Ajayu (Spirit in Aymara)
Agri-Fintech AI Platform

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- Integrated Data Intelligence for Sustainable and Inclusive Agricultural Finance

- Powered by District-Level Spatial, Climate, Land, Labor, and Export Insights

Executive Summary

- Objective: to integrate climate, spatial, socioeconomic, and production data into a modular AI system that supports credit, traceability, insurance, and grant scoring for over 800,000 U.S. export-linked horticultural producers in Peru.

- Problem Statement: Peruvian farmers face fragmented access to finance, limited digital traceability, and uneven adaptation to climate risks. Traditional models do not account for granular, district-level disparities in water, land, labor, and training.

- Technical Solution: Ajayu is a modular AI framework built on Peru's official geospatial and agricultural datasets, exports by revenue, logistics, and data from IoT layers). It uses over 60 engineered features (metrics) grouped into seven intelligence domains: Climate, Water, Land Use, Labor, Training, Traceability, and Financial Risk.

Spatial & Geolocation Framework

- UBIGEO-linked geospatial dataset with 1,892 districts / 196 provinces / 25 regions

- Includes: latitude, longitude, altitude, area (km²)

- Enables mapping of climate, productivity, logistics, and financial access

- Supports real-time dashboarding and risk mapping

Climate & Environmental Indicators

- District-level Rainfall, Temperature, and Humidity (historical and average)

- Drought event tracking with frequency scoring

- Rainfall seasonality and temperature extremes integrated into risk models

- Feeds AI-based yield prediction and credit scoring

Water Access & Agricultural Use

- District-level access to water reservoirs and irrigated land

- Agricultural water consumption by crop and region

- Irrigation presence scored by extension area

- Supports water credit modeling and drought resilience planning

Land Use, Cropping & Production

- Land use by farming purpose and crop type

- Annual harvested area by district and crop

- Irrigated vs non-irrigated land by extension

- Core features: land productivity, irrigation ratio, crop rotation diversity

Employment & Socioeconomic Profiles

- District-level agriculture employment rates

- Farmer density computed per km²

- Labor intensity mapped to land and productivity metrics

- Supports inclusion scoring and cooperative readiness

Training & Capacity Building Layer

- Training activities numbers, training participation, access

- AI-flagged training gaps in financial literacy, sustainable farming, and agri-tech

- Massive mobile/internet penetration enables mobile-first delivery

- District-level training focalized delivery channel scoring (per product/location)

Integrated AI Feature Matrix

- Over 60 district-level features grouped by category: climate, land, water, labor, training, export, financial risk
- Fully spatial master dataset with geospatial and economic integration
- Supports credit scoring, productivity prediction, portfolio stress testing
- Input-ready for ML pipelines, Power BI dashboards, and automated slide generation

Synthesis: Agri-Fintech AI

- Built from Peru's official agricultural, demographic, financial, climatic, and trade data sources
- Designed for real-time credit and yield scoring
- Supports sustainable finance, climate resilience, embedded lending, and inclusive growth
- A scalable, replicable model for Andean agri-finance transformation

Financial Analysis & 5-Year Valuation

- Year 1: Revenue ~$1.2M, Operating Cost ~$0.4M, Net Profit ~$0.8M

- Year 2: Revenue ~$2.0M, Scaling across Top 15 non-traditional exports

- Year 3: Revenue ~$3.0M with 60% reinvestment into digital infrastructure

- Year 4: Revenue ~$4.2M, expanded to credit scoring and input financing

- Year 5: Revenue ~$6.0M with net margins >30%

- Valuation Estimate: ~$18M by Year 5 (at 3x revenue multiple)

- Primary value drivers: embedded financial services, AI scoring, and ESG-aligned investment positioning

Funding Mix

- Initial Seed Round (Pre-Seed – $0.5M): Grants + Angel Capital

- Series A (2026 – $3M): Institutional Agri-Fintech & Climate Impact Funds

- Series B (2027–2028 – $5M): Expansion capital for AI, lending services, regional replication

