BuildFlow – A Construction Management Platform

ICS 2309 - Commercial Programming & BCT 2315

<u>Team Members and Admin Numbers</u>

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1. Project Title

BuildFlow – A Construction Management Platform for Streamlined Site Operations

2. Project Background and Context

The construction industry in Kenya is rapidly expanding, driven by urbanization and infrastructure development. However, many construction firms—especially small to mid-sized ones—face significant challenges in managing site logistics, workforce coordination, inventory control, and task scheduling. Traditional methods involving paper-based logs or scattered WhatsApp communications are inefficient and error-prone.

BuildFlow addresses these pain points by introducing a centralized, intelligent platform designed to digitize and streamline construction management processes. With real-time task tracking, digital worker attendance, inventory updates, and progress visualization, BuildFlow enhances collaboration and decision-making. This solution empowers site managers with timely insights, while ensuring transparency and accountability across the board. The platform contributes directly to SDG goals such as Industry Innovation, Sustainable Cities, and Decent Work.

3. Team Members and Roles

- BuildFlow is developed by a cross-functional team following Agile principles:
  Teddy Muli-Project Lead
- Amy Njeri- Frontend Engineer
- Kimberly Njoroge- Frontend Engineer
- Collins Omollo – Backend Engineer

4. Problem Statement and Justification

Construction sites are dynamic environments where communication breakdowns, delayed reporting, and poor resource visibility often lead to project overruns and material wastage. Most site managers still rely on manual logs or isolated digital tools, which lack integration and real-time synchronization.

BuildFlow fills this gap by providing a single source of truth for daily site operations. With mobile-friendly interfaces, offline support, and easy onboarding, it ensures field workers and managers alike can collaborate effectively. The system is tailored to Kenya's construction context, emphasizing affordability, ease of use, and relevance to local workflows.

5. Project Objectives

• Develop a scalable platform for managing construction site operations digitally.

• Implement real-time task assignments and progress updates.

• Enable inventory tracking with automated low-stock alerts.

• Use cloud-based storage for centralized data access.

• Ensure mobile optimization for on-site usage.

• Document technical architecture and publish a report on operational efficiency improvements.

6. Functional Overview

BuildFlow is structured into several key modules:

• Dashboard: Visualizes daily activity summaries, pending tasks, and worker attendance stats.

• Task Manager: Allows supervisors to assign tasks with deadlines and view real-time updates.

• Inventory Tracker: Logs materials used, current stock, and supplier deliveries.

• Notifications: Sends updates via SMS or in-app alerts for delayed tasks.

Role-based access ensures each user sees only relevant information, with secure authentication protecting all data.

7. Technical Methodology

The project is built using Agile methodology with six defined sprints. Technologies used include:

1. Frontend: Typescript, NextJs
2. Backend: PHP, Laravel
3. Database: PostgreSQL
4. Deployment:

Backend - Azure

Frontend - Vercel

Database – Aiven

5. API Integrations

Paystack

CI/CD: GitHub Actions

8. Market Strategy and Commercial Viability

BuildFlow targets mid-sized contractors and independent project managers across Kenya
We plan to partner with the National Construction Authority (NCA) and contractor unions for
pilot demos. Workshops and YouTube explainers in Kiswahili and Sheng' will support user
education.

Revenue strategy includes:

• Monthly subscription for task tracking, inventory control, and analytics.

• Custom enterprise plans for large firms with multiple concurrent sites.

9. Resource Requirements

Biometric Devices   -Fingerprint/QR scanners for attendance - 20,000

Cloud Services - Heroku, GitHub Actions   - 5,000

Internet - Testing and deployment connectivity - 3,000

Miscellaneous - Transport, test sites, outreach- 7,000

Total   35,000

10. Risk Assessment and Mitigation

Key risks and mitigation strategies include:

• Hardware Limitations: Devices will be tested under site conditions before full rollout.

• Connectivity Issues: Offline mode support with automatic syncing when online.

• User Adoption: Onboarding videos and multilingual support.

• Data Security: JWT tokens, bcrypt hashing, and HTTPS enforced.

• Scope Creep: A clearly defined MVP ensures focus on core functionality.

11. Deliverables & Timeline

Idea validation -1 week

Prototyping – 1 week

Core development – 4 weeks

Testing- 1 week

Deployment – 1 week

However all these phases are iterable

12. Intellectual Property and Licensing

The codebase will be released under the MIT License. Documentation and research outcomes will be shared on GitHub. Commercial licensing will be managed by the team in partnership with the JKUAT Innovation Office.

13. Expected Impact

BuildFlow has the potential to digitize and optimize operations across hundreds of active construction sites. It promotes professionalism, reduces resource wastage, and empowers supervisors with data-backed decision-making. As construction continues to drive Kenya's economic growth, BuildFlow becomes a tool for smarter, faster, and more reliable project execution.

14. References

• FIWARE Construction Toolkit. https://www.fiware.org/solutions/construction/
• Kenya National Construction Authority – Guidelines
• Sommerville, I. (2020). Software Engineering (10th ed.)