



E-Commerce Platform for Tribal People Products

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<https://doi.org/10.55041/ijst.v2i4.325>

Cite this Article: K.Jegan, , ALI, D., A.AKASH, & J.MILAN, (2026). E-Commerce Platform for Tribal People Products. International Journal of Science, Strategic Management and Technology, 02(04). <https://doi.org/10.55041/ijst.v2i4.325>

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Abstract—The rapid advancement of Information and Communication Technology (ICT) has created unprecedented opportunities for rural and indigenous communities to participate in digital commerce. Tribal communities in India produce a diverse range of high-quality handmade and organic products including jewelry, herbal medicines, handicrafts, traditional clothing, and forest produce. However, these communities remain economically marginalized due to the absence of direct market access, dependence on exploitative intermediaries, low digital literacy, and limited connectivity infrastructure. This paper presents the design and development of a dedicated e-commerce platform specifically tailored for tribal artisans and sellers. The proposed system provides an accessible, secure, and inclusive digital marketplace where tribal sellers can register, upload products, manage orders, and receive direct payments, while customers can browse authentic tribal products with full traceability. Built using Django as the backend framework, MySQL as

the database engine, and HTML/CSS/JavaScript for the frontend, the platform incorporates modules for user management, seller onboarding, product management, cart and order processing, digital payment integration, and administrative oversight. The system aims to eliminate middlemen, increase tribal household incomes, and preserve indigenous craftsmanship by connecting artisans directly to a nationwide consumer base. Experimental results demonstrate the practical feasibility and functional completeness of the proposed platform.

Keywords—e-commerce, tribal communities, digital marketplace, Django, rural development, indigenous products, online platform, ICT for development

I. INTRODUCTION

India is home to more than 700 distinct tribal communities, accounting for approximately 8.6% of the national population. These communities inhabit remote forests, hills, and interior regions and are custodians of rich artisanal traditions. Tribal artisans



produce handmade jewellery using locally sourced metals and stones, woven

textiles with indigenous motifs, herbal oils and medicinal preparations, organic fruits and forest produce,

and decorative handicrafts that reflect centuries of cultural heritage.

Despite the intrinsic quality and cultural significance of these products, tribal communities earn disproportionately low returns. The conventional supply chain involves multiple layers of middlemen who purchase goods at exploitative prices and sell them in urban markets at substantial markups. Tribal artisans lack the digital infrastructure, technical knowledge, and market access required to engage directly with end consumers. The proliferation of general-purpose e-commerce platforms such as Amazon, Flipkart, and Meesho has not resolved this problem, as these platforms impose high commission fees, require a degree of digital literacy that many tribal sellers do not possess, and provide no mechanism for authenticating or promoting indigenous products.

Information and Communication Technology (ICT) has been identified as a powerful enabler of rural economic development. Wu et al. [1] demonstrated through an in-depth case study of Taobao Villages in China that ICT affords rural communities the ability to reconstruct social networks, enhance the visibility of entrepreneurial activities, and integrate diverse social capital into cohesive e-commerce ecosystems. The formation and growth of Taobao Villages—rural communities where a significant proportion of households engage in online commerce—illustrates how dedicated digital platforms can transform the economic trajectory of marginalized communities. This theoretical perspective, grounded in the concept of ICT affordances, motivates the design philosophy of the proposed platform.

This paper presents the architecture, design, and implementation of an e-commerce platform dedicated to tribal products. The primary objectives are to provide tribal sellers with a low-barrier entry point into digital commerce, to ensure that product authenticity and cultural origin are preserved and communicated to buyers, to eliminate intermediaries and thereby increase seller income, and to offer customers a trustworthy channel for purchasing genuine tribal and organic products.

The remainder of this paper is organized as follows. Section II reviews related literature on e-commerce adoption in rural and indigenous contexts. Section III describes the proposed system architecture and design. Section IV elaborates on the system modules and implementation. Section V presents the hardware and software requirements. Section VI discusses results and the implemented features. Section VII concludes the paper and outlines future directions.

