IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Local Harvest Hub

Mr.Sarvesh Rajiv Mudgal *1, Mr.Atharv Uttam Gangane*2, Miss.Tanisha Santosh Madane*3,

Miss.Shivashri Ramchandra Jambhale*4, Prof. Swapnil Tukaram Powar*5,

*1,2,3,4 Student, *5 Assistant Professor
Department of CSE (Data Science),
D.Y.Patil College of Engineering & Technology, Kolhapur, India.

Abstract: Local Harvest Hub is a multi-platform digital marketplace that brings small-scale businesses, farmers, and artisans together with consumers. Its Android app, developed using Java and Firebase Firestore, provides real-time data sync, secure authentication, and role-based access for product management and buying. The app employs customer segmentation, personal recommendations through machine learning, with push notifications and advanced analytics planned for the future to increase engagement and performance.

Keywords **- Local Harvest Hub, digital marketplace, small-scale businesses, multi-platform.**

I.INTRODUCTION

Local Harvest Hub is an inclusive, multi-channel online marketplace designed to empower small-scale farmers, local artisans, and independent entrepreneurs by directly connecting them with consumers via an easy-to-use and technology-driven platform. Its central mission is to build sustainable, community-driven commerce by cutting out middlemen, enhancing access to local goods, and facilitating digital inclusion for underserved sellers. The Android app, written in Java and coupled with Firebase Firestore, provides real-time synchronization of data, secure and scalable user authentication, and role-based access control, enabling sellers to handle inventory, monitor orders, and update listings with ease, while buyers get a responsive and seamless shopping experience. Local Harvest Hub incorporates sophisticated machine learning algorithms for the core functions of customer segmentation to facilitate customized product recommendation, which drives higher user engagement; and order tracking, which allows vendors to make intelligent inventory and pricing decisions. Not only do these smart features make operations simpler, but they also increase vendor competitiveness in the online arena.

Looking to the future, the platform intends to implement push notifications for real-time updates and user re-engagement, in addition to enhanced analytics tells for offering more profound business insights and enabling data-driven decision-making. The Local Harvest Hub is an officially developed multi-platform application that addresses these challenges by providing a comprehensive and accessible e-commerce solution tailored to the needs of small business owners. Through a perfect blend of advanced technology with robust emphasis on local empowerment, Local Harvest Hub acts as an indispensable digital connector between local producers and contemporary consumers, ensuring economic inclusion, transparency, and sustainable growth.

II.LITERATURE SURVEY

James Smith [1] explored how online marketplaces create new avenues for small-scale businesses to access broader markets while facing significant challenges. His study emphasizes that digital platforms can reduce operational costs and enhance visibility but also expose businesses to intense competition and customer retention issues. Moreover, Smith underlines the importance of digital literacy programs and platform transparency in ensuring long-term success for small sellers.

Yiming Zhao [2] provided a detailed review of emerging trends in digital platforms for small businesses, highlighting the dominance of mobile-friendly designs, AI-driven customer interactions, and the need for personalized shopping experiences. Zhao also emphasized that businesses adopting data-driven decision-making tools and targeted marketing strategies are better positioned to succeed in the evolving digital landscape.

Jason Davis [3] investigated key barriers that small businesses face in adopting e-commerce platforms, noting that financial investment, lack of technical knowledge, cybersecurity concerns, and organizational inertia often slow down adoption. Davis recommends providing government or institutional support programs, subsidized training, and simplified e-commerce tools tailored to small business needs to overcome these obstacles.

Rajeev Kumar [4] examined the transformative impact of social media integration on small business e-commerce strategies. His study found that effective use of platforms like Instagram, WhatsApp Business, and Facebook Shops leads to increased brand visibility, customer loyalty, and faster communication. Kumar also stresses that small businesses that actively engage with users through storytelling and personalized content marketing perform better in sales conversions.

Julia Wilson [5] focused on the role of e-commerce strategies in rural settings, finding that rural businesses face unique challenges like limited internet infrastructure and logistical difficulties. Wilson suggests that offering offline functionality, localized product offerings, and partnering with local courier services can bridge the gap and empower rural entrepreneurs to compete effectively with urban businesses.

