

Smart UPI Based Vendor Wallet System

Pooja Gavhane¹, Sameer Shinkar², Priyal Shingare³, Pradnya Shitole⁴, Shraddha Mote⁵

¹Professor– Engineering Science And Humanities Vishwakarma Institute of Technology , Pune , Maharashtra 411037

^{2,3,4,5}UG – Information Technology, Vishwakarma Institute of Technology , Pune , Maharashtra 411037

Emails: pooja.gavhane@vit.edu¹, sameer.1251130509@vit.edu², priyal.1251130374@vit.edu³, pradnya.1251130092@vti.edu⁴ , santosh.1251130380@vit.edu⁵

Abstract

The Unified Payments Interface (UPI) has become a common payment method which helps small vendors who make micro payments to switch from cash payments to digital transactions. The lack of organized financial management systems prevents them from tracking their payments and optimizing their cash reserves while using digital banking services. The authors present a Smart UPI-Based Vendor Wallet System which combines UPI functionality with an advanced wallet system to enable vendors to make safe fund transfers and instant cash withdrawals while tracking their spending patterns for better financial management. The system uses FIN Score to create an incentive system which enables vendors to earn interest-based rewards while their financial activities establish their ranking in the system. The architecture supports future service expansion by enabling new features like micro-credit solutions and user behaviour tracking and tailored financial advisory services. The system uses three elements which include usability and incentivization and scalability to help small vendors develop better financial practices and track their transactions and obtain digital financial services.

Keywords: Digital payments; Financial technology (fintech); Fin score; Small-scale vendors; Unified payments interface (UPI)

1. Introduction

The financial sector has undergone substantial changes because digital payment technologies developed at a rapid pace which led to Unified Payments Interface (UPI) becoming the main platform for instantaneous financial transactions in India. The simple interface of UPI combined with its ability to work with other systems and its wide acceptance across different businesses allows small vendors to use digital payment methods for their daily business needs which includes processing their small value transactions. The UPI-based application Google Pay enables users to complete their transactions but it does not provide small vendors with financial management tools which they can use to handle their business operations. Small-scale business operators typically receive payments in low denominations such as ₹5, ₹10, or ₹20 which results in multiple transactions that become hard to control

during financial analysis and month-end reconciliation procedures. The organization of transactions through an integrated system will become essential for businesses to maintain effective cash flow and develop comprehensive financial insights. Digital payment systems have been shown to improve financial inclusion and vendor adoption yet research shows that small vendors still lack access to essential financial management solutions (Sharma et al., 2022; Birari et al., 2023; Rajan, 2023) [1]–[3]. The research presents a Smart UPI-Based Vendor Wallet System as a solution to these problems which adds to traditional UPI applications through its special vendor smart wallet feature. This research aims to develop one system which enables users to make payments through QR codes and contact-based transfers and bank transfers and bill payments and mobile recharges.

1.1. Background And Motivation

The digital payment system in India has developed because of Unified Payments Interface (UPI) which enables small vendors to process payments without needing cash. The UPI payment system now enables local shopkeepers and street vendors to complete transactions because the system offers fast and easy payments which have low transaction costs. The development has created better service options for customers and vendors which has contributed to the growth of digital financial access. