

VSTALLS: A Hyperlocal Digital Marketplace Platform for Small-Scale Business Digitalisation and Economic Empowerment

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Abstract—VStalls is a website that allows micro and small businesses to create their own branded virtual stalls, list catalogues, accept orders from multiple vendors, and engage with their customers directly. The discovery experience is enhanced with browsing by city and location-based filters, so that neighbourhood commerce translates seamlessly to online transactions. The technology is built with Next.js 14, React 18, and Supabase PostgreSQL with Row Level Security and role-based access to enforce tenant-isolation and least privilege operations at minimal operating overhead for MSMEs.

An accompanying discovery suite combines Google Maps business search, directory scraping, lead scoring, and outreach templating to increase efficiency and vendor onboarding time and normalise city-level expansion playbooks across the food, retail, beauty, grocery, services, and lifestyle niches.

Recent research highlights accelerating growth in hyperlocal services and increasing MSME digital adoption, but none provide a seller-first framework; VStalls provides that missing infrastructure and is validated with a small user study (n=22) reporting a 90.9% willingness to use and a strong mobile preference, to be used here as validation rather than the main emphasis.

I. INTRODUCTION

1.1 Background

Generic national marketplaces prioritise paid visibility and centralised logistics, frequently overlooking local sellers who rely on trust, proximity, and conversational selling; local sellers often have poor discovery, fragmented messaging, and little data governance. VStalls aims to fill this gap by blending stall creation, catalogue and inventory, multi-seller checkout, geospatial discovery and WhatsApp messaging,

necessarily tied to products and order statuses, preserving the negotiation conventions, whilst creating structure and auditability for merchants, as illustrated in the city discovery layout in figure 1.

The VStalls multitenant data model is secured using Supabase Row Level Security and API first endpoints, and the PWA-first UI is designed for the mobile contexts of MSMEs and shoppers living in tier 2/3 cities.

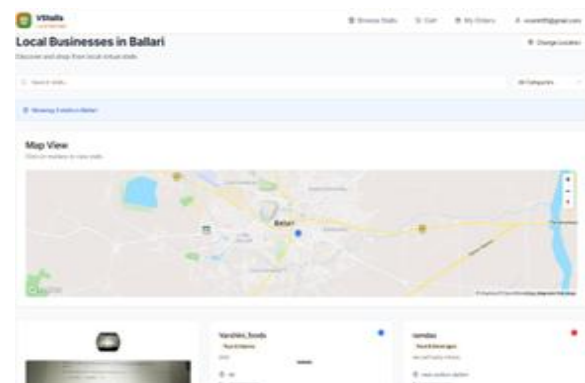


Figure x1: City-wise discovery UI Browse Stalls page with city map on top and stall cards below.

1.2 Problem Statement

Micro and small businesses in local markets lack digital tools that allow for easy city-based discovery, secure order management, and direct customer communication. Existing platforms do not support rapid onboarding, multi-vendor checkout, or chat-to-order processes. As a result, MSMEs are unable to scale or compete with larger e-commerce players. There is a need for a location-aware, WhatsApp-native marketplace that bridges this gap by combining mapped discovery, secure data boundaries, and integrated messaging for sellers and buyers.

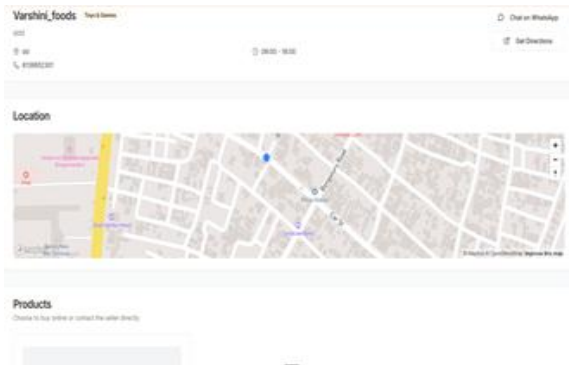


Figure 2: Stall detail page with brand header, category tag, hours/phone, Chat on WhatsApp and Get Directions CTAs, location map, and product list.

