoring and Advisory System

1. Cover Page

Project Name: AgroSense

Tagline: Cultivating Success with Intelligent Farming

Team Members -

- Kandoji Dheeraj - Tech Lead
- Kasam Siddhartha - Research and analysis expert

2. Problem Statement

What challenges do farmers face in modern agriculture? This section will outline the key issues our solution addresses.

Agriculture remains the backbone of India's economy, employing nearly 40% of the workforce and contributing significantly to GDP. Despite this, farmers face enormous challenges in sustaining their livelihoods.

1. Unpredictable Weather Patterns

Climate change has made rainfall and temperature highly erratic. Farmers often misjudge the timing of sowing, irrigation, or harvesting, leading to significant crop losses.

2. Market Volatility

Crop prices fluctuate drastically due to demand-supply imbalances, lack of real-time market information, and middlemen exploitation. This prevents

farmers from selling their produce at the right time for maximum profit.

3. Pest and Disease Outbreaks

Limited access to timely guidance on pest control and disease management often leads to widespread crop damage, further lowering yield.

4. Lack of Personalized Guidance

Most advisory services available to farmers are either generic or too technical. Farmers rarely receive *personalized, actionable, and real-time* recommendations tailored to their crop, soil, and location.

5. Low Technology Accessibility

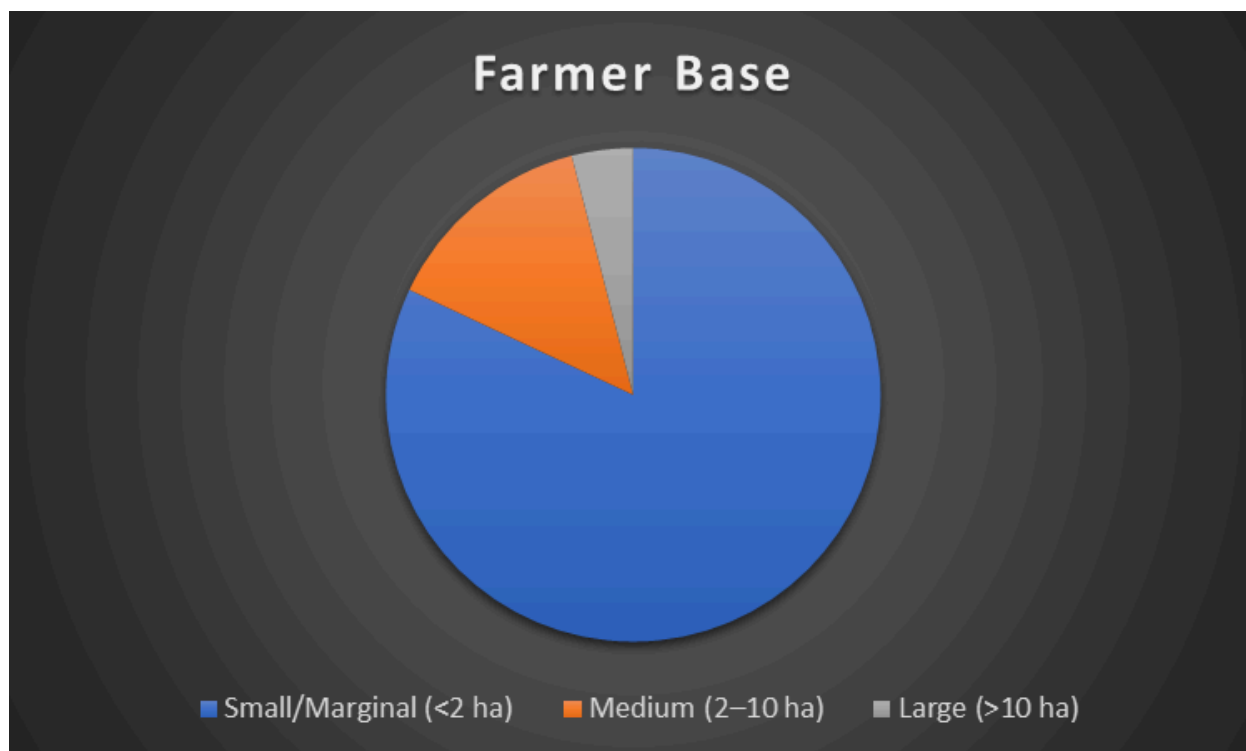
Although smartphones are increasingly available in rural areas, existing agri-tech solutions are often not user-friendly, lack local language support, or require internet speeds that farmers cannot reliably access.

