

Design and Implementation of a Custom E-Commerce Platform for Sustainable Coir Goods

VAISHNAVI SHIVPRASAD GHARE¹, SAMIDHA RAJENDRA SHINDE², ANUDNYA SUYOG SAWANT³

^{1, 2}Dept. of Computer Engineering S.S.P. M's College of Engineering, Kankavli Sindhudurg, India

³As.Professor at CSE Department S.S.P. M's College of Engineering, Kankavli Sindhudurg, India

Abstract—The evolution of digital commerce has revolutionized the traditional marketplace, enabling small and medium enterprises to reach a broader customer base. This paper presents "Pramila Coirs," an e-commerce platform developed to support the traditional coir industry by integrating modern web technologies and user-centric features. The platform offers functionalities such as a secure shopping cart, online order tracking, user reviews, product recommendations, admin analytics, and real-time chat support. Technologies like Razorpay, MongoDB, and Google Analytics are employed for payments, data management, and customer insights. The proposed system ensures mobile responsiveness, security, and scalability. The paper highlights the development process, system architecture, and the impact of such platforms on rural artisans and small-scale industries.

Index Terms—E-commerce, Coir Industry, Online Market- place, Razorpay, MongoDB, Chatbot, Admin Dashboard, Analytics, UPI Payment, SEO Optimization

I. INTRODUCTION

The global growth of e-commerce has opened up immense opportunities for traditional industries, including India's coir sector. Coir, a natural fiber extracted from coconut husk, is used to manufacture a wide variety of eco-friendly products such as doormats, floor mats, mattresses, brushes, ropes, geotextiles, planters, coir pith blocks, carpets, and handicrafts. These products are not only biodegradable but also highly durable and in demand globally for their sustainability.

Despite their growing appeal, many coir producers struggle to access digital markets due to a lack of technical infrastructure and expertise. Coir artisans and small-scale industries often rely on middlemen or local markets, which limits their reach and profitability. Pramila Coirs aims to empower such vendors by providing a tailored online platform built with the latest technologies and user-centric design. The platform allows sellers to present their products attractively, manage inventory and orders

efficiently, and connect directly with customers across India and abroad.

By integrating advanced features, Pramila Coirs not only facilitates product visibility and sales but also ensures smooth order management and customer support, ultimately contributing to the digital transformation of the coir industry.

II. PROBLEM STATEMENT

The traditional coir industry, though rich in heritage and environmental value, struggles to thrive in the modern digital marketplace. Coir-based products such as floor mats, door- mats, ropes, brushes, mats, wall hangings, planters, mattresses, and geotextiles are primarily manufactured by rural artisans and small-scale producers. Despite the quality and sustainability of these products, they face significant barriers in reaching urban and global customers due to the lack of digital presence and technology adoption.

Most coir manufacturers rely on physical storefronts, word- of-mouth marketing, or local exhibitions to promote their products. This limits their market reach, growth potential, and ability to compete with larger brands in the eco-product segment. Additionally, order management is often manual, making it difficult to handle multiple customers, track inventory, or process secure payments efficiently.

Another pressing issue is the absence of interactive features on basic websites, such as customer reviews, real-time chat support, order tracking, or analytics—features that modern consumers expect from any professional e-commerce platform. As a result, potential buyers may perceive these businesses as untrustworthy or outdated, further widening the digital divide. Thus, there is a strong need for a dedicated, user-friendly, and feature-rich e-

commerce platform tailored to the unique requirements of the coir industry. Such a platform should empower artisans and sellers to showcase their products effectively, manage transactions securely, and build trust with their customers through modern digital tools—all while being accessible to non-technical users and scalable for future growth

III. OBJECTIVES

The primary objective of this project is to design and develop a comprehensive, secure, and scalable e-commerce platform specifically tailored for the coir industry, enabling small and medium-scale artisans to reach a wider market and digitally transform their businesses. The specific goals of the system are as follows:

