**JaivikSetu**

**“हर घर तक जैविक उत्पाद,  
हर किसान तक सही बाज़ार!”**

**“Organic products to every home, a fair market to every farmer!”**

**Index**

1. Team Name and Member Details……………………………………………………….3
   1. Team Name
   2. Member Details
2. Problem Statement…………………………………………………………………………….4
   1. Chosen Problem
   2. Problem Analysis
   3. Target Audience
3. Solution Overview………………………………………………………………………………6
   1. Brief Explanation
   2. Approach
   3. Uniqueness
4. Frameworks/Technologies……………………………………………………………….16
   1. Tech Stack
   2. Reasoning
   3. Assumptions & Constraints
5. Feasibility and Implementation………………………………………………………..22
   1. Effectiveness:
6. UI/UX Mockup…………………………………………………………………………………23
7. Business Scope and Use Case…………………………………………………..………24
   1. Use Case Scenarios:
   2. Market Need
   3. Revenue Model
8. System Design and Architecture………………………………………………….……27
   1. Technologies Overview
   2. Design Patterns
   3. Functional Flow
9. Coding Standards……………………………………………………………………………..30
10. Additional Supporting Documents……………………………………………………31

**Keta-known**

**Members:**

Janvi Chauhan (Team Manager)

**Role**: -Backend Developer – Oversees project planning, facilitates team coordination, and ensures timely project execution.

Tirth Gohel

**Role**: -Frontend Developer

Ansh Yadav

**Role**: -Full Stack Developer

Tej Doshi

**Role**: -Backend Developer

**Problem Statement**

Farmers practicing natural farming struggle to find reliable buyers, often relying on middlemen who reduce their profits. Consumers looking for organic, chemical-free food face difficulty verifying authenticity, leading to trust issues in the organic market. There is no direct system ensuring transparency between farmers and consumers.

**Farmers lack direct access to buyers**, forcing them to depend on local markets or intermediaries. **Consumers have no easy way to verify** if a product is genuinely organic.  
**No transparency or certification system** builds trust between both parties.  
**The absence of a direct connection** makes organic markets unreliable and unstructured.

**Problem Analysis:**

In today’s market, **fake organic labels** and **unverified claims** are common, making it hard for consumers to differentiate between **genuine organic products** and commercially grown ones involving pesticides and insecticides. **Farmers lack a direct connection** to consumers, which means they **earn less** while buyers **pay more** due to unnecessary middlemen.

Fake organic labels and unverified claims mislead consumers, making it difficult to identify truly organic products. Pesticides and insecticide usage in commercially grown products remains unchecked due to a lack of transparency. Farmers lack direct access to consumers, reducing their earnings while middlemen increase costs for buyers.

No proper verification system exists for consumers to confirm product authenticity before purchase. Digital certification and QR codes can help trace product origin, ensuring trust and fair pricing. Limited market access for farmers prevents them from sustaining their natural farming practices. Non-transparent systems and uncertified products mislead buyers, weakening consumer confidence in organic markets.

**Targeted Audience:**

**Farmers** – Small and mid-sized natural farmers who need a **better market without middlemen**.  
**Consumers** – Health-conscious buyers who want **trustworthy organic products**.  
**Retailers & Restaurants** – Businesses that need **certified organic produce**.

**Solution Overview**

* **Digital Marketplace**: A platform that directly connects natural farmers with conscious consumers.
* **Farmer Verification**: Only certified natural farmers can sell on the platform, ensuring authenticity.
* **Consumer Trust**: QR code-based traceability allows buyers to verify product origin, farming methods, and certification details in real-time.
* **Elimination of Middlemen**: Farmers receive fair pricing, and consumers get affordable, genuine organic food.

**Addressing Key Issues**:

* Farmers struggle with market access and fair prices.
* Consumers face trust issues due to fake organic products.
* Middlemen inflate costs, reducing farmer profits and increasing consumer prices.

JaivikSetu’s Solution: A transparent digital platform that directly connects verified farmers and consumers, ensuring trust, authenticity, and fair trade.

**Approach: How Our Solution Works**

1. **Farmer Verification**
   1. Farmers submit documents, land details, and farming practices for review.
   2. A third-party inspection team verifies claims before certifying farmers as authentic organic producers.
2. **QR Code Generation**
   1. Once verified, each product receives a unique QR code linking to its origin, farming methods, and certification details.
   2. Consumers can scan the QR code before purchase to ensure authenticity.
3. **Direct Selling Marketplace**
   1. Verified farmers list their organic products at fair prices.
   2. Consumers can browse, filter, and purchase directly, removing middlemen and reducing costs.
4. **Order & Delivery Management**
   1. Supports easy ordering, secure payments, and doorstep delivery.
   2. Ensures authentic organic food reaches consumers hassle-free.

