**Product Requirements Document (PRD) — E‑commerce Platform (Web, Multi‑Role)**

**Notices:**  
• **Payments:** The MVP will integrate **Paymob** as the primary payment gateway (hosted checkout/API per Paymob docs).  
• **Engineering conventions:** **Feature‑based structure** + **Atomic Design** UI system.  
• **QA:** Processes and ownership mapped to **Codie** roles.

**1) Product Overview**

**Product:** A customizable, multi‑tenanted (future‑ready), web‑based e‑commerce platform with role‑specific surfaces: **Customer App/Website**, **Seller Dashboard**, **Admin Panel**, **Accountant Dashboard**, **Affiliate Dashboard**.  
**Vision:** Provide a seamless marketplace experience—from discovery to checkout to reconciliation—scalable to 1M+ users, adaptable across industries (fashion, furniture, agriculture), and compliant with security, accessibility, and privacy standards.

**2) Goals & Success Metrics (MVP)**

* **G1: Conversion & Revenue**
  + M1: Checkout success rate ≥ **95%** (sessions with payment success / checkout sessions).
  + M2: Add‑to‑cart → purchase conversion ≥ **25%** for returning users.
* **G2: Performance & Reliability**
  + M3: **Core Web Vitals**: p75 **LCP ≤ 2.5s**, CLS ≤ 0.1 on key pages (Home, PLP, PDP, Cart, Checkout).
  + M4: p95 API latency ≤ **500ms** for read endpoints; service availability (checkout path) **≥ 99.9%**.
* **G3: Operations & Finance**
  + M5: Seller payout cycle accuracy 100% (no mismatches) and < 3 business days processing.
  + M6: Refund processing SLA: decision within 48 hours.
* **G4: Quality & Compliance**
  + M7: A11y baseline **WCAG 2.1 AA** for web dashboards; no critical accessibility blockers.
  + M8: Security gates aligned with **OWASP ASVS** level appropriate for e‑commerce; no P0 security issues.

**3) Target Users & Personas**

* **Consumer/Customer:** Browses catalog, adds to cart, applies promos, checks out, tracks orders, manages returns/wishlist/alerts.
* **Seller/Vendor:** Manages products (media/variants), inventory, orders, refunds, and sees sales analytics.
* **Admin:** Onboards/approves sellers, manages taxonomy & commissions, resolves disputes, runs promos, monitors KPIs.
* **Accountant:** Generates financial reports, reconciles orders/refunds, manages payouts & commissions.
* **Affiliate:** Registers, obtains tracking links, and monitors traffic/conversions/commission.

**4) Scope**

**4.1 MVP (Must‑have)**

1. **Auth & Accounts:** Email/phone/social login with **2FA**; session management; profiles.
2. **Discovery:** Category/collection browse; advanced search & faceted filtering; baseline recommendations (recent/trending/similar).
3. **PDP:** Variants, price, inventory, shipping info, rich media gallery.
4. **Cart & Checkout:** Persistent cart; promo codes; taxes/shipping; **Paymob** hosted checkout/API; order confirmation & receipts.
5. **Orders & Returns:** Real‑time status timeline; returns/refunds workflow with notifications.
6. **Seller Dashboard:** Product CRUD + media; inventory; order handling; invoices/refunds; sales analytics (v1).
7. **Admin Panel:** Seller onboarding & KYC; users/roles; categories & **commission structures**; promos; dispute resolution.
8. **Accountant Dashboard:** Financial reports (revenue, fees, payouts); payout run management (sellers/affiliates).
9. **Affiliate Dashboard:** Enrollment/approval; referral & commission tracking.
10. **Cross‑cutting:** **Atomic Design** system; feature‑based code structure; notifications center; audit logging; analytics/telemetry; observability.

**4.2 Post‑MVP (Should/Could)**

* Loyalty & rewards, gift cards; buyer subscriptions; A/B testing; multi‑warehouse inventory; shipping integrations; reviews/Q&A; multi‑currency/FX; headless API for additional channels; ML recommendations.

**5) Functional Requirements**

Each item includes key acceptance criteria (A/C). More exhaustive test cases live in the Test Plan.

**5.1 Customer Web App**

**FR‑C1: Authentication & 2FA**

* Sign‑up/login via email, phone (OTP), Google/Apple; 2FA via OTP/app when enabled.
* **A/C:** Valid credentials grant access; invalid → errors; 2FA prompts when enabled.

**FR‑C2: Discovery & Search**

* PLP with filters (price, brand, attributes), sort (relevance/newest/price), search suggestions, recent views; baseline recommendations (recent/trending/similar).
* **A/C:** Filters update results dynamically; results relevance verified; recs match context/fallback to trending.

**FR‑C3: Product Detail Page (PDP)**

* Variants (size/color/sku), stock per variant, rich media (images/video), price & promo display, shipping & returns info.
* **A/C:** Selecting variant updates SKU/price/stock; out‑of‑stock disables purchase; structured data markup (SEO) present.