II. LITERATURE REVIEW

A. ICT-Enabled Rural Commerce

Wu et al. [1] conducted a revelatory case study of three Taobao Villages in Zhejiang Province, China, to examine how ICT empowers rural e-commerce formation and development. Using the theoretical lens of affordance, they identified six categories of critical actors and eight ICT affordances, including connection, visibility, persistence, recombability, experimentation, collaboration, interactivity, and openness. The study found that ICT enables rural communities to reconstruct social networks, spread entrepreneurial knowledge, and integrate diverse social capital into sustainable e-commerce ecosystems. Their findings affirm that community-driven digital development, when supported by appropriate ICT infrastructure, can substantially improve rural household incomes and reduce poverty.

B. E-Commerce Adoption in Developing Economies

Ahmad et al. [2] examined the determinants of e-commerce adoption among small and medium enterprises (SMEs) in Malaysia, a developing economy with demographic parallels to rural India. Their empirical study identified relative advantage, compatibility, and government support as the primary drivers of adoption, while complexity and lack of trust were identified as significant barriers. The study underscores the importance of platform design that minimizes complexity and builds user trust through transparent processes, findings that directly inform the design of the proposed tribal e-commerce platform.

C. Digital Marketplaces for Handicraft and Artisan Products

Grandón et al. [3] compared multiple theories to explain e-commerce adoption, including the Theory of Reasoned Action, the Technology Acceptance Model, and the Diffusion of Innovation framework.

Their analysis revealed that subjective norms and perceived behavioral control are particularly influential for first-time adopters, suggesting that peer influence and community support structures are critical for onboarding tribal sellers with limited prior digital experience. The platform design incorporates a seller onboarding module that provides guided registration and product upload workflows to reduce adoption friction.

D. Mobile Commerce and Rural Connectivity

Chatterjee et al. [4] investigated how mobile ICTs enable organizational fluidity and identified that the affordances of mobility, connectedness, interoperability, and identifiability collectively enhance the adaptive capacity of organizations. In the context of tribal communities, where fixed broadband penetration remains low, mobile accessibility is a critical design requirement. The proposed platform is developed with a responsive frontend to ensure usability on low-bandwidth mobile connections, aligning with the mobility affordance identified by Chatterjee et al.

E. Trust and Authentication in Online Marketplaces

Leong et al. [5] examined the role of social media and ICT in empowering marginalized communities through digital activism and social movements. They found that visibility and persistence affordances of ICT allow actors in remote areas to accrue social capital and amplify their voice in broader economic and social networks. For tribal artisans, product authenticity and seller credibility are central trust dimensions. The proposed platform incorporates an admin-mediated seller approval process and product verification workflow to establish and maintain marketplace trust.

III. PROPOSED SYSTEM

A. System Overview

The proposed e-commerce platform is a web-based marketplace exclusively designed for tribal artisans and sellers. The platform is accessible to three primary user roles: customers who browse and purchase products, sellers who manage their product listings and orders, and administrators who oversee platform operations, approve sellers, and generate reports. The system is built on a three-tier architecture comprising a presentation layer implemented in HTML, CSS, and JavaScript; an application logic

layer built using the Django web framework; and a data persistence layer using a MySQL relational database.

B. Architectural Design

The system adopts the Model-View-Template (MVT) architectural pattern inherent to Django. Models define the data schema for entities including users, sellers, products, orders, cart items, payments, and feedback records. Views implement the business logic for each functional module, handling HTTP requests, processing data, and returning responses. Templates render the user interface dynamically, incorporating Bootstrap for responsive layout and custom CSS for aesthetic consistency.

The database schema is normalized to third normal form (3NF) to minimize redundancy and ensure data integrity. Key entities include User (customer and seller accounts), Product (product metadata, images, pricing, and inventory), Order and OrderItem (order header and line items), Payment (transaction records and gateway responses), and Feedback (customer reviews and ratings). Foreign key relationships enforce referential integrity across these entities.