**Some important points to be taken care of: -**

**1)Managing and showcasing of the fair pricing**

* **No Middleman**: By connecting farmers directly with consumers, you eliminate intermediary costs. Display the savings from this approach on the product page so consumers can see the difference in pricing compared to traditional market prices.
* **Fair Profit Margin**: Allow farmers to set their own prices with an option to recommend a fair margin above their costs.

**2)Management of the farmer verification and Details needed for the document verification.**

**1️. Farmer Registration & Profile Setup**

* Farmers sign up with name, farm location, and contact details.
* Provide bank details for direct payments.

**2️. Submission of Required Documents**

* Farm Identity Proof – Aadhar Card, Land Records, or Lease Agreement.
* Organic Certification – PGS (Participatory Guarantee System) Certificate or Third-Party Organic Certification (if available).
* Farm Details – Size, type, crops grown, and farming methods used.
* Proof of Natural Farming Practices
  + Farm Photos (fields, composting, organic inputs).
  + Receipts for organic seeds, compost, and natural pesticides.

**3️. Third-Party Verification Process**

* Inspectors visit the farm to check:
  + Soil Health – No synthetic fertilizers.
  + Water & Waste Management – Eco-friendly farming techniques.
  + Crop Management – Crop rotation, organic manure, and sustainable practices.

**4️ Admin Review & Approval**

* Admin verifies submitted documents and inspection reports.
* If approved, the farmer receives a certification badge and can list products.
* If rejected, the farmer is given guidance on corrections.

**5️ Product Listing & Activation**

* Once verified, farmers can upload products, set prices, and generate QR codes for consumer traceability.

### ****Certification Timeline (48-Hour Approval)****

**1. Document Upload** – Farmers submit required documents (takes up to **1 day).**  
2. **Third-Party Inspection** – On-site verification, completed within **a few hours to a day**.  
**3. Review & Approval** – Findings are reviewed, and certification is **approved or denied in 48 hours.  
4. Certificate Issuance** – If approved, the digital certificate is **generated and available on the farmer’s profile.**

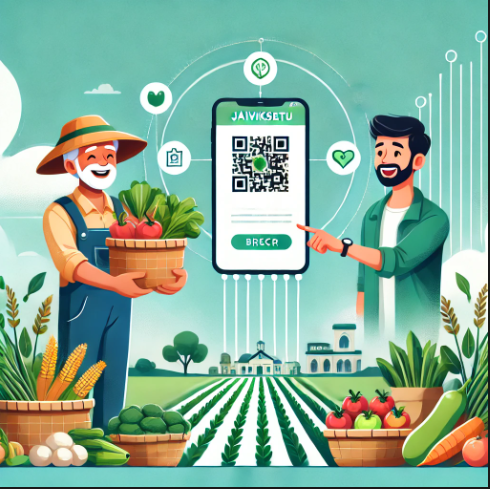
Reverification of the products

**Annual Farmer Reverification**

* Farmers must undergo reverification once a year to ensure they continue following organic/natural farming practices.
* They need to resubmit updated documents, farm photos, and crop logs for review.

**Seasonal Product Batch Verification**

* For perishable crops, **batch-wise verification is required every season** (e.g., wheat in Rabi season, rice in Kharif season).
* This should be once atleas t 2-3 months.

**QR Based Information**

#### **1. Farmer QR Code:**

* Farmer’s details (name, farm location, history)
* Certification details (organic, fair trade, etc.)
* Proof of natural farming practices (photos, audits)
* Sustainability and eco-friendly practices
* Direct Link to the farmer’s products

#### **2. Product QR Code:**

* Product-specific details (name, batch number, harvest date)
* Photos/videos showing natural harvesting methods
* Testing reports (e.g., pesticide residue, chemical-free)
* Traceability from farm to consumer (timeline, farm location)
* Certification and compliance evidence
* Ratings and reviews
* **Interactive Platform**: The QR codes should link to an interactive web platform where the consumer can see detailed reports, images, and videos. It should be mobile-friendly for easy access.

Middleman elimination

**How JaivikSetu Eliminates Middlemen**

* Direct Farmer-to-Consumer Marketplace – Farmers list products directly on JaivikSetu, bypassing wholesalers, traders, and brokers.
* QR Code-Based Transparency – Every farmer and product gets a unique QR code that consumers can scan to check farm location, certification, and farming methods.
* Transparent Pricing & Fair Trade – Farmers set their own prices based on production costs, ensuring fair earnings without middlemen price manipulation.
* Secure Digital Payments & Direct Transactions – Consumers pay directly to farmers via UPI, Bank Transfer, or Wallet, removing commission cuts from middlemen.
* Logistics & Delivery Without Intermediaries – Farmers can manage their own deliveries or use partnered logistics services, avoiding third-party distributors.