3. Market Research

Farmer Base

- India has **146 million farmers** (NSSO, 2019).
- **82% are small/marginal farmers** (<2 hectares of land).
- Agriculture contributes **~18% to India's GDP** (World Bank).

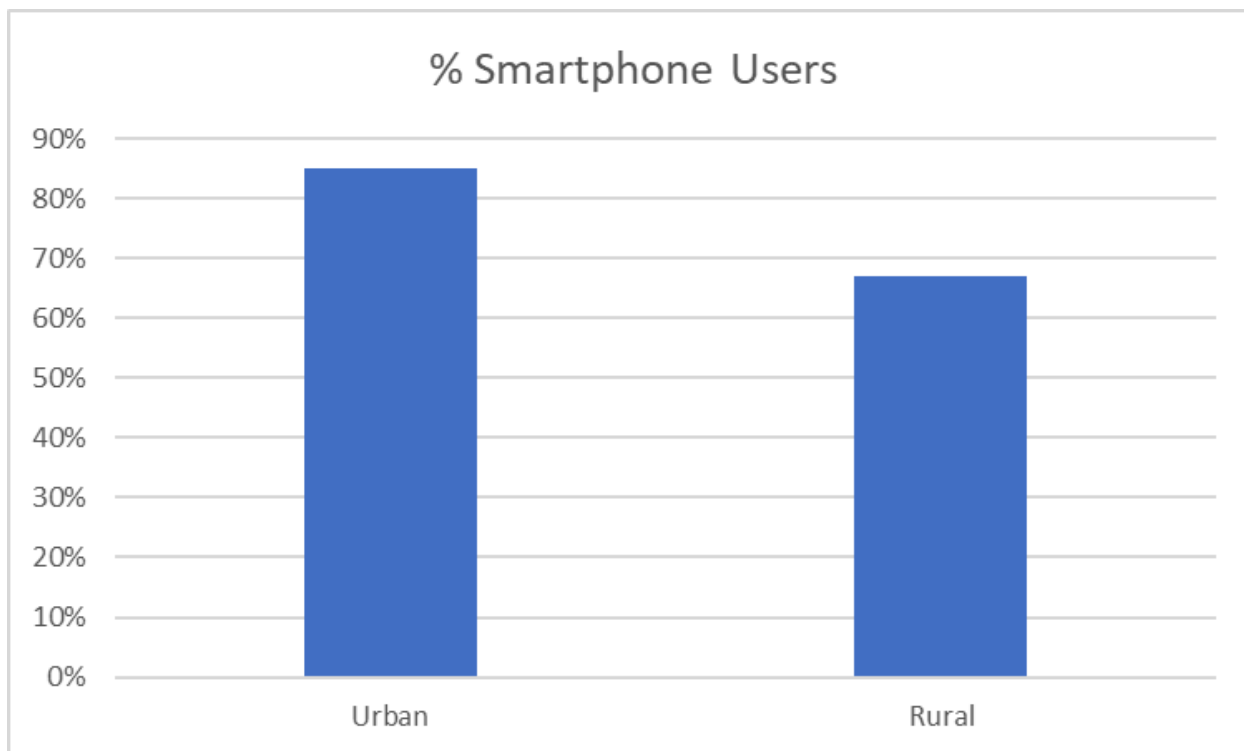
💡 Insight: Despite being the backbone of India's economy, small farmers remain underserved by technology.