C. System Objectives

- Provide an accessible online marketplace for tribal communities without requiring advanced technical expertise.
- Promote authentic organic, handmade, and indigenous products to a nationwide customer base.
- Eliminate exploitative intermediaries and ensure that a larger share of revenue reaches tribal artisans directly.
- Integrate secure digital payment mechanisms and real-time order tracking capabilities.
- Support both web browser and mobile device access through a responsive user interface.
- Enable transparent seller onboarding through an administrative approval workflow.

IV. EXISTING SYSTEMS AND LIMITATIONS

General-purpose e-commerce platforms such as Amazon, Flipkart, and Meesho have achieved significant scale in the Indian market. However, these platforms present several fundamental limitations for tribal sellers. First, commission and fee structures on these platforms typically range from 5% to 20% of the transaction value, substantially eroding the income of small-scale artisans who already operate on thin margins. Second, the onboarding process on

established platforms requires GST registration, bank account documentation, and compliance with stringent product listing standards, creating administrative barriers that many tribal sellers are unable to meet independently. Third, these platforms offer no mechanism for authenticating the tribal or indigenous origin of products, making it impossible for buyers to distinguish genuine tribal crafts from mass-produced imitations. Fourth, the platforms are designed for sellers with moderate to high digital literacy, and the complexity of seller dashboards, logistics integrations, and customer communication tools is prohibitive for first-time users in remote areas.

In contrast, the proposed platform is purpose-built for tribal communities. Seller onboarding is simplified through guided registration workflows available in accessible language. Commission structures are minimized to ensure maximum income retention by sellers. Product categories are organized around indigenous product types, and the platform explicitly communicates the tribal origin and craftsmanship behind each product to buyers. Administrative support is available for sellers who require assistance with product photography, description writing, and order fulfillment.

V. SYSTEM MODULES

A. User Module

The user module manages customer registration, authentication, and profile management. Customers can create accounts using email and password credentials, with password hashing implemented using Django's built-in PBKDF2 algorithm for security. Upon successful login, customers can browse the product catalog, apply search and filter criteria, add products to their cart or wishlist, and proceed to checkout. The module also provides order history and delivery tracking interfaces.

B. Seller Module

The seller module enables tribal artisans to register as sellers on the platform. Registration requires basic personal information, bank account details for payment disbursement, and optional documentation verifying tribal community membership. Upon administrative approval, sellers gain access to a dedicated dashboard where they can upload products with images, descriptions, pricing, and inventory quantities. Sellers can view incoming orders, update fulfillment status, and monitor their sales performance through summary reports.

C. Admin Module

The admin module provides platform administrators with comprehensive oversight capabilities. Administrators can review and approve or reject seller registration applications, manage product listings, resolve customer disputes, and generate operational reports. The admin control panel includes user management interfaces for suspending accounts in cases of policy violations, and dashboard analytics displaying sales trends, active sellers, and platform revenue.

D. Product Management Module

Products are organized into categories including Jewelry and Accessories, Herbal Medicines and Oils, Handicrafts and Decoratives, Traditional Clothing and Textiles, Organic Fruits and Forest Produce, and Other Tribal Products. Each product listing includes a title, detailed description, price, available stock quantity, product images, and seller information. The search functionality implements SQL query filtering across product titles, descriptions, and categories to enable customers to locate relevant products efficiently.

E. Cart and Order Processing Module

The cart module allows customers to add multiple products to a session-persistent shopping cart, modify quantities, and remove items. The checkout process collects delivery address information and initiates payment processing. Upon successful payment, an order record is created, and confirmation notifications are dispatched to both the customer and the relevant seller. Order status updates progress through states including Pending, Processing, Shipped, and Delivered, with the customer able to monitor progress in real time.

F. Payment Module

The payment module integrates a third-party payment gateway API to support digital transactions including UPI, debit card, credit card, and net banking methods. Payment records are stored in the database with transaction identifiers, amounts, timestamps, and status indicators. In the event of payment failure, the system gracefully handles rollback of the order record and notifies the customer. This module is critical for ensuring that tribal sellers receive direct, traceable payments without cash handling or intermediary bank accounts.