Capital Allocation Strategy

- Lending & Risk Capital (70%): Credit for farmers, input financing, bundled agri-insurance, agritech grants

- Product Development (20%): AI models, API stack, full-stack web and mobile app development, blockchain for export traceability and finance, cloud data infrastructure

- Management (10%): Salaries, compliance, operational execution, legal and fiscal governance

5-Year Growth Plan

Projected Annual Revenue ($M)

Capital Allocation Strategy

Management (10%)

10%

Product Development (20%)

20%

70%

Lending & Risk Capital (70%)
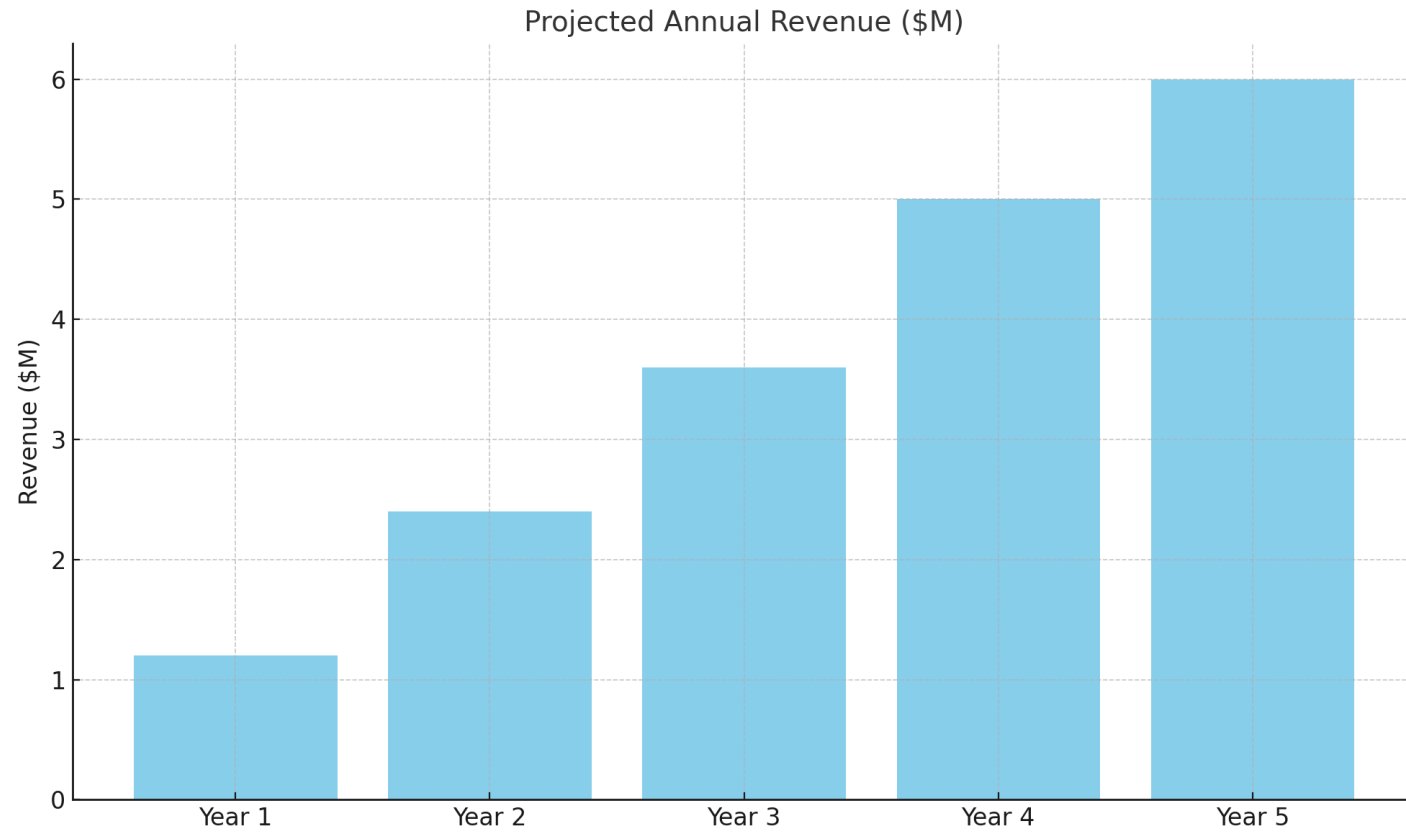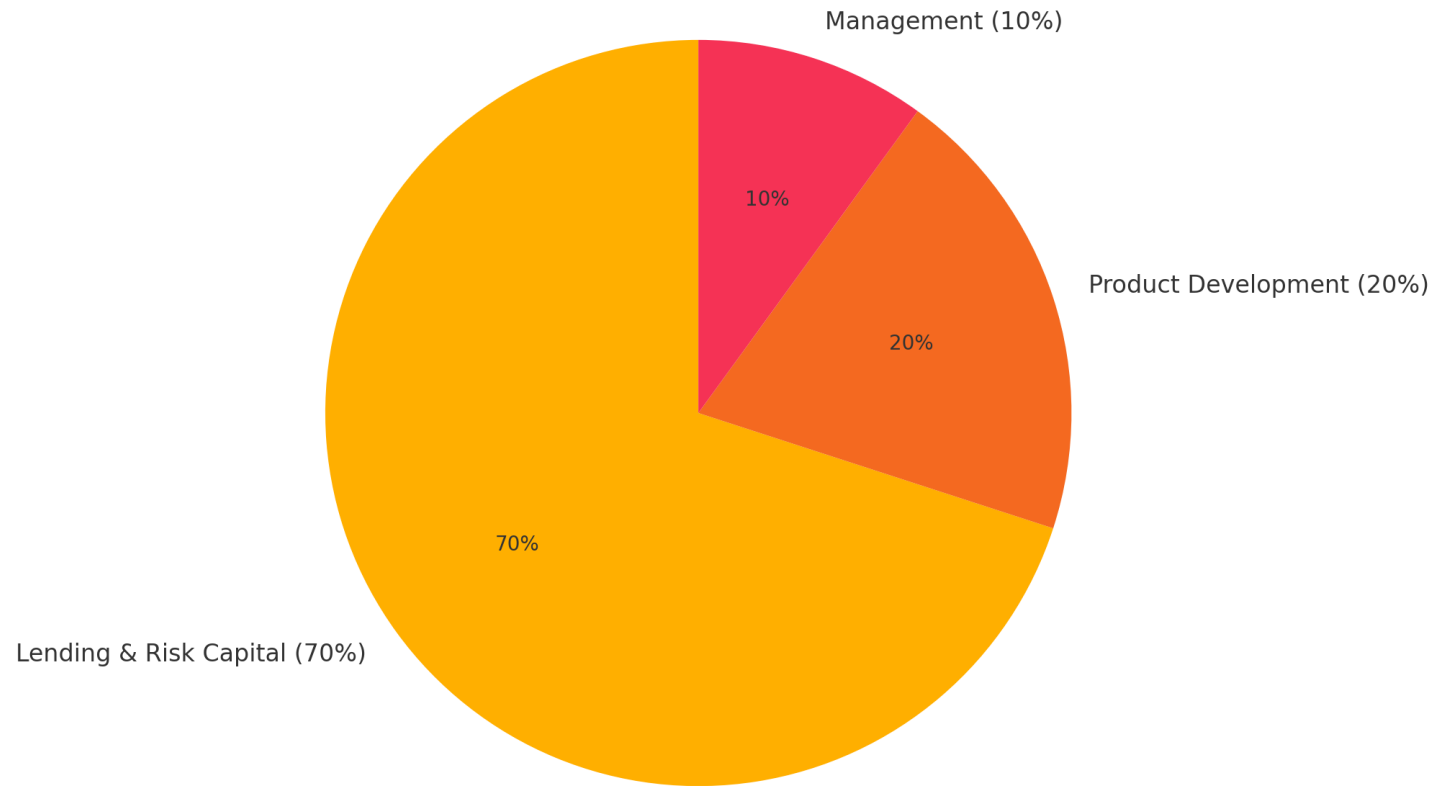
AI-Powered Marketing & SEO Strategy