1. To Digitally Showcase Coir-Based Products
Provide an online storefront to display a wide range of coir products such as mats, ropes, brushes, geotextiles, planters, handicrafts, and more with high-quality images, product details, and category-wise navigation. [9]
2. To Implement a Seamless Shopping Experience
Enable features such as a shopping cart, wishlist, and secure checkout using multiple payment methods (UPI, credit/debit cards, net banking) through a gateway like Razorpay. [8]
3. To Facilitate User Engagement and Trust-Building
Incorporate product reviews, ratings, and real-time chat support (via chatbot and WhatsApp integration) to enhance customer satisfaction and provide instant query resolution.
4. To Provide Real-Time Order Tracking
Allow customers to track their orders post-purchase using a unique order ID, thereby increasing transparency and user confidence.
5. To Enable an Admin Dashboard for Business Owners
Build an intuitive dashboard for sellers to manage inventory, view orders, update product listings, track performance metrics, and access analytics.
6. To Optimize for Mobile and SEO
Ensure that the platform is mobile-responsive and search-engine optimized using meta tags, structured data, and Google Analytics to attract organic traffic.
7. To Secure Transactions and Data
Implement SSL encryption, proper authentication (login/signup), and form validation to protect sensitive user and transaction data.
8. To Promote Sustainable Local Industry through

Technology Empower coir artisans and entrepreneurs to adopt digital platforms without needing deep technical knowledge, contributing to economic upliftment and sustainability.

IV. PROPOSED SYSTEM

The proposed system, Pramila Coirs, is a web-based e-commerce platform specifically designed to support the coir industry by providing an end-to-end digital commerce solution. The system offers both customer-facing and admin-facing interfaces and integrates essential modern features to streamline operations, enhance user experience, and expand market reach.

A. System Overview

The platform is structured into three primary layers:

1. Presentation Layer (Frontend):
 - Built using HTML, CSS, and JavaScript (with optional React.js or Vue.js for dynamic components).
 - Fully responsive UI to support mobile, tablet, and desktop users.
 - Includes product listing pages, search filters, product galleries, cart, wishlist, order tracking, and review submission.
2. Application Layer (Backend):
 - Developed using Node.js and Express.js.
 - Handles API endpoints for user authentication, order processing, review storage, payment handling, and admin operations.
 - Manages user sessions, chatbot responses, and communication with third-party services like Razorpay and Google Analytics.
3. Data Layer (Database):
 - Uses MongoDB for storing user information, product details, reviews, orders, and admin data.
 - Implements data relationships through Mongoose models.

B. Key Functional Components

1. Product Management System
Admins can add, edit, or delete coir products (e.g., doormats, ropes, planters). Each product includes images, descriptions, price, tags, stock, and SEO metadata.
2. User Account System
 - Secure login/signup using email and password.

- JWT-based session authentication.
- Users can view past orders, track status, and manage wishlists.

3. Shopping Cart and Checkout

- Cart functionality for adding/removing items.
- Integrated Razorpay payment gateway supporting UPI, net banking, and cards.
- Cash on Delivery (COD) option also available.

4. Order Tracking Module

- Users enter an Order ID to view live status.
- Backend updates status (Order Received → Packed → Shipped → Delivered).

5. Review and Rating System

- Authenticated users can rate products and write reviews.
- Reviews stored in MongoDB and displayed on the product page. [3]

6. Chatbot

- Tidio chatbot embedded for FAQs and support. [11]

7. Newsletter Pop-ups

- Users can subscribe for updates and offers.
- Time-based or scroll-based popups to capture leads.

8. Admin Dashboard with Analytics

- Secure admin panel for managing products, users, and orders.
- Sales statistics and user behavior visualized using Chart.js and Google Analytics.

9. SEO and Mobile Optimization

- Meta tags, product schema, and sitemap included.
- Designed mobile-first to support accessibility and fast load times.

10. Security Features

- HTTPS via SSL certificate.
- Input validation and data sanitization.
- Protected admin routes with role-based access control.

C. Third-Party Integrations

Feature Tool/Service Used Payments Razorpay, Chatbot Tidio, Analytics Google Analytics + Chart.js Database Mon- goDB Atlas SEO Google Search Console [7]

D. Deployment Plan

- Hosting on platforms like Render, Vercel, or Firebase.
- MongoDB Atlas for cloud database storage.
- Domain secured with SSL certificate for secure browsing.

V. RESULTS

The Pramila Coirs platform was successfully implemented and tested across various parameters to ensure functional correctness, usability, performance, and integration of modern e-commerce features. The platform met all the design and user experience objectives initially proposed.

A. Functional Results

All major features of the platform were developed and validated. User registration and login worked securely with JWT-based authentication, allowing users to manage their accounts and orders effectively. The product listing and filtering system allowed users to search and browse items like coir mats, ropes, and planters with ease. Shopping cart and checkout functionalities were integrated using Razorpay, supporting both online payments and Cash on Delivery.

Users were able to add products to their wishlist, submit product reviews and ratings, and track their order status using a unique order ID. The admin panel successfully supported functions like product management, order tracking updates, user management, and inventory monitoring.