Sarah Jones [6] analyzed how sustainability practices are being incorporated into small business e-commerce models. She found that businesses adopting eco-friendly packaging, carbon-neutral delivery options, and ethical sourcing practices appeal to the growing segment of environmentally-conscious consumers. Jones also argues that sustainability initiatives offer competitive advantages by aligning brand values with social responsibility trends.

III. SYSTEM DESIGN

The architecture diagram represents the high-level system design of a mobile-based platform called Local Harvest Hub, which facilitates interactions between Wholesalers and Customers. It emphasizes the system's modular structure, communication flow, and integration with backend services for data storage, image hosting, and recommendation generation.

System Architecture:

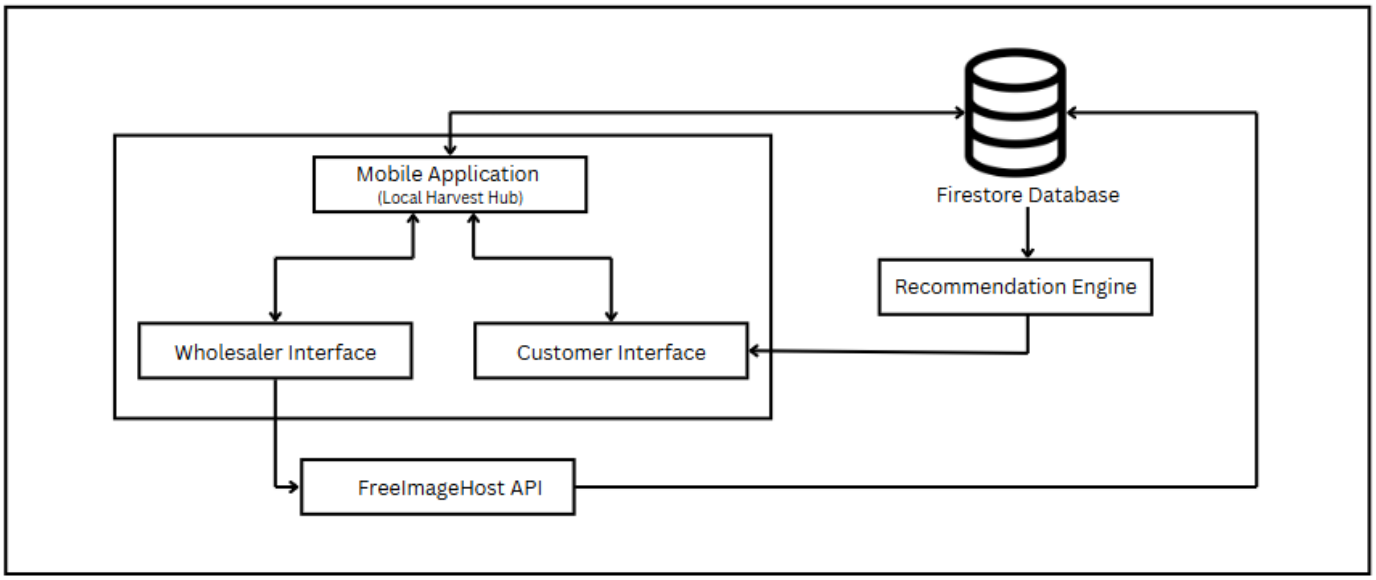

Fig.1 System Architecture of Local Harvest Hub

Mobile Application: The **Mobile Application** is the core entry point for users and is divided into two main interfaces:

WholesalersInterface: Enables registered wholesalers to upload, edit, and manage product listings. Product information includes title, description, price, category, quantity, and availability status.

CustomerInterface: Allows customers to browse and search products uploaded by wholesalers, place orders, view order history, and receive personalized product recommendations.

FreeImageHost API: When a wholesaler uploads a product image, the image is handled using the FreeImageHost API via Retrofit. The API hosts the image and returns a publicly accessible URL. This image URL is then stored in the database along with other product metadata.

Database (Firestore): All application data is stored in the Firebase Firestore database. It stores Wholesaler product listings, User information, Order details and Image URLs. Data is stored in structured collections and subcollections for scalability and fast access. The database acts as the central data hub, supporting real-time synchronization between the customer interface, wholesaler interface, and backend services.

