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Co-Operative System for End-to-End Artisan Workers Product Management

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ABSTRACT: This study explores the development of a MERN (MongoDB, Express.js, React, Node.js) stack-based e-commerce platform designed to empower artisans in showcasing and selling their handmade products. Focusing on categories such as artisan supplies, customized items, eco-friendly products, home décor, and wellness products, the platform addresses the unique needs of both artisans and consumers. By analysing existing literature and platforms, the study identifies critical features and challenges specific to artisan-focused e-commerce solutions. The proposed platform emphasizes a user-centric design, offering comprehensive product browsing, secure transaction handling, and efficient user account management. Detailed methodologies, including system architecture and feature implementation strategies, are presented. The anticipated outcomes suggest that such a platform can expand market access for artisans while providing consumers with a diverse and sustainable range of unique products.

KEYWORDS: Artisan Supplies, Customized Items, Eco-friendly Products, Home Décor, Wellness Products.

I. INTRODUCTION

The global handicraft market is a vital component of cultural heritage and economic development, especially in regions rich in artisanal traditions. However, artisans often face challenges in reaching broader markets due to limited access to digital platforms and resources. E-commerce offers a viable solution to bridge this gap, enabling artisans to connect directly with consumers worldwide. This paper proposes the development of an e-commerce platform using the MERN stack, designed specifically to meet the needs of artisans and consumers seeking unique, handmade products. The platform focuses on user-friendly interfaces, secure transactions, and efficient management of user accounts and product

This platform prioritizes usability, scalability, and security while introducing innovative features to enhance user engagement and create a unique shopping experience. By integrating cutting-edge technologies and emphasizing artisan empowerment, the platform aspires to redefine e-commerce in the art and craft domain. This initiative recognizes the importance of preserving cultural heritage, fostering economic sustainability, and celebrating the craftsmanship of these talented individuals.[2] Through the utilization of e commerce technology, artisans can now expand their mark reach, increase their income, and continue to produce high quality, culturally significant products. By reducing the need for manual record-keeping and streamlining processes, online ecommerce applications enable local artisans or jewelers to focus on other activities, thereby enhancing resource utilization and empowering them in their business endeavors.

Our aim is more comprehensive, in that it encourages networking of artisans, creating communities of artisans who can use a virtual space to share knowledge and products information online, eliminating the need for middlemen and intermediaries in the production/selling chain. The platform will allow artisans to open an online shop and to sell directly their artefacts to the customers without the presence of the middlemen, getting direct payments, thus earning the entire profit from their hard handmade work.

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II. LITERATURE SURVEY

The literature survey focuses on existing e-commerce solutions for artisans, highlighting their features, challenges, and contributions. Several platforms and technologies have been explored that support local and handmade businesses, and this review helps in shaping the development of the proposed platform. Lokart is a mobile-based platform that aims to connect local artisans with customers through a mobile app. The application is developed using Flutter SDK, enabling cross-platform compatibility for Android and iOS. The key feature of the platform is the real-time database, powered by Google Firebase, which enables artisans to showcase their products and manage orders without the need for intermediaries. Direct-to-Customer Sales: Lokart removes the need for intermediaries by allowing artisans to sell directly to consumers. Real-Time Database: Efficiently manages inventory and orders in real time.

Limited Scope: Lokart is primarily mobile-based and does not cater to desktop users or global audiences. Challenges: Limited to the local market lacks global payment gateway integration and complex product features like customization. Relevance to the Proposed Platform. The real-time database functionality can be applied to the proposed platform to enhance inventory and order management. Features such as eliminating intermediaries and allowing direct communication between artisans and customers align well with the objectives of the proposed platform. A key improvement would be expanding Lokart's mobile-first model to include both mobile and desktop users, which is a crucial need for the global artisan market.

E-Commerce for Artisans Using Communication and Growth Technology. This platform provides artisans with a web-based solution to showcase and sell handmade products. It is built using the MERN stack, ensuring scalability, security, and ease of use. The platform allows artisans to create personalized online storefronts, manage product inventory, and process orders securely through integrated payment systems.

Secure Payment Gateway: The platform integrates reliable payment systems for secure transactions. Sustainability: Emphasizes ethical production and fair trade by offering eco-friendly and sustainably sourced products.

Challenges: Limited product discovery features, lack of advanced recommendation systems, and minimal focus on customer engagement beyond basic product listings. Relevance to the Proposed Platform: The personalized storefronts concept is highly relevant and could be expanded to allow artisans to showcase their stories and craftsmanship in more detail, fostering better connections with customers. Implementing a sustainability badge system, as suggested by this platform, could be a distinguishing feature of the proposed platform to attract eco-conscious customers. More advanced product discovery features like AR and AI-based recommendations can be introduced to enhance user engagement-commerce for Artisans. EPICRAFT is a platform that focuses on promoting handicrafts from Indian artisans, providing a digital space for them to sell their products globally. The platform uses a standard e-commerce model where artisans create accounts, list their products, and engage with customers through messaging features. It also integrates logistics and payment gateways to simplify transactions. Cultural Preservation: EPICRAFT helps preserve local craftsmanship by making it accessible to global markets.