Related-work

1. Kanmani, M., Nivasan, R., Pradeep, S., Manoj, B. S., Rangarajan, R. V. (2024), "Hyperlocal E-Commerce Platform," IJCRT: proposes neighborhood-commerce modules and local ordering but omits WhatsApp-anchored order traceability, RLS tenancy, and a city-replicable discovery, scoring, outreach playbook. VStalls adds chat-to-order linkage, policy-backed multi-tenant controls, multi-vendor checkout with per-stall fulfillment, and a repeatable onboarding pipeline.
2. Kumar, A. (2025), "The Role of WhatsApp Marketing in Small Business Growth in India,"
3. Yasin, A. S. (2025), "Critical Study of E-Commerce on MSMEs in India," IRJMC (AARF): summarizes MSME barriers and opportunities at a macro level but does not provide workable product design, hyperlocal discovery UX, or repeatable onboarding. VStalls offers SSR/ISR and Supabase RLS design, city-browse with radius and map, and a clear discovery, lead scoring, outreach playbook.
4. De, A. (2024), "A Situated-Infrastructuring of WhatsApp for Business in India," CHI EA: examines the social and technical use of WhatsApp Business in India but does not cover marketplace fulfillment or tenant governance. VStalls integrates chat-to-order with per-stall fulfillment and policy-bounded multi-tenant data for governed operations.
5. Mustafa, H., Al-Tkayneh, K., Imtiaz, R., Abdel Hadi, S., Al Qaruty, R., Abokhoza, R., Ellala, Z. (2023), "The Impact of Using WhatsApp Business (API) in Marketing for Small

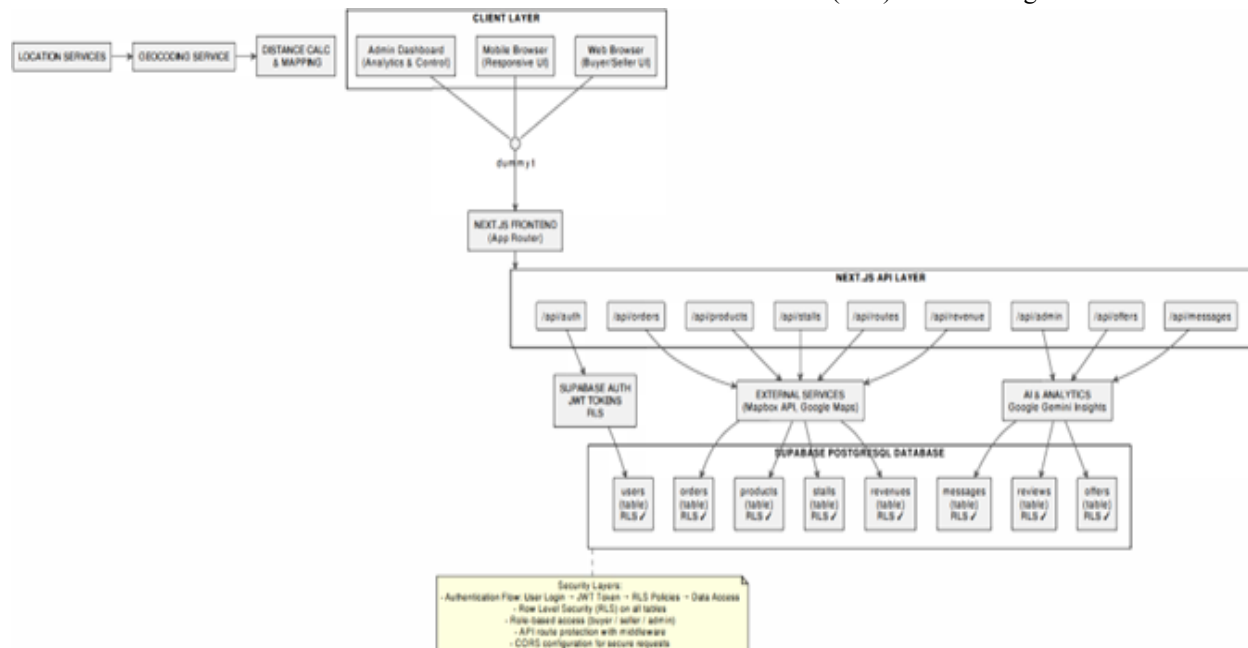


Figure 3: Multi-vendor checkout and order split: one cart creates separate seller orders with independent fulfilment states.

6. Business,” SNAMS: shows measurable marketing benefits from WhatsApp Business API but omits multi-vendor lifecycle and RLS isolation. VStalls adds marketplace orchestration, per-stall analytics, and tenant-safe data boundaries across roles.
7. A structured questionnaire was distributed to 22 respondents as a method to validate assumptions proposed for this design which resulted in 90.9% of participants willing to try a virtual stall, a strong “Yes” for Product Listing (86.4%), a strong “Yes” for Offer System (77.3%), and a “Yes” for sifting through stalls based on location even if only 68.2% of participants responded this way; additionally, 72.7% of participants claimed they would interact with the VStall via mobile, while the mean likelihood of replicating experiences was 3.36 (median Value of 4). These provide supportive evidence, but don't dominate; this study is fundamentally concerned with the architecture, onboarding pipeline, and market fit of VStalls.