**Example: Eliminating Middlemen in Organic Mango Sales**

**Traditional Market:** A farmer sells mangoes to a middleman for ₹50/kg. The middleman sells to a retailer for ₹80/kg, and the retailer sells to consumers for ₹120/kg. The farmer earns only ₹50/kg, while consumers pay ₹120/kg.

**With JaivikSetu:** The farmer lists mangoes directly for ₹80/kg, and consumers buy without price inflation. The farmer earns ₹30 more per kg, and the consumer saves ₹40 per kg.

**Management of the Delivery**

**1. Order Processing & Farmer Notification** – When a consumer places an order, the nearest farmer receives an instant notification via SMS, email, or dashboard alert.

**2️. Smart Delivery Allocation** – The system automatically assigns the delivery method based on the farmer’s location:

* Nearby Farmers (Local Delivery) – If the farmer is within a short distance, the order is sent to Blinkit, Zepto, Dunzo, or any instant delivery partner for fast, same-day delivery.
* Distant Farmers (Long-Distance Shipping) – If the farmer is far from the consumer, the order is assigned to ONDC Logistic provider (e.g. DHL, Delivery, India Post).

**3️. Real-Time Tracking & Status Updates** – Consumers can track their orders live, receiving updates about packaging, dispatch, and expected delivery time.

**4️. Seamless Payment & Order Completion** – Payment is processed securely, and once the order is delivered, consumers confirm receipt and leave a rating/review.

This hybrid model ensures faster deliveries for local farmers while enabling long-distance farmers to reach a wider audience efficiently.

How will you manage orders?

**How JaivikSetu Will Manage Orders Efficiently**

### ****Order Placement & Notification****

### **Consumers browse products, add to cart, and place orders directly from verified farmers.**

### **Farmers receive instant notifications via SMS, email, or dashboard alerts.**

### Smart Delivery Allocation

### **If the farmer is near the consumer, the system assigns the order to instant delivery services (Blinkit, Zepto, Dunzo) for same-day delivery.**

### **If the farmer is far away, the system assigns the order to long-distance logistics providers (DHL, Delhivery, India Post) for standard shipping.**

### ****Payment Processing****

### **Consumers make secure payments via UPI, Bank Transfer, Wallets, or COD (if available).**

### **The platform holds payments until order confirmation to ensure smooth transactions.**

### ****4. Packaging & QR Code Labeling****

### Farmers package products securely and attach QR codes for authenticity and traceability.

### 5.Order Tracking & Status Updates

### **Consumers receive real-time tracking updates via the website and SMS/email.**

### **Updates include order processing, packaging, dispatch, estimated delivery time.**

### ****6.Delivery & Confirmation****

### **The assigned logistics partner delivers the product to the consumer.**

### **Consumers confirm receipt and leave a rating/review on the platform.**

### **7.** ****Customer Support & Dispute Resolution****

### **If any issue arises (damaged product, delayed delivery), consumers can raise a dispute via customer support, and JaivikSetu will assist in resolution**

### **advantages for the farmers and consumers for using this platform**

### ****Farmers' Benefits****

1. **Direct Sales & Higher Profits** – No middlemen, fair pricing, and better earnings.
2. **Wider Market Reach** – Sell across cities, reaching urban consumers.
3. **Trust & Transparency** – QR-based verification ensures genuine organic sales.
4. **Flexible Delivery Options** – Self-delivery or logistics partners like Blinkit, DHL, Delivery.
5. **Secure & Fast Payments** – Get paid directly via UPI, Bank Transfer, or Wallets.

### ****Consumers' Benefits****

1. **100% Authentic Organic Food** – Buy directly from verified farmers.
2. **Fair & Affordable Pricing** – No middlemen markups, lower costs.
3. **QR Code Traceability** – Check farm details & certification before purchase.
4. **Convenient Delivery** – Instant delivery (Blinkit, Dunzo) or nationwide shipping.
5. **Secure Payments & Order Tracking** – Smooth transactions with live tracking.

**Uniqueness**:

* Our platform is unlike other organic markets; it cuts the middleman and offers traceability in real time with the use of QR codes and ensures a certification process, thus letting only genuine organic farmers participate, thereby making it simpler, more transparent, and fairer for farmers and consumers.
* **Direct Farmer-to-Consumer Sales** – Eliminates middlemen, ensuring fair pricing for both farmers and buyers.
* **QR Code-Based Transparency** – Consumers can verify product origin, farming methods, and certifications before purchase.
* **Smart Delivery System** – Uses instant delivery (Blinkit, Dunzo) for nearby farmers and logistics partners (DHL, Delhivery) for distant ones.
* **Certified Organic Marketplace** – Only verified natural farmers can sell, ensuring genuine organic products.
* **Fair & Seasonal Pricing** – Farmers set their own prices based on harvest cycles and demand, promoting sustainable trade.
* **Secure & Instant Payments** – Supports UPI, Bank Transfers, and Wallets, ensuring hassle-free transactions.