**FR‑C4: Cart & Promotions**

* Add/update/remove; persist (guest policy TBD); promo code apply/remove; stacking rules and usage limits.
* **A/C:** Totals recalc including discounts/taxes/shipping; invalid/expired codes display clear errors.

**FR‑C5: Checkout with Paymob**

* Address capture, shipping method, taxes; **Paymob** hosted checkout/API flow; success/fail handling; receipts.
* **A/C:** Success → order created and confirmation shown/emailed; declined → no order, retry CTA; webhooks reconcile payments; idempotency enforced.

**FR‑C6: Orders & Returns**

* Order timeline (placed → paid → packed → shipped → delivered); carrier tracking URL if provided; returns/refunds request wizard (RMA).
* **A/C:** Status changes trigger notifications; return requests follow policy; refunds reconcile balances.

**FR‑C7: Wishlist & Alerts**

* Save to wishlist; alerts for **price drop** and **back‑in‑stock**.
* **A/C:** Add/remove works; alerts fire when price/stock threshold met; user can opt out.

**FR‑C8: Notifications Center**

* In‑app + email/SMS/web‑push; per‑event & per‑channel preferences (GDPR consent).
* **A/C:** Preferences persist; only opted channels fire.

**5.2 Seller Dashboard**

**FR‑S1: Catalog Management**

* Product CRUD incl. media uploads; attributes/variants; draft/publish; bulk import (CSV).
* **A/C:** Required fields validate; media uploads succeed; preview before publish; import validates and reports errors.

**FR‑S2: Inventory & Pricing**

* Stock adjustments; low‑stock alerts; price changes with schedule.
* **A/C:** Stock decrements on order and increments on return; price schedules apply at start/end time.

**FR‑S3: Orders & Fulfillment**

* View orders; update fulfillment status; print invoices; capture/void/refund (per gateway rules).
* **A/C:** Status updates propagate to customer; refunds reflect in ledger.

**FR‑S4: Refunds Workflow**

* Approve/deny return/refund with reason; partial/full amounts; attach evidence.
* **A/C:** Payment provider updated; notifications to buyer; audit logged.

**FR‑S5: Sales Analytics (v1)**

* Revenue, units, AOV, top products; filters & CSV export.
* **A/C:** Figures reconcile with orders/payments; export opens correctly.

**5.3 Admin Panel**

**FR‑A1: Seller Onboarding & KYC**

* Application intake; document upload; approve/reject; status & audit trail.
* **A/C:** Approved sellers gain access; rejected see reasons; actions audited.

**FR‑A2: Users & Roles**

* Suspend/reactivate accounts; role management; password reset links.
* **A/C:** Suspended users cannot log in; all changes audited.

**FR‑A3: Taxonomy & Commissions**

* Manage categories/collections; tiered commissions by category/seller; effective‑date support.
* **A/C:** Changes reflect immediately in catalog and at order pricing.

**FR‑A4: Promotions & Campaigns**

* Create promo codes, banners, scheduled campaigns with usage limits; exclusivity rules.
* **A/C:** Schedules respected; limits enforced; conflicts resolved deterministically.

**FR‑A5: Dispute Resolution**

* Manage refund/return conflicts; final decision updates both buyer/seller balances.
* **A/C:** Outcomes adjust ledgers, order states, and send notifications.

**5.4 Accountant Dashboard**

**FR‑F1: Financial Reporting**

* Revenue, seller earnings, platform fees, taxes, refunds; period filters; drill‑downs.
* **A/C:** Reports reconcile with orders/payments/refunds; rounding documented.

**FR‑F2: Payouts & Commissions**

* Schedule/trigger seller payouts and affiliate commissions; export bank files; mark paid/failed with reasons.
* **A/C:** Payout status reflects accurately; idempotent updates; full audit trail.

**5.5 Affiliate Dashboard**

**FR‑AF1: Enrollment & Approval**

* Registration form with terms acceptance; admin approval.
* **A/C:** Approved affiliates gain dashboard; rejected see reasons.

**FR‑AF2: Tracking & Performance**

* Create tracking links; see clicks, conversions, commissions, payout status; fraud checks (basic).
* **A/C:** Metrics update based on attributed orders; disputes can be raised and resolved.

**6) Non‑Functional Requirements (NFRs)**

* **Performance:** p75 LCP ≤ 2.5s; TTFB ≤ 800ms; p95 API ≤ 500ms; image optimization (responsive, lazy‑load).
* **Availability:** Checkout path 99.9%; graceful degradation (e.g., static PDP if search unavailable).
* **Security:** Follow **OWASP ASVS**; HTTPS/TLS 1.2+; CSP; rate limiting; input validation; RBAC; hardened secrets; webhooks verified; payments via **Paymob** hosted/API (PCI scope minimized).
* **Accessibility:** **WCAG 2.1 AA** components; keyboard navigation, focus states, ARIA roles, contrast ≥ 4.5:1.
* **Privacy/Compliance:** GDPR‑aligned consent, data rights, breach notification processes; cookie consent and DSAR workflows.
* **Scalability:** CDN caching; stateless services; search/indexing aligned to traffic.