II. METHODS

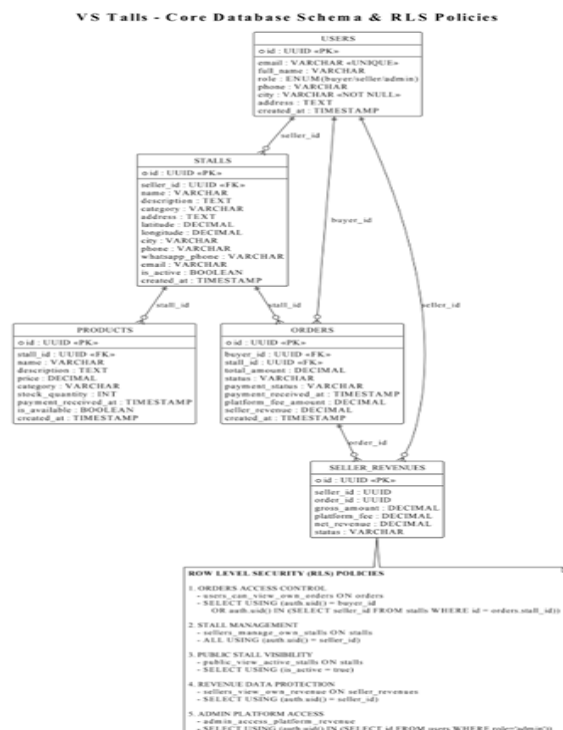


Figure 4. System architecture overview: Next.js 14 (SSR/ISR, API routes) with Supabase (PostgreSQL, Auth, Storage, real time) behind RLS, plus WhatsApp Business and Maps/Mapbox integrations.

2.1 System Design

- Frontend and APIs: Next.js 14, combined with React 18 and TypeScript, forms server components for ISR/SSR support for SEO purposes. APIs are an encapsulation of business logic with a clean HTTP boundary useful for future native clients, as shown in Figure 4.
- Data layer and policies: Supabase PostgreSQL with Row Level Security binds rows to seller identities and roles, meaning catalogue, stall and order mutations are constrained by tenant ownership and valid life cycle transitions, a similar predicate is shown in Figure 5.
- Authentication/authorisation: Supabase Auth implements a JWT session; policies implement least privilege access for buyer and seller roles, with a sale state only being updated by the owning stall role.
- Messaging: WhatsApp Business integration dispatches order notifications and inquiry threads; both retain references to products and orders to provide traceability and any support SLAs worth their salt, as visualised on the integration layer in Figure 4.

2.2 Marketplace Modules

- Stall Management: The branded storefront, hours, contact, map pin, delivery radius, theme presets, and SEO metadata for visibility on city lists are detailed in Figure 2.
- Catalogue & Inventory: Variants, the ability to upload multiple images at once, low stock thresholds, scheduled discounts, and the option to import inventory by CSV for quicker onboarding of large catalogues.
- Orders & Checkout: Multi-vendor cart with per vendor fulfilment triggers, lifecycle states {pending, confirmed, processing, shipped, delivered, cancelled, returned}, and status notifications to reduce ambiguity in coordination flow, as shown in Figure 3.
- Seller Dashboard: Revenue trendlines, top SKUs, low stock alerts, funnel views, and configurable widgets delivered with progressive disclosure for non. Technical users.
- Buyer Discovery: City selector, geospatial discovery capability within delivery radius, and filters for category, price, and rating contained in

Figure 1, to develop behaviour to resemble mobile scanning behaviour.

2.3 Automated MSME Onboarding

- Business Finder (Google-Maps): Queries mapped to categories create candidate sets for each city; duplicates are removed, and a CSV export is provided for review in the pipeline; Mocked/fallback paths allow testing without a headless browser.
- Lead Generator (Directories): Justdial scraping collects contact and context; a lead score is calculated based on visibility, digital presence, and fit within the category; priority is flagged for SDR attention; output is persisted to CSV.
- Outreach Manager: sends email/WhatsApp templates, call scripts, and summary dashboard by city/category to facilitate A-1 contact and gauge appropriate campaign mixes.
- Controller UI: A Flask orchestration application wraps the previous modules, provides progress tracking and error handling, and offers quick exports for field-based operations.



Figure 5: Row Level Security and status transition policy: orders and order_items relations with example RLS policies restricting read/write to owners and valid state changes.