**Frameworks/Technologies**

**1**. **Tech Stack:**

**Frontend (Next.js)**

**Framework:** Next.js – React-based framework for server-side rendering, static site generation, and API routes.

* 1. **UI Components –**
  + [Hero UI](https://www.hero-ui.com/) – UI components for building a visually appealing design.
  + [shadcn/ui](https://ui.shadcn.com/) – Modern UI component library based on Radix UI.

**2.** **Animations:**

* Framer Motion – Powerful animation library for React.

**3.** **Forms & Validation:**

* Yup – Schema validation for form inputs.
* React Hook Form – Performant and flexible form management.

1. **State Management:**
   * Zustand – Lightweight state management solution for React.
2. **Performance & Analytics:**
   * next/bundle**-**analyzer – Analyze and optimize bundle sizes.
3. **Progressive Web Apps (PWA):**
   * Next-pwa **-** Support for offline usage, caching, and improved performance.

### Backend (Django)

**Framework: Django** – High-level Python web framework.

1. **API Development:**
   * Django REST Framework (DRF) – Toolkit for building RESTful APIs.
2. **Authentication & Security:**
   * JWT (JSON Web Token) – Secure user authentication and authorization.
3. **CORS Handling:**
   * django-cors-headers **–** Middleware for managing Cross-Origin Resource Sharing (CORS).

**2. Reasoning:**

JaivikSetu is a farmer and consumer solution designed to eliminate middlemen by directly connecting farmers with buyers. This demands a scalable, efficient, and cost-effective tech stack that ensures seamless user experience, real-time interactions, and robust security. Below is the reasoning behind the chosen technologies:

##### **Frontend (Next.js) – Fast, Interactive, and PWA-Ready**

A farmer-consumer platform needs an intuitive and responsive interface that works well even in low-connectivity areas.

* **Next.js –** Provides server-side rendering (SSR) for faster page loads and static generation (SSG) for scalability, ensuring that even users with slow internet can access the platform quickly.
* **Hero UI & shadcn/ui –** Offer ready-made, highly customizable UI components that speed up development while maintaining a modern and professional look.
* **Framer Motion –** Enhances the user experience with smooth animations, making the platform feel more interactive and engaging, which is important for adoption among consumers.
* **React Hook Form + Yup –** Provides an efficient way to handle forms and validation, ensuring farmers and consumers can register, list, and purchase products seamlessly.
* **Zustand –** A lightweight and scalable state management tool, perfect for handling global states like user authentication, cart management, and real-time updates without performance bottlenecks.
* **Next.js Bundle Analyzer –** Helps optimize the platform’s performance by reducing unnecessary dependencies, making the app lightweight and fast.
* **PWA (Progressive Web App) –** Ensures offline functionality, essential for rural farmers who might have intermittent internet access. This helps them browse, list, and check products even without an active connection.

**Backend (Django) – Secure, Scalable, and API-Centric**

Since the platform must handle user data, transactions, and product listings, Django is an ideal choice due to its security, reliability, and ease of development.

* **Django –** A robust backend framework that allows rapid development and ensures security, scalability, and maintainability.
* **Django REST Framework (DRF) –** Provides a structured API layer, making it easier to manage farmer listings, consumer orders, payments, and notifications efficiently.
* **JWT Authentication –** Ensures secure login and authentication for farmers and consumers, preventing unauthorized access to sensitive data.
* **Django-CORS-Headers –** Enables secure cross-origin requests, allowing the Next.js frontend to communicate seamlessly with the Django backend.

**Why This Stack Works for JaivikSetu?**

1. **Scalability –** Next.js (SSG + ISR) and Django (REST API) ensure that the platform can handle thousands of transactions without performance issues.
2. **Ease of Use –** Farmers and consumers require a simple, intuitive UI, which is enabled through shadcn/ui, Framer Motion, and PWA support.
3. **Cost-Effectiveness –** The tech stack minimizes infrastructure costs by optimizing performance and reducing dependencies, ensuring a smooth user experience without expensive hosting solutions.
4. **Security –** With JWT authentication, CORS handling, and Django’s built-in security, user data remains protected from fraud or unauthorized access.
5. **Offline & Mobile Support –** PWA technology enables users to browse and interact with the platform even when they have limited internet connectivity, which is critical for rural farmers.