VI. IMPLEMENTATION

A. Technologies Used

The frontend layer is implemented using HTML5, CSS3, and JavaScript, with Bootstrap 5 providing responsive grid layout and pre-styled UI components. Custom CSS overrides ensure visual consistency with the platform's brand identity. Django 4.x serves as the backend web framework, providing the MVT architecture, ORM-based database access, built-in authentication, session management, and URL routing. MySQL 8.x is the relational database, hosted locally during development and deployable on cloud infrastructure for production.

B. Implemented Features

- Homepage with featured tribal product categories and promotional banners.
- Product listing and detail pages with image galleries and seller information.
- Customer login, registration, and profile management.
- Shopping cart with persistent session storage and quantity management.
- Wishlist functionality for saving products for future purchase.
- Seller hub with product upload, inventory management, and order tracking dashboard.
- Admin control panel for seller approval, user management, and reporting.
- Search functionality with keyword and category filtering.
- Customer feedback and product review submission.
- Digital payment integration with multiple payment method support.
- Login validation with secure password hashing.

C. Search and Authentication Algorithms

Product search is implemented using SQL LIKE queries on product title and description fields, with results ranked by relevance score computed from keyword match frequency. Future iterations will incorporate inverted index-based search for improved scalability. Authentication employs Django's built-in authentication framework, which applies PBKDF2 with SHA-256 hashing to stored passwords. Session tokens are generated using cryptographically secure random number generation and stored server-side to prevent client-side session tampering.

VII. RESULTS AND DISCUSSION

The platform has been successfully developed and tested across all six functional modules. The homepage renders correctly across desktop and mobile viewports, providing an intuitive entry point to the product catalog. Product listing pages display items with appropriate categorization, and the search function returns accurate results for keyword queries within acceptable response times on local infrastructure.

The seller onboarding workflow was validated through test accounts representing tribal artisans with varying levels of digital literacy. The guided registration process and simplified product upload interface were found to be accessible to users who had not previously used e-commerce platforms. The admin approval workflow successfully enforced quality control over seller registrations, preventing unauthorized or non-tribal sellers from listing products.

Payment processing was tested using sandbox environments provided by the payment gateway API, with all standard payment methods—UPI, debit card, credit card, and net banking—executing successfully. Order creation, status update propagation, and delivery confirmation were verified end-to-end. Customer feedback submission and display on product pages were confirmed to function correctly.

The implemented platform demonstrates that a dedicated e-commerce solution for tribal communities is technically feasible within standard web development constraints. By addressing the specific pain points of tribal sellers—high commissions, complexity, lack of cultural recognition, and trust barriers—the platform offers a meaningful improvement over existing general-purpose alternatives.

VII. CONCLUSION AND FUTURE WORK

This paper has presented the design and implementation of a dedicated e-commerce platform for tribal artisans and their products. The platform provides a structured digital marketplace that enables tribal sellers to register, list products, manage orders, and receive payments directly from customers, thereby eliminating exploitative middlemen and increasing household income. The system is built on industry-standard technologies including Django, MySQL, and Bootstrap, and incorporates all essential



e-commerce modules: user management, seller onboarding, product management, cart and order processing, digital payments, and administrative oversight.

The theoretical grounding of this work in the ICT affordance framework established by Wu et al. [1] provides a principled basis for understanding how digital platforms can empower marginalized rural communities. The empirical success of community-driven e-commerce models such as Taobao Villages in China demonstrates that analogous outcomes are achievable for tribal communities in India when ICT infrastructure and platform design are appropriately tailored to community needs.

Future work will extend the platform in several directions. First, multilingual support will be integrated to enable product descriptions and seller interfaces in regional tribal languages, further reducing language-based barriers to participation. Second, a mobile Android application will be developed to improve accessibility for sellers using smartphones on low-bandwidth mobile connections. Third, AI-based product recommendation will be incorporated to improve the customer discovery experience and increase conversion rates. Fourth, a seller analytics module will be developed to provide artisans with insights into product performance, customer demographics, and seasonal demand patterns. Fifth, integration with government digital identity frameworks such as Aadhaar-based verification will strengthen seller authentication and further build buyer trust in the authenticity of tribal products.

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