Project Report

Topic: Food Delivery System

Course Code: Cse 227

Course Name: System Analysis & Design

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QuickBite Bangladesh

Brand Description

QuickBite Bangladesh is a secure, culturally-aware food delivery ecosystem designed for both urban and semi-urban contexts. It integrates strong mobile applications, auditable order tracking, and human-centered workflows to provide timely, accurate, and transparent food delivery. Key features include multilingual interfaces (Bangla-first), authenticated restaurants and riders, tamper-evident packaging, and verifiable delivery trails.

The system is engineered for Bangladesh's traffic, network constraints, and logistics challenges—leveraging offline-first operation, resilient infrastructure, and transparent processes to build trust across a diverse customer base.

Focus on the Secure Ordering & Delivery Workflow

QuickBite applies complex engineering principles to the entire ordering lifecycle: order placement → restaurant confirmation → rider assignment → real-time tracking → delivery → payment → audit.

The workflow aims for:
- Frictionless customer experience
- High reliability in constrained environments
- Strong accountability and transparency
- Secure, verifiable transactions and tracking

Key objectives include intuitive ordering, error-proof restaurant selection, cryptographic sealing of transactions, real-time tracking accuracy, dual-channel notifications, post-delivery photo verification, and immutable audit logs.

EP1 – Depth of Knowledge Required

A strong understanding of food delivery technologies, logistics processes, and SDLC rigor is required. Comparative analysis includes traditional phone-based ordering, hybrid app + human workflows, and fully automated app ecosystems.

Key domain insights:
- GPS-based live tracking
- Secure payment gateways (bKash, cards)
- Dynamic pricing and delivery time estimation
- Human-factor engineering in last-mile delivery

These insights shape a solution optimized for Bangladesh's urban and semi-urban reality.

EP2 – Range of Conflicting Requirements

Food delivery systems face several trade-offs between real-time tracking, secure payments, offline resilience, and feature-rich UIs. Constraints include a 6-month timeline and a BDT 1,200,000 pilot budget. The chosen approach is a hybrid model with app-based ordering, SMS fallback notifications, and offline-first caching for stable performance.

EP3 – Depth of Analysis Required

Functional requirements are prioritized based on reliability and security. Threat modeling includes order fraud, fake riders, payment downtime, GPS spoofing, and app crashes. Mitigations include encrypted communication, role-based access, secure payments, delivery proof photos, immutable logs, and audits.

Requirements Collection Procedures

1. Interviews

Conducted with customers, restaurant owners, and riders to identify needs for:

- Bangla-first UI
- Simple navigation
- Clear confirmation prompts
- Offline fallback during connectivity loss

2. Workshops

Stakeholders emphasized:

- Real-time order tracking
- Secure payment confirmation
- Transparent delivery verification

3. Surveys

Key customer priorities include:

- Trust and reliability
- On-time delivery
- Transparent pricing
- Photo-proof delivery

Stakeholder Identification

Primary Stakeholders:

- Customers
- Restaurant Partners
- Delivery Riders

Secondary Stakeholders:

- App Developers
- Logistics Coordinators
- Customer Support
- Payment Gateway Providers

Regulators:

- Food safety authorities
- Digital transaction oversight bodies

Requirement Specification
Functional Requirements:
- Customer authentication: OTP login, profile management
- Restaurant browsing: Filters, images, ratings

- Order placement: Cart, promo codes, summary
- Payment: Cash, bKash, card; secure processing
- Live tracking: GPS, ETA updates
- Delivery confirmation: Photo proof, OTP handover, ratings

Non-Functional Requirements:
- Uptime: 99.5% peak
- Security: SSL, RBAC, fraud detection algorithms
- Performance: UI < 3s, order placement < 30s
- Accessibility: Bangla-first, voice assistance
- Auditability: Immutable records, dispute support

Feasibility Analysis

Alternatives:
1. Phone-based system: Low cost, no scalability → Rejected
2. Advanced AI system: High efficiency but expensive → Future phase
3. Hybrid app + SMS + call center: Selected