This stack ensures JaivikSetu is fast, reliable, cost-efficient, and accessible to both farmers and consumers while removing middlemen and increasing profit margins for farmers.

**3. Assumptions & Contraints:**

##### **Assumptions**

These are foundational expectations about the chosen tech stack and its implementation**.**

1. Next.js and Django Can Handle Platform Scalability

a. Assumes that Next.js (SSG, ISR) and Django (REST API) will provide efficient performance as the user base grows.

b. Optimizations like caching, database indexing, and efficient API calls will be needed.

2. Farmers and Consumers Will Use Both Web and Mobile

a. Assumes that users will access the platform on both mobile devices and desktops.

b. PWA support is necessary for offline functionality, particularly for farmers in rural areas.

3. Third-Party Libraries Will Integrate Smoothly

a. Assumes that libraries like shadcn/ui, Framer Motion, React Hook Form, and Zustand will work seamlessly with Next.js.

b.DRF (Django REST Framework) and JWT should integrate without major compatibility issues.

4. Security Measures Will Be Sufficient

a. Assumes that using JWT authentication, CORS handling, and Django’s built-in security features will protect user data.

b. Continuous monitoring for vulnerabilities will be necessary.

5. The Tech Stack Will Remain Cost-Effective

a. Assumes that hosting Next.js and Django on cloud providers (e.g., Vercel, AWS, or DigitalOcean) will be financially sustainable.

b. Optimizations like Next.js ISR and database connection pooling will reduce unnecessary costs.

## **Constraints & Challenges**

These are potential limitations and challenges related to the frameworks and technologies chosen.

1. **SSR and API Load Balancing**

a.Next.js SSR requests can become resource-intensive if not optimized properly.

b. Solution: Use ISR (Incremental Static Regeneration) where possible to reduce server load.

2. **State Management Complexity**

a. Managing global states (cart, authentication, farmer inventory) efficiently across Next.js and Zustand might require careful structuring.

b. Solution: Use a mix of Zustand for local state and API polling/WebSockets for real-time updates.

3. **Handling Large Data & File Uploads**

a. Farmers might need to upload high-resolution images of their products, which could slow down the backend.

b. Solution: Use cloud storage (e.g., AWS S3, Firebase, Cloudinary) and optimize images with Next.js.

4. **Cross-Origin Requests & API Security**

a. Django must allow safe CORS requests from the Next.js frontend without exposing security vulnerabilities.

b. Solution: Implement strict CORS policies and use JWT for authentication to prevent unauthorized API access.

5. **Database Optimization for Large-Scale Queries**

a. As product listings and transactions grow, Django’s database queries could become a bottleneck.

b. Solution: Use PostgreSQL with indexing, caching (Redis), and database sharding if needed.

6. **Offline Functionality & PWA Limitations**

a. While PWAs help with offline access, they can’t sync real-time data updates until the user goes online.

b. Solution: Implement background sync mechanisms to handle pending updates when users reconnect.

7**. Mobile Responsiveness & Performance**

a. Some UI components (shadcn/ui, Framer Motion) could impact mobile performance if overused.

b. Solution: Optimize animations and use lazy loading for non-critical UI elements.

How We Address These Challenges?

* **Optimized API Calls** → Use caching and pagination for heavy queries.
* **Cloud Storage for Media** → Store images & files in an external service.
* **Strict CORS & Security Measures** → Implement JWT, HTTPS, and secure API endpoints.
* **Database Performance Tuning** → PostgreSQL with indexing & caching mechanisms.
* **Mobile-First Approach** → Ensure lightweight UI components and efficient animations.
* By considering these assumptions and constraints, we ensure that the chosen Next.js and Django tech stack is scalable, cost-efficient, and optimized for real-world usage on JaivikSetu.