Buyer-Seller Communication: Features like messaging enable direct communication between buyers and artisans, facilitating negotiation and customization. Global Reach: While primarily focused on Indian artisans, the platform has made efforts to integrate international shipping options and promote exports.

Challenges: Limited product marketing and customer engagement tools; lacks an immersive shopping experience such as AR or 3D product views. Relevance to the Proposed Platform: Direct Communication: The proposed platform could integrate similar messaging features, allowing artisans to customize orders and interact directly with buyers. Global Reach: The importance of integrating international shipping and payment gateways in the proposed platform cannot be overstated. Enhanced Marketing: The introduction of advanced product marketing tools like AR and personalized recommendations would help set the platform apart. Blockchain technology has gained attention for ensuring product authenticity, especially in markets with high-value handmade products. This paper discusses using blockchain and smart contracts to verify the authenticity and traceability of artisan products. Contributions: Product Authentication: By integrating blockchain technology, the provenance of products can be tracked and verified, ensuring customers receive authentic items. Smart Contracts: Automatically executed contracts between artisans and buyers reduce the need for intermediaries and ensure secure transactions. Challenges: Implementation of blockchain technology in the artisanal

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market is still in its infancy, and there are scalability concerns related to transaction costs. Relevance to the Proposed Platform:

The integration of blockchain for authenticity is a highly valuable feature to build trust with customers who seek unique, high-quality products. This feature can be incorporated into the proposed platform to provide a digital certificate of authenticity for each product sold, enhancing consumer confidence. Augmented Reality (AR) has revolutionized retail by allowing customers to visualize products in their own environment before making a purchase. This study explores how AR is applied to retail e-commerce platforms and discusses its benefits for user engagement.AR Visualization: By integrating AR, consumers can visualize products like furniture, home decor, and jewelry in their physical space, improving purchasing confidence. User Engagement: AR significantly increases the time users spend on e-commerce websites, as they interact more deeply with the product. Relevance to the Proposed Platform: Incorporating AR for product visualization in the proposed platform would provide users with an immersive shopping experience, particularly beneficial for high-value or design-centric products like home decor and jewelry. Implementing AR would be a key differentiator for the platform and enhance user retention by allowing consumers to interact with products before purchase. Personalized User Experience: Platforms like Lokart and EPICRAFT demonstrate the importance of personalized storefronts for artisans and the need for direct buyer-seller interaction. Global Accessibility: The integration of payment gateways and logistics solutions enables artisans to sell internationally, as seen in EPICRAFT.Product Authenticity: Blockchain technology provides an added layer of security and trust, making it an ideal solution for high-value artisan products. Augmented Reality: Using AR for visualizing products in real-time offers a compelling reason for customers to stay engaged and make a purchase.

III.METHODS

A. Methodology:

1. The user navigates to the homepage of the website through a web browser. Display an overview of available products, featured artisans, and categories for easy navigation.

2. The user browses or searches for products. Users can view available products in various categories, filter products by price, ratings, or material, and select a product for more details. The frontend layer handles the product display and filtering functionality, supported by the backend and database interactions depicted in Fig 1.

3. User selects a product to view detailed information. Display comprehensive product details such as description, price, images, availability, and customization options.

4. The user opts for customization if available for the selected product (e.g., color, size, engraving). User can upload a reference image (such as a hand-drawn design) for custom orders. User provides additional customization details (e.g., text for engraving). Allow the user to personalize the product based on their specifications.

5. Once the user is satisfied with their selections, they add the product to the cart and proceed to checkout. The backend processes manage cart functionality and ensure data consistency with the database. These interactions are enabled by the system's architecture, as shown in Fig 1.

6. The user either logs in or registers if they do not have an account. User credentials are validated using JWT (JSON Web Tokens) for secure authentication. This process involves seamless communication between the frontend, backend, and database layers. Fig 1 illustrates how the system architecture facilitates secure authentication and account management through efficient interactions between these components.

7. After authentication, the user proceeds to enter payment details. Payment is processed via Stripe for secure transactions.
Ensure secure payment processing, supporting credit/debit cards,

8. If the user has submitted a customization request (e.g., uploaded a design), the artisan receives a notification and reviews the request. The artisan sends a price quote and estimated delivery time back to the user. Allow the artisan to evaluate and approve or reject custom orders, ensuring feasibility before proceeding.

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9. After the payment is successful, the order is confirmed, and the user receives an order summary. The backend communicates with the database to update the order status and notifies the user and artisan about the order, as demonstrated in Fig 1, where these layers work cohesively to handle order management.

10. The artisan begins working on the product, whether customized or standard. For custom products, the artisan follows the customization details provided by the user. Craft the product based on the user's specifications, ensuring quality control.

11. The user can browse and register for live artisan workshops. Workshops are streamed in real-time using WebRTC or WebSocket's, enabling live interaction between artisans and users. Allow users to interact with artisans, learn about their processes, and gain insights into the craft.