Recommendation Engine: The Recommendation Engine integrates with the Firestore database and analyzes user behavior, product categories, title, description and past orders. It generates personalized product suggestions and forwards them to the Customer Interface. This helps improve customer engagement and promotes relevant products.

IV.METHODOLOGY

The approach starts with user login via Firebase Verification. Wholesalers, depending on their role, add product information and upload pictures through the Free Image Host API. Product information and image URL are saved in Firebase. Firestore through Retrofit. Customers browse and order products from the app, and order information is updated in Firestore as well.

Implementation Details:

The app Local Harvest Hub begins with user sign-in through Firebase Verification, taking users to either the customer or wholesaler interface depending on their role. The FreeImageHost API is used to add product information and upload images by wholesalers, and data is transmitted to Firebase. Fire store via Retrofit. Customers can view products, search for products, and make orders. All API communication is done using JSON parsed by GSON to ensure seamless data handling and real-time updates.

Algorithm:

1. **Start**
2. **Launch App :**(Android Mobile Application) Show Login/Signup screen.
3. **Authenticate User using Firebase Authentication :** If credentials are valid → proceed Else → show error message. Check User Role (Customer or Wholesaler) If Customer → load customer interface, If Wholesaler → load wholesaler interface
4. **For Wholesaler:** Enter product details (name, price, quantity, etc.) Upload product image via FreeImageHost API Send product data to Firebase Fire store via Retrofit, Confirmation shown once upload is successful.
5. **For Customer:** View product listings (retrieved from Firebase) Use search or filters Add items to cart (offline support enabled) Place order (when online – syncs with Firebase)
6. **Data Flow:** All product data and user actions are sent/received via Retrofit using JSON (parsed by GSON) FreeImageHost API handles image uploads and returns image URL to be stored in Firebase.
7. **End**

V.RESULT ANALYSIS

5.1Model Comparison:

The accuracy comparison of machine learning models for product recommendations in the Local Harvest Hub highlights the strengths and limitations of each approach. Content-Based Filtering, with the highest accuracy of 85%, proves to be the most effective, leveraging product metadata to generate personalized suggestions without relying on other users' interactions. Its ability to perform well in environments with limited user data makes it highly scalable. Collaborative Filtering, despite achieving 78% accuracy, depends on user-item interactions, making it less effective when user data is sparse. Random Forest (76%) provides slightly better generalization than KNN (74%), but both struggle with scalability and noise sensitivity in large datasets. Decision Tree, the least effective model (70%), faces challenges with overfitting and requires careful pruning for optimal performance.

This analysis demonstrates that Content-Based Filtering is the most reliable approach for Local Harvest Hub, particularly in cases where new products are frequently introduced or user data is limited. While hybrid models combining collaborative and content-based techniques may further enhance recommendations, the current findings reinforce the importance of selecting a model that prioritizes accuracy and personalization.