Feasibility and Implementation

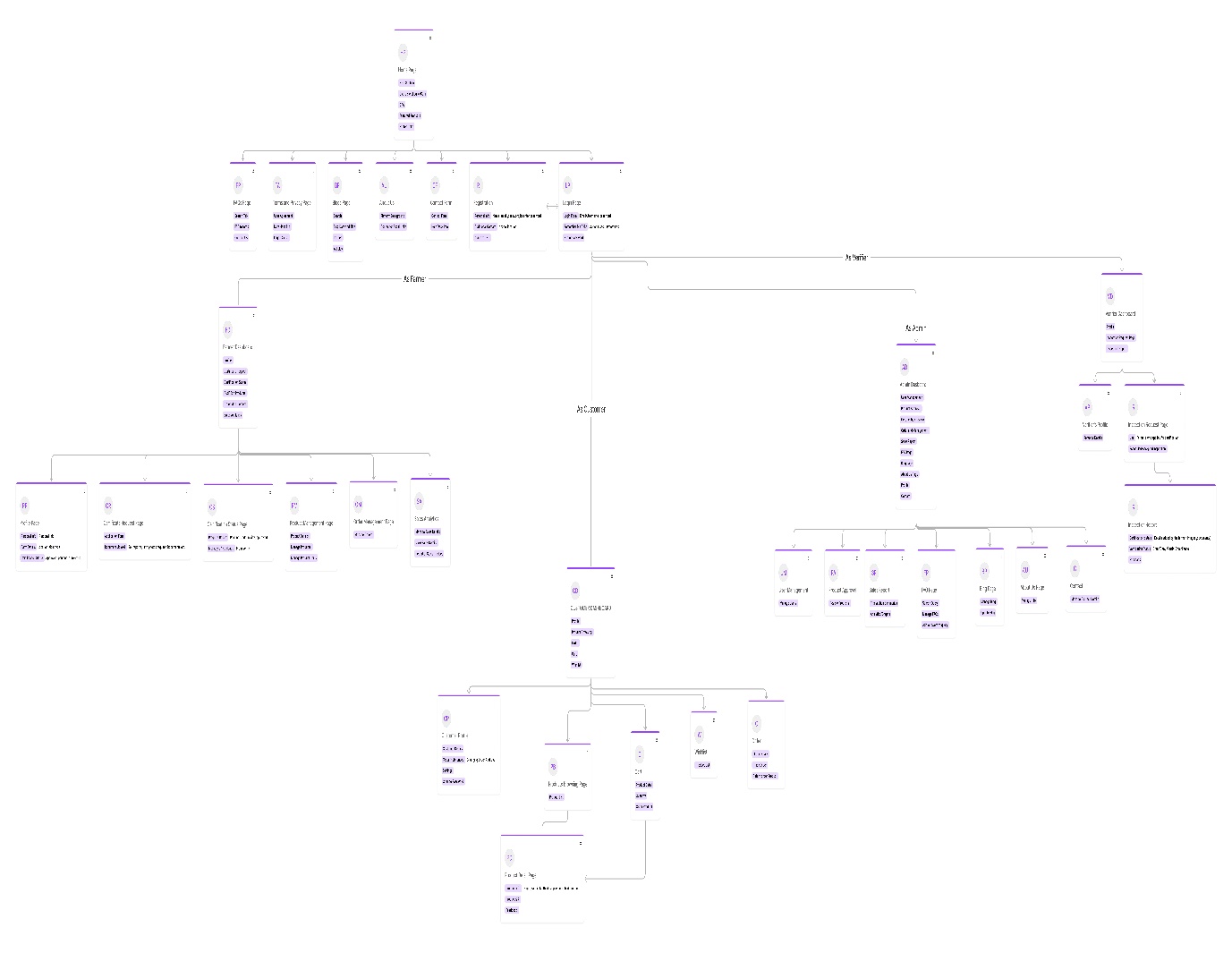
**Effectiveness**

* Effectiveness refers to how well JaivikSetu solves the problems faced by farmers and consumers. It explains how successfully your platform achieves its goals.
* Eliminates Middlemen – Ensures farmers earn more and consumers pay less by enabling direct sales.
* Builds Trust with QR Codes – Consumers can scan and verify farm details, ensuring authentic organic products.
* Expands Market Reach for Farmers – Small farmers can sell nationwide, even reaching city consumers.
* Ensures Fast & Reliable Delivery – Smart allocation to Blinkit (local) or DHL (distant) for seamless logistics.
* Encourages Fair & Seasonal Pricing – Farmers set their own prices based on harvest cycles and demand.
* Accessibility Considerations: Highlight design decisions for broader accessibility.
* Simple & User-Friendly UI – Clean, easy-to-navigate dashboard for farmers and buyers, even with low digital literacy.
* Multi-Language Support – Farmers can access the platform in regional languages for better usability.

UI/UX Mockup

**What is a Sitemap?**

A sitemap visually represents the website’s structure, showing page relationships for easy navigation and organization.



Business Scope and Use Case

* 1. **Use Case Scenarios**

**A. Verified Farmer Gains Market Access**

* **Scenario:** Ramesh, a small-scale natural farmer, struggles to sell his organic produce at a fair price due to lack of trust and market access.
* **Solution:** He registers on the platform, submits proof of natural farming practices, and gets verified through digital certification. His farm receives a QR code-enabled profile showcasing his farming methods, location, and certification details.
* **Impact:** Consumers gain confidence in his produce, leading to increased sales and fair pricing without middlemen.

