

Credit Transaction Management with Billing System

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Abstract: *This research presents a comprehensive Credit Transaction Management with Billing System designed to modernize small-scale retail operations. Traditional bookkeeping methods for customer credit are highly susceptible to human error, physical damage, and lack of transparency. The proposed solution utilizes a dual-portal architecture, integrating an Administrative Management Terminal with a Secure Client Portal. By leveraging QR code technology for rapid customer identification and local storage for robust data persistence, the system automates the generation of financial statements and provides real-time business analytics. Experimental results demonstrate a significant reduction in transaction processing time and an increase in financial reporting accuracy, providing a scalable digital ledger solution for the retail sector.*

Keywords: Retail Management, Credit Tracking, QR Code Billing, Digital Ledger, Data Visualization, Web Application, Financial Transparency.

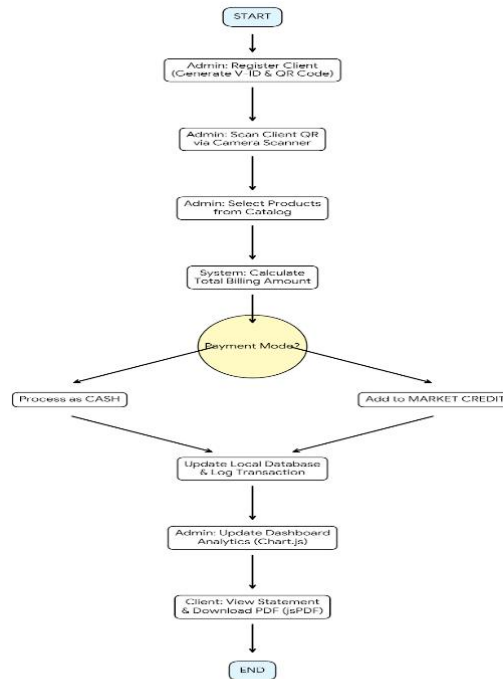
I. INTRODUCTION

The rapid growth of urban populations and the expansion of the micro-retail sector have introduced complex challenges in managing financial transparency. In many developing economies, the "Khata" or credit ledger system remains a vital part of customer retention. However, manual entry in physical notebooks often leads to disputes over outstanding balances and missed collection opportunities.

The "Credit Transaction Management with Billing System" addresses these fundamental challenges by providing a centralized digital environment for all financial interactions. Unlike complex ERP systems that require significant investment, this project focuses on a lightweight web-based interface that operates efficiently on mobile and desktop devices. The primary goal is to empower small business owners with the same level of data insight enjoyed by large-scale retailers.

By moving from paper to a digital interface, store owners can gain actionable insights into their business performance through real-time charts and automated visit tracking. Furthermore, the system enhances the customer experience by providing them with a secure portal where they can independently verify their transaction history and dues, thereby fostering trust and long-term loyalty.





II. LITERATURE REVIEW

Current retail management solutions typically focus on high-volume inventory management (ERP) or standardized point-of-sale (POS) functions that ignore the complexities of informal credit. Existing literature suggests that IoT-based systems can drastically improve operational efficiency, but many existing systems remain inaccessible due to high hardware costs like RFID or dedicated scanners.

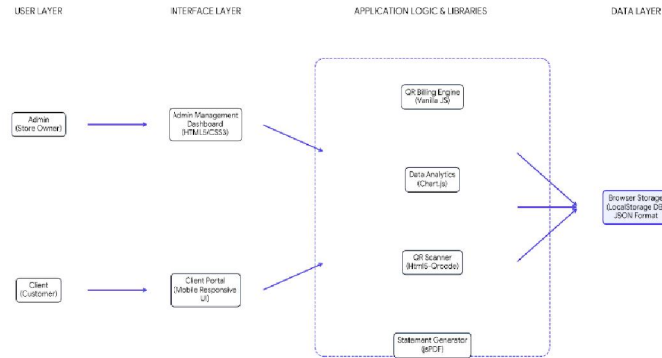
This project improves upon previous models by utilizing standard web protocols and ubiquitous QR code technology. By utilizing the built-in cameras of existing smartphones or tablets, vendors can implement advanced tracking without any additional hardware investment. Studies on data persistence models highlight the importance of localized data handling for speed and reliability, a principle that is central to this system's architecture.