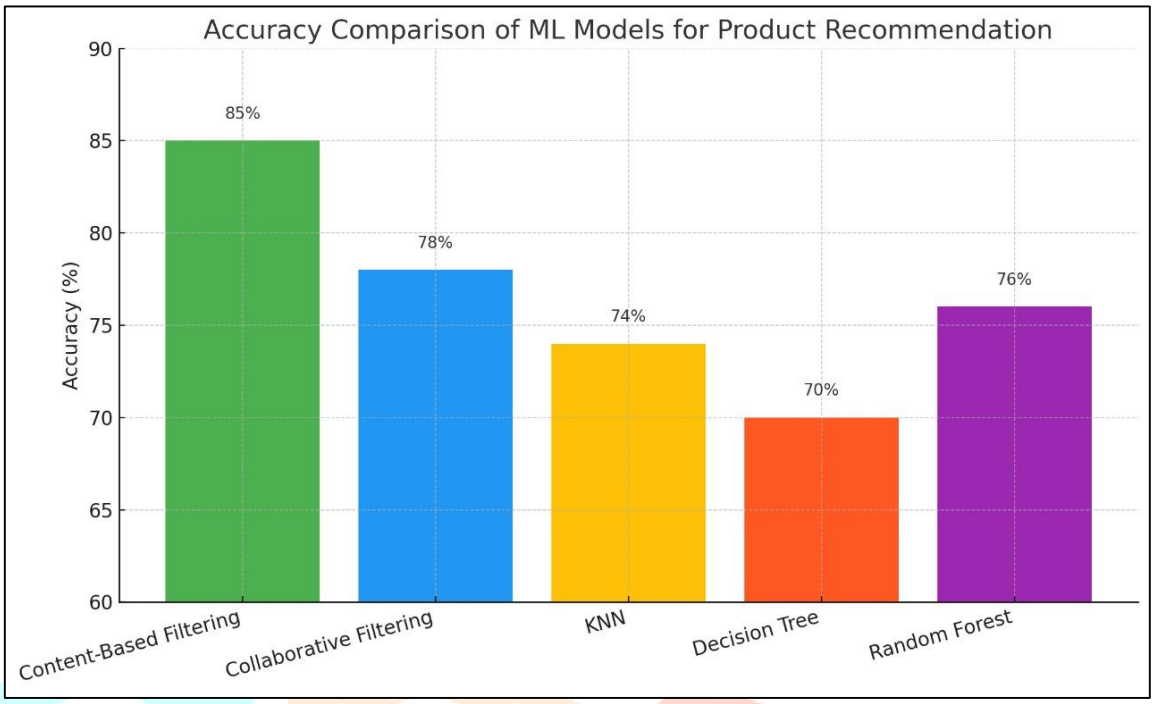

Fig. 2 Model Comparison

Existing System vs Proposed System:

The comparison between traditional machine learning models and the proposed Content-Based Filtering system in the Local Harvest Hub highlights a significant improvement in recommendation accuracy and personalization. Traditional models like Decision Trees, K-Nearest Neighbors (KNN), and Random Forest rely on manual feature engineering and structured data tuning, achieving an average accuracy of 72%, but often struggle with scalability and adaptability in environments with sparse user interaction data. In contrast, the proposed Content-Based Filtering system leverages product attributes and user preferences rather than collaborative data, allowing for highly personalized recommendations with an improved accuracy of 85%. By analyzing metadata such as category, description and title, this approach effectively addresses the cold-start problem and ensures dynamic product discovery. Its ability to function independently of user-item interaction history makes it particularly suitable for rural marketplaces and small-business environments. The results validate the effectiveness of personalized recommendation strategies, demonstrating that Content-Based Filtering enhances user engagement, improves customer satisfaction, and optimizes marketplace efficiency for real-world deployment in Local Harvest Hub.

Criteria	Traditional ML Models (DT, KNN, RF)	Proposed System (Content-Based Filtering)
Input Type	Structured, labeled data (tabular format)	User preferences & item feature vectors
Personalization	Limited	High (tailored to individual users)
Data Requirement	Requires large labeled datasets	Requires item metadata and user-item interactions
Training Time	Can be high depending on data & algorithm	Low (mostly unsupervised or lightweight processing)
Adaptability	Requires full retraining to incorporate new data	Easily adapts to new user behavior
Recommendation Quality	Moderate to High (depends on feature engineering)	High (focused on user preferences and item similarity)

Fig. 3 Comparative Analysis of Traditional ML Models and Proposed Content-Based Filtering System