**B. Consumer Verifies Product Authenticity Before Purchase**

* **Scenario:** Priya, a health-conscious consumer, wants to ensure the organic vegetables she buys are genuinely from natural farming sources.
* **Solution:** At a local store or online marketplace, she scans the QR code on a product’s packaging. The system displays detailed information about the farm, cultivation methods, and certification status.
* **Impact:** Priya trusts the product and makes an informed purchase, supporting ethical and sustainable farming practices.

**2. Market Need**

* Farmers engaged in natural farming often face challenges in accessing fair markets and frequently rely on intermediaries, which diminishes their profits.
* Consumers desiring chemical-free, fresh produce encounter difficulties in verifying the authenticity of products and often pay inflated prices.
* Current marketplaces lack transparency, and small-scale promotional events fail to satisfy the substantial demand.

**Rationale for Our Solution**

* Empowering Farmers: Establish direct connections between farmers and consumers, enabling farmers to retain a larger share of their earnings by removing intermediaries.
* Guaranteed Quality for Consumers: Offer fresh, organic produce with verification of authenticity.
* Cost Efficiency for Buyers: Eliminate unnecessary intermediary expenses, resulting in more favorable pricing for consumers.
* Enhanced Transparency: Implement QR-based traceability to confirm farming practices, origins, and certifications in real-time.
* Sustainable Development: Foster an environment that encourages more farmers to adopt natural farming practices, thereby enhancing the ecosystem.

**Market Potential**

* Increasing demand for organic and chemical-free food products.
* Consumers are prepared to pay a premium for genuine, farm-fresh produce.
* Government backing for natural farming initiatives presents an opportunity for a scalable digital marketplace.

**3. Revenue Model:**

**1. Transaction Fees on Sales (Marketplace Model)**

* Charge a small commission (e.g., 2-5%) on each transaction between farmers and consumers.
* Ensures affordability for farmers while generating consistent revenue.

**2. Subscription Plans for Farmers & Retailers**

* Basic (Free): Farmers get verified and listed on the platform with limited features.
* Premium ($X/month): Offers advanced analytics, marketing tools, and priority listing for better visibility.
* Retailer Plans: Restaurants and grocery stores pay a subscription to access verified farmers and bulk ordering tools.

**3. QR Code & Certification Services**

* Farmers pay a nominal fee for premium QR codes that include detailed farm profiles, traceability insights, and brand visibility.
* Partner with certification bodies to offer official natural farming certifications for a fee.

**4. Data & Insights for Businesses**

* Aggregated consumer trends and demand insights can be sold (anonymously) to eco-friendly brands, organic retailers, and research institutions.
* Farmers can subscribe to personalized analytics for better crop planning and market predictions.

**5. Sponsored Listings & Ads**

* Farmers and organic brands can pay to feature their products or farms in premium search results.
* Sustainable brands can advertise eco-friendly packaging, farm equipment, or organic fertilizers.

This diversified revenue model ensures fair pricing for farmers, affordability for consumers, and sustainable growth for the platform.

System Design and Architecture

**1. System Design and Architecture**

**1. Architectural Style**

* **Microservices-oriented Architecture:** The system is designed in a modular way, where Django handles the backend APIs, while Next.js is responsible for server-side rendering (SSR) and client-side rendering (CSR).
* **API-Driven Development:** Django serves as the API provider with a RESTful or GraphQL approach, consumed by Next.js.
* **Hybrid Rendering Strategy:** Next.js uses Static Site Generation (SSG) for SEO-friendly pages and Server-Side Rendering (SSR) for dynamic user interactions.
* Event-Driven Architecture (for notifications, real-time updates, and traceability logs using WebSockets or Firebase).

**2. Design Patterns Used**

**Backend (Django)**

**1.Model-View-Controller (MVC)**

* Model: Represents database entities (e.g., Farmer, Product, Order).
* View: Handles HTTP requests and business logic.
* Controller: Handles the request and response

**2.Repository Pattern**

* Used for separating database queries from business logic.
* Enables easy switching of databases (e.g., PostgreSQL, MongoDB).

**3.Decorator Pattern**

* Used in Django middleware and authentication (e.g., @login\_required, @permission\_classes).

**4.Observer Pattern**

* Applied in the event-driven notification system (e.g., real-time order updates via WebSockets or Firebase notifications).

**5.Factory Pattern**

* Used for creating dynamic instances of models (e.g., different types of users like Farmers, Consumers, and Admins).

**Frontend (Next.js)**

**1.Component-Based Architecture**

* Uses reusable React components for UI consistency.
* Implements Atomic Design principles (Atoms, Molecules, Organisms).

**2.Container-Presentational Pattern**

* Container Components: Handle data fetching and business logic.
* Presentational Components: Focus on UI rendering.