Smartphone Penetration in Rural India

- **67% of rural Indians own a smartphone** (TRAI, 2023).
- Rural internet adoption is growing at **13% YoY**.
- Farmers already use WhatsApp, YouTube, and digital payments—showing readiness for mobile-first solutions.

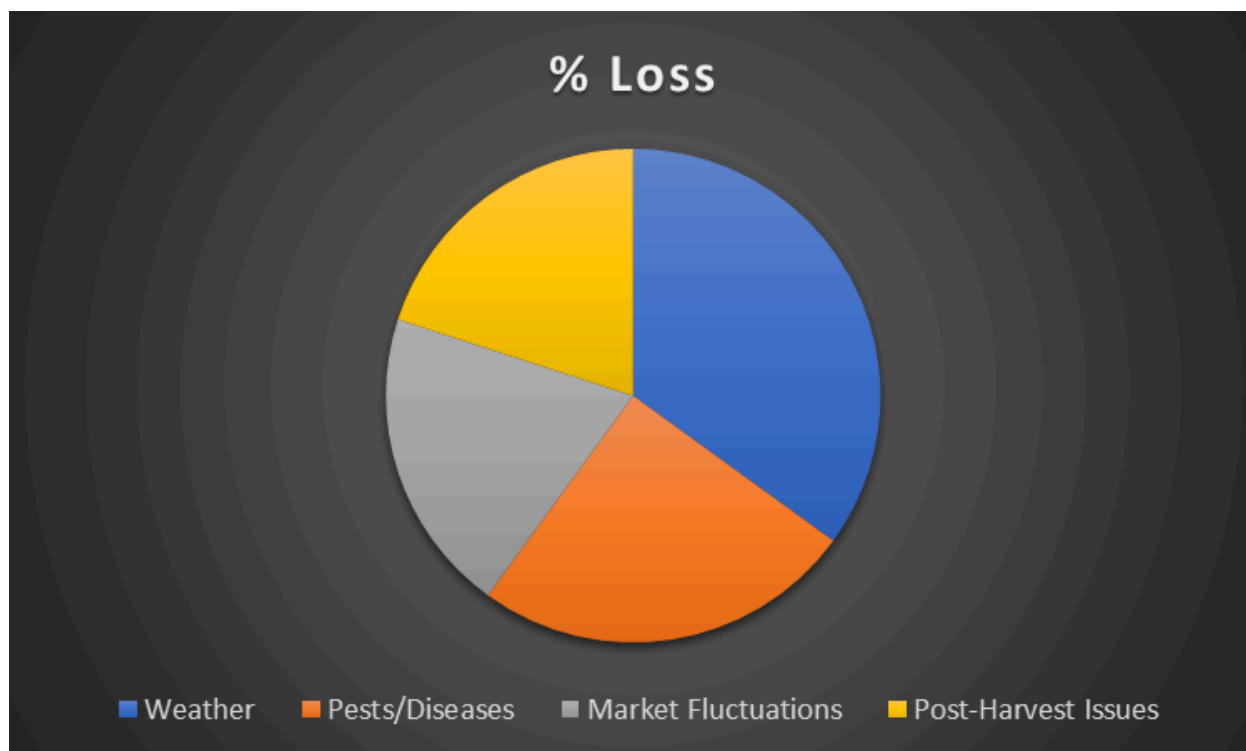
📌 Opportunity: A simple, local-language app is practical and accessible.



Losses Due to Challenges


- Farmers lose **20–30% of yield annually** due to unpredictable weather & pests (FAO).
- Crop price fluctuations reduce farmer income by **up to 40%**.
- India loses **₹50,000+ crore annually** to post-harvest and mismanagement issues.

[Insert Pie Chart: Causes of crop losses – Weather, Pests, Market, Post-harvest]



AgriTech Market Potential

- Indian AgriTech market projected to reach **\$24B by 2025** (EY India).
- AI & data-driven farming tools growing globally at **25% CAGR**.
- Current adoption is low, but scaling potential is massive.