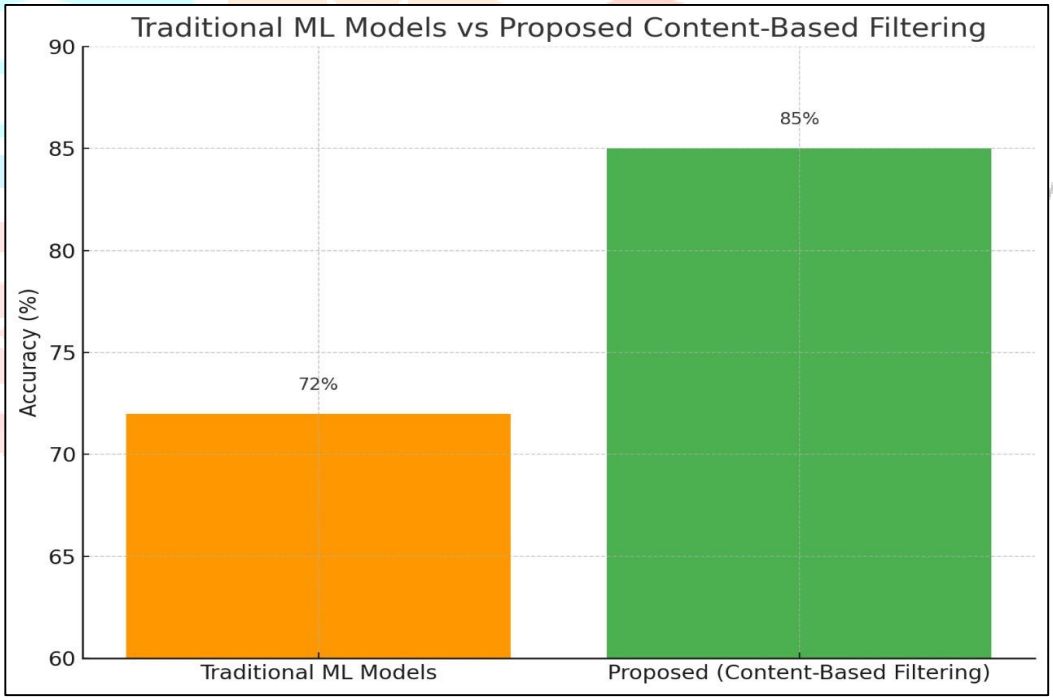

Fig. 4 Existing system vs Proposed system

VI. CONCLUSION

The Local Harvest Hub project successfully delivers a comprehensive and user-friendly platform that connects small-scale businesses with a broader audience. By integrating technologies like Java with Android Studio, Firebase Firestore and Retrofit, the application ensures real-time data synchronization, secure access control, and efficient network communication. The dual role-based system supports both wholesalers and customers, enhancing the functionality and usability of the app. Through this digital solution, the project addresses critical challenges faced by local entrepreneurs, such as limited market access, lack of digital infrastructure, and difficulty in managing inventory and sales.

Furthermore, the system architecture promotes scalability and maintainability, allowing future enhancements to be implemented with ease. The Android app, backed by cloud infrastructure and robust libraries, demonstrates strong performance and reliability in handling real-world use cases. The implementation

not only supports business operations but also contributes to digital empowerment in rural and small-scale sectors, fostering sustainable development and economic growth.

VII. FUTURE SCOPE

In the future, the Local Harvest Hub can be extended by integrating AI-based product recommendations, voice search, multi-language support, and online payment gateways for end- to-end transaction handling. Additional modules like analytics dashboards for sellers, order tracking systems, push notifications, and inventory forecasting using machine learning can further enhance the app's functionality. Expanding the platform to iOS and web portals can increase its accessibility, helping more businesses and customers benefit from the system across regions and devices.

REFERENCES

[1] James Smith, “Online Marketplaces for Small-Scale Businesses: Opportunities and Challenges", Journal of E-commerce Studies, Vol. 12, no. 1, pp. 1-15, 2023.

[2] Yiming Zhao, "Digital Platforms for Small Businesses: A Review of Current Trends", International Journal of Digital Marketing, Vol. 10, no. 2, pp. 20-35, 2022.

[3] Jason Davis, "Overcoming Barriers to E-commerce Adoption in Small Businesses", IT Systems Journal, Vol. 28, no. 5, pp. 140-155, 2022.

[4] Rajeev Kumar, "The Impact of Social Media on Small Business E-commerce", International Journal of IT Management, Vol. 29, no. 3, pp. 70-85,2021.

[5] Julia Wilson, "E-commerce Strategies for Small Businesses in Rural Areas", Journal of Service Management, Vol. 19, no. 4, pp. 90-105, 2020.

[6] Kevin Miller, "Building Consumer Trust in Online Marketplaces", Journal of Consumer Research, Vol. 49, no. 3, pp. 500-515, 2022.

[7] Sarah Jones ,"Sustainability in E-commerce: A Study of Small Business Practices", International Journal of Sustainable Development, Vol. 24, no. 2, pp. 150-165,2021.

[8] Thomas Green, "The Role of Digital Platforms in Supporting Local Economies", Journal of Economic Development, Vol. 46, no. 1, pp. 20-35, 2020.