Assessment:
- Technical: Feasible with smartphones, GPS, and secure payments
- Operational: Matches existing workflows
- Economic: Fits within budget and scalable via commissions

Decision Table – Order Acceptance

Conditions	Rule 1	Rule 2	Rule 3	Rule 4
Restaurant Open	Yes	Yes	No	Yes
Items Available	Yes	No	–	–
Delivery Zone Covered	Yes	Yes	Yes	No
Actions				
Accept Order	✓			
Suggest Alternatives		✓		
Reject with Reason			✓	✓

Conditions	Rule 1	Rule 2	Rule 3	Rule 4
Notify Customer	✓	✓	✓	✓

Decision Tree – Delivery Completion

Delivery Completed?

- No → Continue tracking → Update ETA → Notify customer
- Yes → Request delivery proof → Verify → Confirm delivery → Release payment → Complete order → Request rating

Feasibility Analysis

Alternatives:

- Phone-based system – Low cost, poor scalability → ✖ Rejected
- Advanced AI system – High efficiency, high cost → ✖ Future phase
- Hybrid app + SMS + call center – ✅ Selected (balanced efficiency and cost)

Assessment:

- Technical: Feasible with smartphones, GPS, and secure payment APIs
- Operational: Matches current restaurant and rider workflows
- Economic: Affordable within BDT 1.2 million pilot budget; scalable through commission-based revenue

Budget and Timeline

Pilot Budget (BDT 1,200,000):
- Development: 700,000
- Hardware/Operations: 300,000
- Contingency: 200,000

Gantt Chart (6 months):
Month 1: Requirements & Research
Months 2–3: Design (UI/UX, Architecture)
Months 3–5: Development (Backend, Mobile Apps, Payments)
Month 5: Testing (Unit, Integration, UAT)
Month 6: Pilot Launch, Monitoring, Feedback

Implementation Procedures

Hardware:
- Smartphones (customers, riders)

- Tablets + printers (restaurants)

Software:
- React Native apps
- Node.js backend + REST + WebSockets
- JWT authentication, encrypted database, GPS tracking

Authentication & Access:
- Roles: Customer, Restaurant, Rider, Admin
- OTP login, shift-based rider login

I/O Design:
Input: Touch UI, voice search, photo uploads
Output: Push notifications, SMS, map tracking, receipts

Testing

White-Box Testing

- Payment encryption validation
- API authentication paths
- Rider assignment logic
- Secure order handling

Black-Box Testing

- First-time order
- Modified order and refunds
- Delivery delays
- Poor network performance scenarios

Test cases: UI latency <3s, GPS accuracy ±5min ETA, secure payment failure handling.

Quality Targets

- Reliability: ≥95% order completion
- Security: Zero fraud, verifiable logs
- Usability: ≥90% success rate in pilot

Maintenance and Future Development

Routine Tasks: Server checks, app performance, payment monitoring.
Continuous Improvement: User feedback loops, UI/UX updates.
Periodic Audits: Security reviews, compliance checks.

Future Roadmap:
- AI route optimization
- Loyalty and rewards
- Corporate accounts
- Multi-city expansion
- Verified payment workflows

Chapter 5 – Conclusion

5.1 Summary:

QuickBite Bangladesh presents a secure, reliable, and culturally optimized food delivery ecosystem suitable for Bangladesh's urban and semi-urban environments. It ensures transparency, security, and efficiency while balancing usability, performance, and cost constraints.

5.2 Limitation:
Limited automation and analytics in the pilot version. Full scalability and AI optimization planned later.

5.3 Future Work:
Future versions will introduce AI-based dynamic routing, multi-city integration, advanced analytics, and enhanced fraud detection. These developments will strengthen the system's reliability and expand its reach across Bangladesh.

References

[1] Sommerville, Ian. Software Engineering, 10th Edition. Pearson, 2015.
[2] Pressman, Roger S. Software Engineering: A Practitioner's Approach. McGraw-Hill, 2014.
[3] Food Delivery Trends in South Asia, Quick Service Tech Reports, 2024.