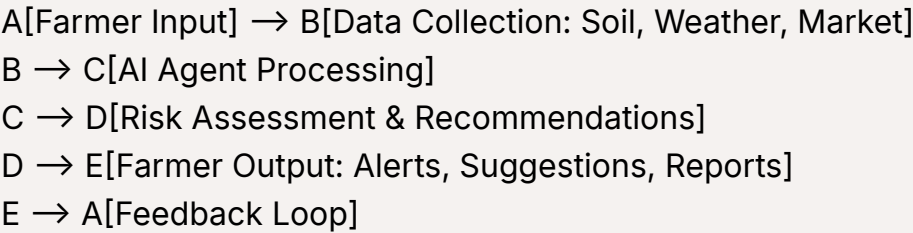
 Scalability: If just 10% of India's farmers adopt such tools, the potential user base exceeds 14M+ farmers.



vs Existing Solutions vs Our Agent

Platform	Type	Limitation
Kisan Suvidha	Govt App	Only generic advice
AgroStar	Private	Limited AI personalization
DeHaat	Startup	Mostly advisory, not agent-driven
Our Agent	AI Agent	Real-time, personalized, multi-source guidance

flowchart TD



4. Proposed Solution

Our AI-powered agricultural monitoring and advisory system addresses the identified problems through:

We propose an **AI-powered Farmer Risk Management Agent (AgroRisk Agent)** that acts as a **personal digital assistant for farmers**, helping them make smarter decisions, reduce risks, and maximize profits.

◆ Key Components

1. Data Collection

- Gathers crop, soil, and location details from the farmer.
- Pulls external datasets: weather forecasts, market price APIs, government policies, and pest/disease alerts.

2. AI-Powered Analysis

- Uses ML models (Gemini) to assess risks such as drought, pest infestation, or price drops.
- Identifies best practices for crop management (irrigation schedules, fertilizer use, seed selection).

3. Decision Engine

- Suggests optimal crop choices based on soil and market demand.
- Alerts farmers of upcoming risks (bad weather, falling prices).
- Recommends insurance schemes, subsidies, and best marketplaces to sell.

4. Farmer-Friendly Output

- Provides **personalized alerts** in local language (via SMS, WhatsApp, or App).
- Generates simple **visual guides** (icons/graphs instead of complex text).
- Continuous **feedback loop** improves the system with every farmer interaction.

◆ Benefits

- **Reduced financial risk:** Farmers get early warnings about weather or market drops.
- **Increased productivity:** AI-driven recommendations for seeds, fertilizers, and irrigation.
- **Better market access:** Farmers learn where and when to sell for maximum profit.
- **Inclusive & Scalable:** Works for small-scale rural farmers with basic smartphones, as well as larger farms.

Solution Overview Diagram (to be added)

5. System Architecture

Frontend

- **React Native (Expo)** → mobile-first, farmer-friendly, easy demo.

Backend

- **FastAPI (Python)** → clean, lightweight, AI-friendly.

Database

- **PostgreSQL (via Supabase)** → structured data (farmers, insurance, markets).
- MongoDB (Optional)

AI

- **Gemini Free API** → crop/market advisory, chatbot.
- **Optional ML** (only if time left) → pre-trained disease detection or yield prediction.

Cloud & Infra

- **Railway** → backend hosting.

- **Supabase** → database + auth.
 - **Firebase** → notifications & analytics.
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6. Features

Farmer-Facing

1. Crop & Risk Advisory

- AI agent (Gemini) suggests best crops for season based on soil/weather.
- Warns about possible risks (drought, pests, rainfall issues).

2. Market Price Updates

- Live integration with APIs to show nearby mandi/market prices.
- Suggests best time to sell.

3. Healthier Farm Practices

- Personalized advice on fertilizers, water usage.
- Push notifications for irrigation/fertilizer reminders.

4. Insurance Guidance

- Helps farmer understand crop insurance policies in simple language.
 - Suggests nearest insurance offices/partners.
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Analytics & Dashboard (For NGOs/Govt/Insurance)

1. Farmer Profiles & Risk Reports

- Aggregated data from multiple farmers.
- Risk maps for drought/pest-prone areas.