- Goal: Drive platform adoption and credibility with AI-optimized visibility campaigns

- Farmer Campaigns: Geo-targeted WhatsApp, SMS, and voice in Spanish, Quechua

- Bilingual SEO: English/Spanish blog posts and reports ranked for agri-fintech and traceability keywords

- Academic Indexing: Google Scholar, SSRN, ResearchGate listings for papers and updates

- Conversion Analytics: Funnel optimization through A/B testing and behavioral modeling

LinkedIn Strategy: Exporters, Experts & Investors

- Objective: Position Agri-Fintech products between farmers, exporters, and investors

- Create LinkedIn Page: Highlight platform news, partnerships, and insights

- Founder-Led Content: Share behind-the-scenes, capstone research, and impact updates

- Sponsored Campaigns: Target exporters, agritech experts, institutional investors

- AI-Backed Analytics: Monitor engagement and adapt campaigns in real-time

Technical Data Documentation

Ajayu's Integrated Data Sources:

- ENA (Encuesta Nacional Agraria) Survey: farmer access to financial services, cost of production, training participation, producer profiles.
- CENAGRO (2012 Agrarian Census): baseline producer counts for spatial expansion.
- INEI (Demographics): population projections, rural workforce data.
- INEI Financial Offer Mapping: spatial distribution of banking and insurance services.
- Aduanet/SUNAT Export Data: horticultural export metrics aligned to HS codes.
- SENAMHI Climate Indicators: district-level rainfall, drought, temperature, and humidity.
- Reservoir and Irrigation Databases: water access by district and crop.
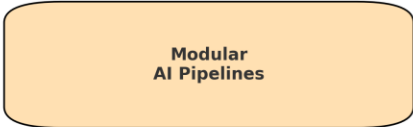
Data Harmonization Strategy:
- ENA ratios expanded using CENAGRO census and INEI demographic baselines.
- All sources spatially joined at UBIGEO district/province/region levels.
- Ready for real-time AI model integration, credit scoring, and predictive analytics.
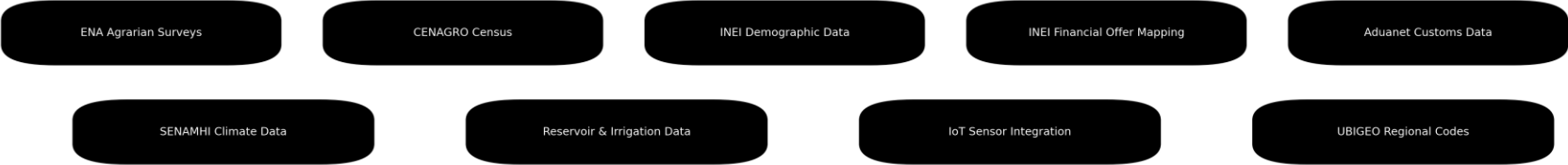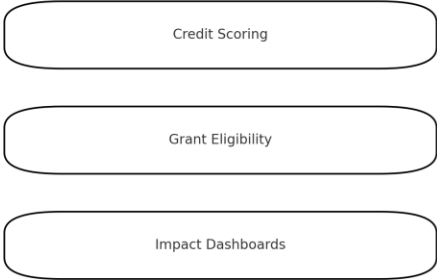
Ajayu Data Architecture

Data Layers

| Climate & Environment |
| Water Access & Agriculture |
| Land Use & Production |
| Labor & Socioeconomics |
| Training Activity |
| Traceability & Exports |
| Financial Risk |