**3.Singleton Pattern (for Global State Management)**

* Implemented using useContext and useReducer for state management.
* Alternatively, Zustand or Redux can be used for more complex state handling.

**4.Lazy Loading & Code Splitting**

* Optimized using Next.js’s dynamic imports and React Suspense for better performance.

**5.Proxy Pattern**

* Used in API calls to ensure requests are routed through a centralized API layer.
* Example: Fetching data via Next.js API routes (api/products) before sending requests to Django.

**3. Authentication & Security**

* JWT Authentication for API security (Django Rest Framework JWT).
* Role-Based Access Control (RBAC) to manage permissions (e.g., Farmers vs. Consumers vs. Admins).

**4. Deployment & Scalability**

* Frontend Deployment: Vercel or AWS Amplify for optimized Next.js hosting.
* Backend Deployment: AWS EC2, AWS Lambda (for serverless functions), or DigitalOcean.
* CI/CD Pipeline: GitHub Actions or GitLab CI/CD for automated testing and deployment.
* Docker + Kubernetes: For containerized deployment and scalability.

Coding Standards

**Next.js**

**1.Code Reviews:** Ensure PRs follow coding standards and are reviewed before merging.

**2.Testing:**

* Unit tests with Jest and React Testing Library.
* Integration tests for API calls using MSW (Mock Service Worker).

**3.Linting & Formatting:**

* ESLint for enforcing JavaScript/TypeScript best practices.
* Prettier for consistent code formatting.

**4.State Management:**

* Use Zustand for lightweight state management.
* Utilize React Hook Form and Yup for form validation.

**5.Caching & Data Fetching:**

* Use SWR (stale-while-revalidate) for API data fetching and caching.

**6.PWA Support:**

* Implement next-pwa for progressive web app features.

**Django**

**1.Code Reviews:** Ensure adherence to PEP8 standards.

**2.Testing:**

* Unit and integration tests using pytest-django.
* API testing with DRF’s APITestCase.

3.Security:

* Implement JWT authentication for secure API access.
* Use CORS middleware to handle cross-origin requests.

4.Database Best Practices:

* Optimize queries using Django ORM.
* Utilize database indexing for performance improvements.

5.API Documentation:

* Use DRF’s OpenAPI (Swagger) for API documentation.

Market Research

**Understanding the Market Gap**

* Natural farmers face challenges in securing dependable buyers, while consumers often question the authenticity of organic products. The existing market structure relies heavily on intermediaries, resulting in inflated prices for consumers and diminished profits for farmers.
* A transparent business-to-consumer marketplace can address these issues by facilitating direct connections between farmers and consumers, thereby promoting fair pricing, authenticity, and improved accessibility.

**1.Total Addressable Market (TAM)**

* **Global Organic Food Market**: Valued at approximately ₹21.6 lakhcrore in 2024, with a projected Compound Annual Growth Rate (CAGR) of **20.13%** from 2025 to 2033.

[imarcgroup.com](https://www.imarcgroup.com/indian-organic-food-market?utm_source=chatgpt.com)

**2. Serviceable Available Market (SAM)**

* **Target Segment**: Indian Organic Food Market of estimated at ₹15,917 crore in 2024, expected to reach ₹90,437 crore by 2034, growing at a CAGR of 22**%** during 2025-2034.

[expertmarketresearch.com](https://www.expertmarketresearch.com/reports/india-organic-food-market?utm_source=chatgpt.com)

* Market Dynamics:
  + Growing awareness of health benefits associated with organic foods.
  + Government initiatives promoting organic farming practices.
  + Challenges in the current supply chain, including middlemen inflating prices and reducing farmer profits.

[researchgate.net](https://www.researchgate.net/publication/379285062_Investigating_the_Supply_Chain_Dynamics_of_the_Organic_Food_Retail_Market_in_India_-with_Case_Studies?utm_source=chatgpt.com)

**3. Serviceable Obtainable Market (SOM)**

Initial Market Capture: Aiming to secure 2% of the Indian organic food market within the first three years, translating to approximately ₹1,808 crore in revenue.

* Strategic Focus:
  + Implementing a digital marketplace that directly connects verified natural farmers with consumers, eliminating intermediaries.
  + Utilizing QR code-based traceability to ensure product authenticity and build consumer trust.
  + Leveraging government programs supporting organic farming to onboard more farmers.

**Market Challenges and Opportunities**

* **Challenges:**
  + Prevalence of counterfeit organic products leading to consumer distrust.
  + Farmers' dependence on middlemen, resulting in reduced earnings.
  + Lack of a unified platform for direct farmer-to-consumer transactions.
* Opportunities:
  + Rising consumer demand for transparent and authentic organic products.
  + Government policies favouring organic farming practices.
  + Potential to enhance farmer incomes by providing direct market access.