2. AI Insights

- Trends in crop health, yields, insurance claims.
 - Prediction of hotspots where intervention is needed.
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👉 Additional Add-Ons (If Time Allows)

- **Image-based Crop Disease Check** (basic ML model).
 - **Community Forum** (farmers asking agent questions, agent responds).
 - **Offline Mode** → cached advisory when no internet.
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7. Scalability & Future Scope

Market Scope

- Indian AgriTech sector projected to hit **\$30–35B by 2025**, with <1% tech penetration today → massive growth headroom.
- Rural India has **398M internet subscribers** (45% of total data users) and growing fast.
- Smartphone penetration in rural households is ~78% and climbing — enabling mobile-first solutions.

Scalability of AgroRisk Agent

- **Cloud-Native Foundation:** Built on FastAPI + PostgreSQL + React Native, enabling easy horizontal scaling.
- **Offline-first Capability:** Farmers can use the app even with poor connectivity; data syncs when online.
- **Language & Accessibility:** Multi-language support, voice-first interactions, and SMS fallback for low-literacy users.
- **AI Modularity:** Risk detection, price prediction, and advisory are modular AI components — new features can be plugged in without breaking the system.
- **Partnership-Friendly:** Designed to integrate with co-operatives, NGOs, and government schemes for large-scale rollouts.

Long-Term Scope

- Expand beyond risk advisory into **crop yield forecasting, weather-based insurance guidance, and financial literacy**.

- Build a **data layer** valuable for government and agri-businesses → opens B2B revenue streams.
 - Scalable architecture supports both **individual farmer subscriptions** and **institutional adoption**.
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8. Revenue Model

Option 1:

Monthly / Annual Subscriptions

Farmers can pay to use the app with essential and advanced features to decrease their risk factors by a lot.

Plans	Monthly	Annual
Basic	49	
Premium	99	999
Elite	299	3299

Option 2:

Sponsored Products:

Sellers can market their products like specific fertilisers or medicines for crops and other various farm related products which farmers might buy when the AI suggests them.

9. Team & Resources

Core Team

Kandoji Dheeraj - Tech Lead

- Full-stack development
- AI/ML implementation

Required Resources

Technical Requirements:

- Cloud infrastructure (AWS/GCP)
- AI/ML development tools

- System architecture

Kasam Siddhartha - Research & Analysis

- Agricultural domain expertise
- Market research and validation
- User experience design

- Mobile development frameworks
- API subscriptions (weather, market data)

Human Resources:

- UI/UX Designer (Part-time)
- Agricultural consultant
- Regional language translators

10. Risk Analysis & Mitigation

Risk	Probability	Impact	Mitigation Strategy
Low farmer adoption	Medium	High	Extensive field testing, local partnerships, simple UI
Technical challenges in AI accuracy	Medium	Medium	Iterative model training, expert validation, fallback systems
Competition from established players	High	Medium	Focus on personalization, superior UX, local partnerships
Connectivity issues in rural areas	Medium	Medium	Offline-first design, SMS backup, edge computing

Success Factors

- **User-Centric Design:** Simple, intuitive interface with local language support
- **Accurate AI Models:** Continuous training with local agricultural data
- **Strong Partnerships:** Collaboration with agricultural universities and government bodies
- **Scalable Infrastructure:** Cloud-native architecture for rapid scaling
- **Community Building:** Creating farmer networks for knowledge sharing

Conclusion

AgroSense represents a significant opportunity to bridge the technology gap in Indian agriculture. By combining AI-powered insights with user-friendly design and local partnerships, we can create meaningful impact for millions of farmers while building a sustainable business.

Next Steps:

1. Finalize technical architecture and technology stack
2. Begin MVP development with core features
3. Establish partnerships with agricultural institutions
4. Conduct pilot testing with local farmer groups
5. Secure initial funding for development and operations

Vision: To empower every farmer with intelligent, personalized agricultural guidance that increases yield, reduces risk, and improves livelihoods.