AI Modeling

**Modular
AI Pipelines**

Output Systems

| Credit Scoring |
| Grant Eligibility |
| Impact Dashboards |

ENA Agrarian Surveys

CENAGRO Census

INEI Demographic Data

INEI Financial Offer Mapping

Aduanet Customs Data

SENAMHI Climate Data

Reservoir & Irrigation Data

IoT Sensor Integration

UBIGEO Regional Codes

Predictive Spatial Intelligence for Rural Finance

Data Intelligence Stack

Delivery Layer

AI Models, Power BI, PPTX Generator, Farmer-Facing Mobile Tools

Master Feature Store

District x Product matrix for modeling and dashboarding

Feature Engineering

Over 60 Engineered Features

Integration Layer

Unified by geolocation (Region, Province, District levels)

Data

Spatial, Agriculture, Peruvian Global Value Chains, Peruvian Demographics, Climate, Irrigation, Land, Farmer Training, Costs of Agricultural Production, Farmer Access to Financial Services

Cross-Layer Feature Interactions

- Product-Code Linkage: Top 15 exports from G3 aligned to Aduanet via HS codes

- Geolocation Layer: UBIGEO enables district-level spatial joins across all sources

- Climate Sync: Rainfall, temperature, and humidity joined to export zones via UBIGEO

- Water Resources: Irrigation and reservoir data layered on crop geography

- Training Flags: ENA-based training score tied to land use and credit gaps

- Logistics Overlay: Distance to Callao, export routing, and market exposure scoring

- AI Inputs: All features engineered to feed into credit, productivity, and risk models

Model – 1. Farmer Profile & Behavior

- Credit history score

- Loan repayment rate

- Transaction frequency

- Income seasonality index

- Digital device access

- Mobile app usage

- Grant/subsidy history

- Cooperative membership

- Leadership index

- Gender of producer

Model – 2. Crop & Production Intelligence

- Primary crop type

- Farm size (ha)

- Crop rotation frequency

- Irrigation access

- Fertilizer use intensity

- Pesticide use intensity

- Yield history

- Harvest calendar alignment

- Organic certification

- Post-harvest storage access

Model – 3. Climate & Environmental Risk

- Rainfall index

- Temperature variability

- Altitude

- Drought risk

- Flood frequency

- Frost exposure

- Soil quality

- Erosion risk

- Evapotranspiration index

- Microclimate deviation

Model – 4. Traceability & Market Access

- HS code match

- Blockchain enrollment

- Traceability % output

- Port access time

- Cold chain availability

- Exporter association

- Market volatility index

- Exporter location

- Product grading compliance

- Digital logistics integration

Model – 5. Behavioral & Digital Usage

- Onboarding speed

- SMS/WhatsApp open rate

- Language preference

- App session duration

- Form completion rate

- Referral behavior

- Support tickets

- Response time to offers

- Training attendance

- Early repayment behavior

Model – 6. Risk & Eligibility Scoring

- Composite risk score

- Eligibility index

- Climate risk index

- Market alignment index

- ESG alignment

- Traceability score

- Digital literacy

- Cross-subsidy flag

- Loan approval likelihood

- Grant scoring index

Best-Fit Predictive Models

Model Domain	Best-Fit Predictive Models	Why?
Farmer Profile & Behavior	Logistic Regression, Decision Trees	Binary outcomes (repayment, trust) + interpretability
Crop & Production Intelligence	Random Forest, Gradient Boosted Trees	Complex nonlinear relationships in input/output patterns
Climate & Environmental Risk	Support Vector Machines, Neural Nets, Ensemble Methods	High-dimensional data, complex interactions
Traceability & Market Access	K-Nearest Neighbors, Naïve Bayes, Multi-class Classification Models	Segmenting exporters vs. local vs. partial traceability
Behavioral & Digital Usage	Time-Series Analysis, Clustering (K-Means), Behavioral Trees	Pattern recognition + engagement scoring
Risk & Eligibility Composite Scores	Ensemble Models (XGBoost, Stacking), Meta-Models	Aggregation of outputs from other models into composite scoring