2.4 Algorithmic and KPI Note

The suitability score $S = w_1 V + w_2 D + w_3 C$ ranks potential sellers based on three factors: their visibility, which includes ratings and listing depth; their digital presence, like their website, social profiles, and the completeness of their contact information; and how well their category matches VStalls' initial focus. We

adjusted the weightings during pilot runs to increase the number of sellers moving from initial onboarding to active product listings, as shown.

The pilot phase will track several onboarding metrics. This includes how many leads become successful contacts, how many of those contacts turn into active stalls, how many stalls create their first listing, and how long it takes for a newly listed seller to get their first order. These indicators help improve each city's expansion strategy through real, ongoing feedback.

III. RESULTS AND DISCUSSIONS

1. Platform capability evidence:

The loop covers stall setup, catalog and variants, orders with per stall fulfillment, and analytics that change with usage. It also includes WhatsApp linked support. The controller driven onboarding pipeline turns city discovery into repeatable execution instead of random recruitment.

2. Product UI evidence:

Figure 1 shows the card hierarchy for city browsing. It displays price, rating, and delivery radius as the first signals to help speed up decisions on low bandwidth. There's also a map for quick spatial orientation. Figure 2 highlights stall details like identity, hours, phone number, directions, a location map, and a WhatsApp entry connected to the item or order context. This approach maintains the bazaar style of negotiation while ensuring traceability.

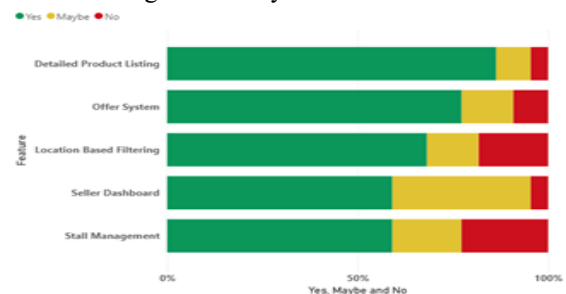


Figure 6: Feature preference stacked bars from the survey

3. Validation snapshot:

A structured questionnaire with 22 participants shows 90.9% are willing to try a virtual stall. For Product Listing, 86.4% responded "Yes," while 77.3% said "Yes" for Offer System. There is meaningful demand for Location Filtering at 68.2%. Strong mobile usage stands at 72.7%, and the likelihood of adoption has a mean of 3.36 with a median of 4. If charts are included,

insert “Figure 6 Feature preferences” and “Figure 7 Device usage” right after this paragraph; otherwise, keep this subsection as text only.

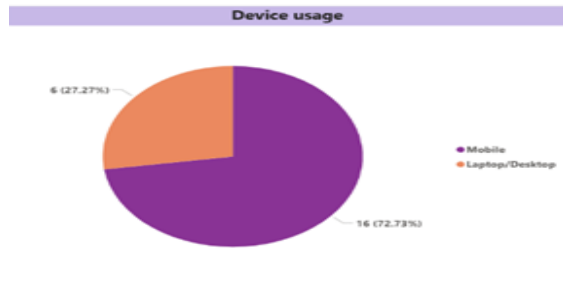


Figure 7: Device usage pie (Mobile vs Desktop) validating PWA-first design.

4. Comparative advantages:

Compared to traditional markets that depend on foot traffic and phone calls, VStalls offers branded online stalls with built-in SEO, city-based discovery using radius filters and interactive maps, and WhatsApp threads linked to products and orders. Sellers benefit from managing variants, receiving low-stock alerts, and quickly onboarding product catalogs with CSV files. Buyers can shop using a multi-seller cart, with each stall handling its own fulfillment. They also have access to analytics that improve with usage and an organized onboarding process that helps with steady city-by-city growth. This approach combines the strengths of physical markets with the benefits of digital platforms, improving visibility, trust, and control for MSMEs.

IV. CONCLUSION

VStalls offers a seller-focused local framework that combines secure, tenant-restricted data management with location-based discovery, chat-based transactions, and a clear onboarding process. It goes beyond general market commentary by providing a practical, testable system that can be used at the city level for MSMEs.

Unlike logistics-only local tools or large national marketplaces, its uniqueness lies in bringing together city-specific discovery, multi-vendor checkout, WhatsApp-based communication, and a guided seller acquisition workflow. The user study supports the platform’s mobile-first approach and the focus on these features.

ACKNOWLEDGEMENTS

The VStalls team authored this research and built the platform (architecture, RLS governance, discovery/lead/outreach pipeline); thanks to the 22 respondents for providing validation data.

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