**7) Information Architecture (IA)**

* **Customer:** Home → PLP (category/search) → PDP → Cart → Checkout → Order Detail → Returns → Notifications
* **Seller:** Dashboard → Catalog → Products (variants/media) → Inventory → Orders → Refunds → Analytics
* **Admin:** Dashboard → Sellers/KYC → Users/Roles → Taxonomy/Commissions → Promotions → Disputes → Settings
* **Accountant:** Dashboard → Financial Reports → Payouts → Exports
* **Affiliate:** Dashboard → Links → Performance → Payouts

**8) Data Model (high level)**

* **User**(id, email/phone, role, status, profile), **Seller**(id, kyc, status), **Product**(id, title, desc, media[]), **Variant**(sku, attrs, price, stock), **Category**, **Inventory**, **Cart/CartItem**, **Promotion/Coupon**, **Order/OrderItem**, **Payment**, **Shipment**, **Return/Refund**, **Invoice**, **Payout**, **Affiliate**, **Attribution/Click**, **Commission**, **Notification**, **AuditLog**.

**9) External Integrations**

* **Payments:** **Paymob** hosted checkout/API; use **webhooks** for payment success/failure and refunds; consider **Unified Intention API** and **mobile SDKs** alignment for future mobile apps.
* **Search:** Algolia/Elastic (TBD).
* **Email/SMS:** SendGrid/Twilio (TBD).
* **Analytics:** GA4 + custom events.
* **Tax/Shipping (post‑MVP):** Avalara/TaxJar; Shippo/EasyPost.

**10) UX/UI Principles (Atomic Design + Feature‑based)**

* **Atomic Design:** atoms (Button, Input, Badge) → molecules (FilterBar, PriceTag) → organisms (ProductCard, CartSummary) → templates (PDP Template, Checkout Template) → pages.
* **Feature‑based structure:** /features/auth, /features/catalog, /features/pdp, /features/cart, /features/checkout, /features/orders, /features/seller, /features/admin, /features/accounting, /features/affiliate, /features/notifications.
* **Responsive patterns:** grid/breakpoints; touch targets ≥ 44px; reduced motion preference honored.

**11) Quality Plan (Codie QA Roles)**

* **QA Lead:** Owns strategy, risk matrix, release sign‑off.
* **Test Designer/SDET:** Unit/widget/E2E suites; contract tests for Paymob webhooks; a11y & performance checks in CI.
* **Performance Engineer:** Core Web Vitals budget monitors; load tests on PLP/PDP and checkout.
* **Security Tester:** ASVS‑aligned checks; DAST on staging; webhook auth & idempotency validation.
* **Accessibility Tester:** WCAG audits; screen‑reader checks; keyboard nav.
* **Release QA:** Regression packs and go/no‑go checklist.

**12) Telemetry & Observability (MVP)**

* **Key events:** view\_product, add\_to\_cart, start\_checkout, apply\_coupon, payment\_succeeded, payment\_failed, order\_placed, return\_requested, refund\_approved, seller\_product\_published, payout\_triggered.
* **KPIs dashboards:** Conversion funnel, AOV, checkout drop‑off, refund rate, payout latency.
* **Error tracking:** Client + server; webhook failure alerts with replay.

**13) Risks & Mitigations**

* **Payment failures/latency:** Use hosted checkout; retry logic; idempotent webhook handlers; alerting with replay.
* **Search/recs quality:** Start with deterministic rules; plan ML upgrade.
* **Fraud/chargebacks:** Basic rules; velocity/rate limits; consider Paymob risk tooling (if available).
* **Scale hot spots:** CDN + cache PLP/PDP; denormalized reads for product/price; paginate & lazy‑load.

**14) Release Criteria (MVP)**

* All MVP FRs implemented and covered by tests; **checkout success ≥ 95%** in staging with Paymob sandbox; Core Web Vitals within targets; WCAG baseline met; no P0/P1 defects; finance reconciliation matches 100% for test cycles; webhooks idempotency verified.

**15) Open Questions**

* Guest checkout policy?
* Reviews/ratings in MVP?
* Preferred search (Algolia vs Elastic)?
* Multi‑currency & FX approach?
* Returns logistics ownership & label generation?

**16) Traceability (User Stories → PRD)**

* A1 → FR‑C1 (Auth & 2FA)
* B5 → FR‑C2 (Search & filters)
* C7 → FR‑C3 (PDP variants/media)
* D9‑D12 → FR‑C4/FR‑C5 (Cart/Checkout with Paymob)
* E13‑E15 → FR‑C6/FR‑C8 (Orders/Returns/Notifications)
* S16‑S20 → FR‑S1..S5 (Seller)
* Admin 21‑25 → FR‑A1..A5
* Accountant 26‑27 → FR‑F1..F2
* Affiliate 28‑29 → FR‑AF1..AF2
* Cross‑cutting 30‑32 → Sections 10–12.