Integration with Tidio chatbot enabled real-time support, while WhatsApp chat allowed direct seller-buyer communication. Google Analytics was effectively integrated to provide visitor and session insights. Mobile responsiveness and security through HTTPS were ensured across all pages.

B. Usability Testing

The platform underwent usability testing with a small group of diverse participants including students, small business owners, and artisans. Testers performed real-time activities such as browsing products, filtering items, placing test orders, and submitting reviews. Most users found the platform highly navigable and appreciated its mobile-friendly layout, professional appearance, and ease of checkout. The ability to track orders and view

product reviews significantly increased trust among users.

The chatbot integration were particularly appreciated for offering instant communication with the business, which is not often found in small-scale e-commerce sites.

C. Performance Evaluation

Performance was assessed by measuring page load speeds, server response times, and database query efficiency. The platform loaded quickly on both mobile and desktop, with page load times averaging under 2 seconds on a 4G network. The system was able to handle more than 50 concurrent users in a test simulation without any crashes or slowdowns. API response times for product listings and order status updates remained consistently under 200 milliseconds.

D. Analytics and Insight

After connecting the site to Google Analytics during the testing phase, real-time traffic and session data were monitored. The majority of users accessed the platform via mobile devices, indicating the importance of mobile responsiveness. The bounce rate was low, and the average session duration exceeded 2 minutes, suggesting a high level of user engagement. Coir mats and decorative planters emerged as the most viewed products during the testing period. [4]

E. Visual Output and Admin Features

The admin dashboard visually presented data such as total sales, product stock, and daily visitors using dynamic charts and graphs. The dashboard was intuitive and allowed easy access to product and order data. The chatbot and review modules functioned as expected, improving the customer interaction experience.

In conclusion, the platform achieved robust functionality, user satisfaction, and performance efficiency. It offers a scalable solution for bringing the traditional coir industry into the digital marketplace effectively.

VI. CONCLUSION

The Pramila Coirs e-commerce platform stands as a transformative step toward empowering rural artisans and modernizing the traditional coir industry.

By blending thoughtful design with robust technology, this platform bridges the digital divide and brings handcrafted, sustainable products to the fingertips of global consumers.

Through the successful integration of secure transactions, order tracking, product reviews, admin analytics, and real-time customer interaction, the system not only enhances user experience but also builds trust and transparency—core pillars for small business growth in the digital age.

Unlike generic marketplaces, this custom-built platform addresses the unique needs of the coir sector, offering a scalable, cost-effective solution for artisans to manage and grow their businesses online.

In essence, Pramila Coirs is not just a website—it is a digital livelihood tool, preserving heritage while embracing innovation. It serves as a replicable model for other traditional industries striving to thrive in the era of e-commerce and sustainable development.

VII. FUTURE SCOPE

The development of the Pramila Coirs platform marks the beginning of a digital journey for the traditional coir industry, but its true potential lies in future enhancements that can further elevate its reach, accessibility, and impact.

A. Mobile Application Development

Creating native or cross-platform mobile apps will make the platform more accessible to a broader user base, especially in rural areas where smartphones are more common than desktops.

B. Multilingual and Voice Interface Support

Adding support for regional Indian languages and voice commands can make the platform more inclusive for local artisans and customers with limited digital literacy.

C. Artificial Intelligence for Smart Recommendations

AI-driven product recommendations based on user behavior and purchase history can personalize the shopping experience and boost conversion rates.

D. Augmented Reality (AR) Integration

AR features will allow customers to preview products like mats or planters in their real environment before

buying, enhancing confidence and satisfaction.

E. Inventory Automation and Supplier Integration
Future updates could include automatic stock management, supplier-side dashboards, and real-time alerts for low inventory, streamlining backend operations.

F. Loyalty Programs and Referral Systems
Implementing features like customer reward points, referrals, and discounts can improve retention and encourage organic growth through word of mouth.

G. Government Scheme Integration
Collaborating with MSME portals, Coir Board initiatives, and subsidies can help rural sellers receive official support and onboard more artisans.

H. Eco-Impact Dashboard
Introducing a sustainability tracker showing the eco-benefits of each purchase (e.g., biodegradable, handcrafted, plastic-free) can appeal to conscious consumers and reinforce the platform's green identity.

I. Global Marketplace Expansion
With multilingual, currency, and shipping enhancements, the platform can be scaled to sell globally, promoting Indian coir goods in international markets.

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