**AUTOMATED WATER DELIVERY AND CONSUMPTION TRACKING SYSTEM: H2HOME**

**ABSTRACT**

Water accessibility remains a challenge in urban areas where many residents lack a reliable supply of clean drinking water. This paper presents ***H2HOME***, a software-based solution designed to automate and track drinking water delivery from local vendors to consumers while monitoring water consumption. The system incorporates a subscription-based model and Pay-As-You-Go (PAYG) options to enhance affordability and convenience. Using an Agile development methodology, the platform integrates Flutter for frontend development, Django/Rust for backend services, and MySQL for data management. Pilot testing in Juja, Kiambu County, will validate system effectiveness before a full-scale launch. This research highlights the impact of digital automation in addressing essential resource distribution challenges.

1. **INTRODUCTION**

Access to clean drinking water is essential, yet urban residents often face difficulties due to unreliable supply from apartment buildings. This forces individuals to frequently visit local vendors for refills, leading to inconvenience and inefficiency. H2HOME seeks to address this challenge by providing a digital solution that connects consumers with local water vendors, enabling scheduled deliveries and tracking water consumption. This paper explores the development, implementation, and expected impact of H2HOME in urban areas.

**1.1 PROBLEM STATEMENT**

In Juja, Kiambu County, most apartment buildings do not provide fresh drinking water for tenants, making water vending a critical service. However, the manual process of refilling bottles is time-consuming and inefficient. H2HOME aims to streamline water delivery through an automated platform that facilitates vendor selection, order placement, and consumption tracking.

**1.2 CONTRIBUTION TO THE FIELD**

H2HOME introduces a novel approach to water distribution by leveraging digital automation. Unlike traditional methods that require physical presence, this platform enables consumers to schedule deliveries at their convenience while supporting vendors with an efficient order management system.

1. **LITERATURE REVIEW**

Existing solutions for water delivery primarily rely on direct consumer-vendor interactions, which lack automation and efficiency. While mobile payment systems have facilitated digital transactions, there is no integrated system that combines automated ordering, delivery tracking, and consumption monitoring. H2HOME differentiates itself by offering a holistic solution that aligns with modern digital transformation trends.

1. **METHODOLOGY**

H2HOME follows an Agile development methodology, ensuring an iterative approach with continuous user feedback. The project is structured into distinct phases:

**3.1 SYSTEM ARCHITECTURE**

* **Frontend:** Flutter (Dart) for cross-platform mobile application development.
* **Backend:** Django/Rust for API management and data processing.
* **Database:** MySQL for secure data storage and retrieval.
* **Authentication:** Django authentication for secure user management.

**3.2 REVENUE MODEL**

* **Subscription-Based:** Users pay a monthly fee based on water quantity and number of refills.
* **PAYG Option:** Customers who do not subscribe can pay per refill at a slightly higher rate.

**3.3 DEVELOPMENT PLAN**

1. **Planning & Requirements Gathering (Weeks 1-2)** – Define functionalities, collect user feedback, finalize technical stack.
2. **UI/UX Design (Weeks 3-4)** – Create wireframes and prototypes using Figma.
3. **Frontend Development (Weeks 5-8)** – Implement user interface and integrate APIs.
4. **Backend Development (Weeks 5-8, Concurrently)** – Build API endpoints and database architecture.
5. **Payment Integration (Week 9)** – Implement M-Pesa and credit card transactions.
6. **Testing & Debugging (Week 10)** – Conduct unit, integration, and user acceptance testing.
7. **Deployment & Launch (Weeks 11-12)** – Deploy on cloud servers, conduct pilot testing in Juja.
8. **RESULTS & ANALYSIS**

Upon deployment, the system will undergo a pilot test in selected apartment buildings and student hostels. Metrics for success include:

* **User Adoption Rate:** Number of sign-ups and active users.
* **Order Completion Rate:** Percentage of successful deliveries.
* **Customer Satisfaction:** Feedback collected through surveys.

1. **DISCUSSION**

H2HOME is expected to enhance water accessibility and vendor efficiency. However, challenges such as vendor onboarding, ensuring real-time order fulfillment, and maintaining system security must be addressed. Future improvements may include integrating IoT-based water level sensors and AI-driven consumption predictions.

1. **CONCLUSION & FUTURE WORK**

H2HOME presents a scalable solution to urban water distribution challenges. By automating vendor-consumer interactions and enabling real-time tracking, it enhances service efficiency while supporting local businesses. Future developments may include expansion to other urban centers and integration with government water supply systems.

1. **REFERENCES**

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