12. The website uses the Geo-location API to suggest nearby artisans or products based on the user's current location. The integration of external APIs into the system, including the Geo-location API, is highlighted in Fig 1, showcasing how location-based recommendations are generated.

13. Once the artisan completes the product (custom or standard), it is shipped to the user. Shipment status is updated and sent to the user with tracking details. Ensure timely delivery and provide users with the necessary tracking information for their orders.

14. After receiving the product, the user can leave a review and rate the product. Reviews are submitted to the website and are visible to other customers. Provide valuable feedback to artisans and enhance the user experience for future customers.

15. The user can view and update their profile, track orders, and Loyalty Program: Users earn points for purchases, reviews, and referrals, which can be redeemed for discounts. Create a personalized experience for the user, allowing them to track their engagement with the platform and reward them for loyalty.

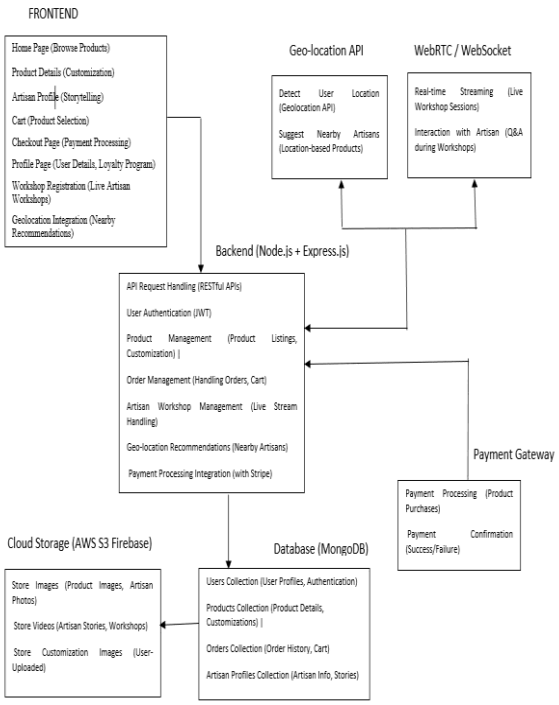

Fig 1. Architecture of the application.

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IV. RESULTS AND DISCUSSION

The implementation of the e-commerce platform for artisans is expected to result in significant improvements across several key areas, including user engagement, artisan empowerment, business revenue growth, and scalability. The platform's personalized features, such as product customization, artisan storytelling, and geolocation-based recommendations, are designed to foster high user engagement by offering tailored experiences. Customization options will enhance user satisfaction and increase the likelihood of purchases, as users can personalize their products. The live artisan workshops create a unique interactive experience, allowing users to connect with artisans directly, which will improve engagement and increase the platform's retention rates. Geo-location recommendations will allow users to discover nearby artisans, improving the relevance of products and promoting local craftsmanship, while also supporting the sustainability aspect by reducing transportation costs. These features collectively aim to increase the time users spend on the platform and contribute to higher conversion rates. On the artisan side, the platform empowers creators by providing increased visibility through personalized profiles and the ability to showcase their craft stories. The introduction of custom orders will allow artisans to command premium pricing, boosting their income. The ability for artisans to engage directly with consumers through workshops also enhances their reputation and connection with customers. The platform's revenue model, which includes custom product pricing, and a loyalty program, is designed. The loyalty program will incentivize repeat purchases and referrals, leading to long-term customer retention. From a business perspective, the platform's scalability, enabled by the MERN stack and secure Stripe payments, ensures it can handle growing demand as the user base expands. The system is capable of supporting a global market, with integration options for multiple currencies and languages, ensuring that the platform can grow internationally without compromising performance. The use of React.js for a responsive frontend, Node.js for efficient backend processing, and MongoDB for flexible data storage ensures that the platform performs efficiently even as traffic and data volume increase. Overall, the e-commerce platform will drive higher user satisfaction, artisan visibility, sustained revenue growth, and long-term scalability. By combining these innovative features with a robust technological foundation, the platform is well-positioned to provide lasting value to both artisans and customers while contributing to the growth of the global artisan market.

V.CONCLUSION

In conclusion, the e-commerce platform for artisan crafts is designed to revolutionize the way artisans connect with consumers by providing a comprehensive, user-friendly marketplace for handmade, customized, and unique products. With features like product customization, artisan storytelling, live workshops, the platform enhances user engagement and satisfaction by offering tailored shopping experiences. The integration of geo-location recommendations ensures that users discover local artisans, fostering a sense of community while supporting sustainability. For artisans, the platform provides increased visibility, direct customer interaction, and new revenue opportunities through custom orders and workshops. Additionally, the use of scalable technologies like the MERN stack and Stripe ensures the platform can handle growth and support a global user base. The platform's business model, combining one-time purchases, and loyalty programs, promises steady revenue growth and customer retention. Ultimately, this platform aims to empower artisans, foster a deeper connection between them and consumers, and create a thriving marketplace that supports both cultural heritage and modern e-commerce trends. Through its innovative features, seamless user experience, and scalability, the platform is poised for long-term success, bringing value to both artisans and customers alike.

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