A logo of a university

AI-generated content may be incorrect.**A blue and black logo

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***Hotel Management Application***

**1 — Project Overview & Goals**

**Goal:** Build an integrated Hotel / Restaurant Management System with mobile and web apps for Manager, Receptionist, Cook and Admin (Owner). Streamline table allocation, orders, timers, real-time sync across roles, inventory & procurement, payroll & attendance, CCTV linkage per table, and an AI business evaluation dashboard to optimise procurement, costs and menu performance.

**Primary objectives**

* Reduce order delays and improve table turnaround.
* Provide real-time visibility to managers, receptionists, cooks and owners.
* Automate inventory & procurement with cost tracking.
* Provide staff management (payroll, attendance, performance).
* Use AI to recommend procurement actions and cost-saving opportunities.

**2 — Users & Modules (Functional Summary)**

**2.1 Manager (Mobile app)**

* Floor plan view of tables (drag/drop or touch) with table statuses (vacant, occupied, ordering, served, bill\_pending).
* Allocate table to reservation/walk-in.
* Maintain orders per table:
  + Add/edit items, quantities, notes.
  + Start order timer per table when order placed.
  + Order-level timers + per-item prep timers (if needed).
* Visual timers: elapsed time, warnings color-coded (green/yellow/red).
* Notifications:
  + Every 15 minutes reminder for table visit (configurable).
  + Push/SMS/WA optional.
* Sync order summary, bills, and performance with receptionist dashboard.
* Assign waiter to table (sync with receptionist/waiter info).
* Quick actions: request busser, reprint bill, call cook, mark served.
* Offline caching for intermittent connectivity; sync when online.

**2.2 Receptionist (Web app)**

* Reservation management + walk-in allocation.
* Table allocation and reallocation to managers.
* View orders & bills in real time (synced).
* Generate order summaries (session/day/table).
* Push buzzer to manager and cook dashboards for delayed orders.
* Allocate waiters to table and sync waiter info to manager portal.
* Billing: create/edit bills, apply discounts, accept payments (POS integration).
* Reports: daily collection, pending bills, no-shows.

**2.3 Cook (Web app)**

* Order queue sorted by timestamp and priority.
* Timers showing time since order received.
* Mark items as “In Progress”, “Ready”, “Served” (or only Ready to push to manager).
* Flag items that can be prepared quickly (fast-prep toggle).
* Push notification/buzzer when order completed (sync back to manager).
* Option to mark ingredients shortages to trigger inventory decrement/low-stock alerts.

**2.4 Admin / Owner (Web + Mobile)**

* Dashboard: overview of each table (status, order timers), total collection, occupancy, average turnaround time.
* CCTV view with mapping of camera(s) to table areas (live stream embed or links).
* Inventory & procurement:
  + Track stock levels, consumption (ration used), purchase orders, suppliers.
  + Maintain costing per raw material and recipe cost.
* Payroll & Attendance: manage staff profiles, timesheets, payroll generation, role-based dashboards.
* Performance analytics: staff KPIs, table performance, busiest hours.
* AI Business Evaluation Tab:
  + Monthly business portal summarizing procurement, consumption, revenue.
  + Recommendations: which items to procure less/more, slow-moving menu items, suggested price changes, cost-saving procurement strategies.
  + Forecasting (sales & inventory), anomaly detection, supplier comparison.

**3 — Feature Breakdown (Detailed)**

**Table & Floor Management**

* Dynamic floor plan editor (web) + simplified mobile view.
* Table grouping (sections), capacity per table, merge/split tables.
* Table states, color-coded indicators, tapped to open order modal.

**Orders & Timers**

* Order lifecycle: Placed → Sent to Kitchen → In Progress → Ready → Served → Bill Generated → Paid.
* Timers:
  + Order elapsed timer (global) and per-item ETA.
  + Alerts after thresholds (e.g., 15/30/45 minutes).
* Notification channels: in-app push, web socket updates, optional SMS/WhatsApp.

**Synchronisation & Real-time**

* Use WebSockets (Socket.IO or similar) or server-sent events for live updates.
* Conflict resolution: last-write wins + optimistic locking on order edits.
* Offline-first support for manager mobile to handle network drops.

**Billing & Payments**

* Bill generation, split bills, merge bills.
* Payment integrations: card terminals, UPI, wallets, cash.
* Tax calculations (configurable per region).
* Print/Email/Whatsapp bill.

**Inventory & Procurement**

* Stock items, units of measure, recipes (BOM per menu item).
* Auto-consumption when order marked ready/served.
* Low stock alerts and auto-PO generation workflows.
* Supplier management and purchase order life-cycle.

**Staff Management**

* Roles: Owner(Admin), Manager, Receptionist, Cook, Waiter, Adhoc staff.
* Attendance check-in/out (mobile/geofencing optional), shift scheduling.
* Payroll calculation (salary, hourly, overtime, incentives).
* Performance metrics: tables handled, average order time, customer feedback.

**CCTV Integration**

* Map cameras to floor zones and tables.
* Embed RTSP/HLS streams or link to vendor portal.
* Permissions: only owner/admin access by default.

**Hardware & Peripheral Integration**

* Buzzers / desk buzzers: integrate via network calls or middleware (MQTT).
* KDS (Kitchen Display System) screens.
* Receipt printers (ESC/POS over network or via companion app).
* Buzzer/LED triggers on delayed orders.

**Reporting & Analytics**

* Sales reports: hourly, daily, weekly, monthly.
* Item-wise sales and profitability.
* Inventory consumption & variance.
* Staff performance, table turnover rates.

**AI Business Evaluation (Details)**

* Data inputs: sales, inventory movements, recipes, supplier prices, purchase history.
* Outputs:
  + Item-level demand forecasting (next 30/90 days).
  + Suggested reorder quantities (economic order quantity + lead time).
  + Identify slow-moving vs high-margin items.
  + Cost reduction suggestions: vendor switching, bulk order suggestions, recipe substitutions.
  + Menu rationalization: items to promote or remove.
* Models: time series forecasting (ARIMA/Prophet or LSTM), clustering for menu segmentation, optimization heuristics for procurement.
* UI: monthly AI report with interactive filters, “Accept Recommendation” to auto-create PO or adjust menu prices.