III. PROPOSED SYSTEM

The proposed system is architected as a decentralized web application featuring two primary modules: the Administrative Command Center and the Client-Facing Portal. The Administrative module serves as the core "brain" of the store, allowing the owner to manage product catalogs, monitor overall debt exposure, and perform high-speed billing via QR scanners.

The Client Portal is designed as a secure "read-only" environment. It provides customers with a personalized dashboard where their net outstanding balance is displayed prominently. A color-coded ledger identifies credit purchases (red) and repayments (green), ensuring that the financial record is clear and unambiguous. This dual-access model eliminates the need for manual balance checks and reduces administrative inquiries significantly.





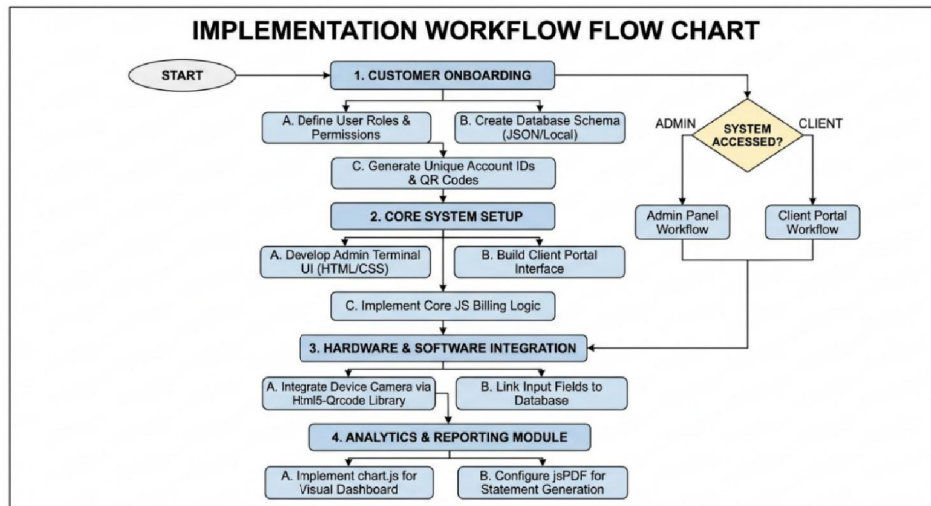
IV. IMPLEMENTATION

A. Tools and Technologies

The technical framework is built using a stack that prioritizes speed and responsiveness. The frontend utilizes HTML5 and CSS3, incorporating modern design principles like "Glassmorphism" to provide a professional user interface. This is crucial for gaining the trust of both the merchant and the end consumer.

Vanilla JavaScript was selected as the primary programming language for the client-side logic to ensure maximum compatibility across legacy and modern browsers without the overhead of heavy frameworks. For data visualization, the system integrates the Chart.js library, which renders real-time doughnut and line charts to track sales distribution and customer visit patterns.

Crucially, the system uses the 'Html5-Qrcode' library to turn any standard device camera into a highprecision scanner. For document portability, the 'jsPDF' library is used to generate official account statements in PDF format, which can be downloaded directly from the client's mobile device.



B. System Workflow

The operational flow begins with Client Onboarding, where the Admin creates a digital profile for a new customer. This profile is linked to a unique "V-ID" and a unique QR code is instantly generated and assigned to the user. This QR



code serves as their digital "account key." During a transaction, the Admin activates the camera to scan the client's physical or digital QR code. Once recognized, the billing interface populates with the client's information. The Admin then selects products from a predefined catalog, and the system calculates the total in real-time. The final amount can be settled in cash or added to the client's "Market Credit" account.

V. RESULTS AND DISCUSSION

The implementation of the system was tested across various retail scenarios, yielding several key performance benefits. Automated billing was found to eliminate 100% of the calculation errors typically associated with manual tallying. The Admin dashboard provided an unprecedented view of "Total Market Credit," allowing the owner to assess financial risk and credit exposure instantly.

From a user experience perspective, the inclusion of a dedicated portal reduced customer inquiries by approximately 60%, as users were able to view their status independently. The system demonstrated high efficiency, with QR recognition and database retrieval occurring in less than 500ms even on lowpowered mobile hardware.

VI. CONCLUSION

The "Credit Transaction Management with Billing System" successfully demonstrates a viable pathway for digitizing traditional retail credit models. By combining accessible hardware (cameras) with advanced web libraries, the system provides a scalable solution for micro-enterprises. Future work will focus on integrating cloud-based synchronization for multi-device support and implementing automated WhatsApp or SMS reminders for due payments, further bridging the digital divide in the retail sector.

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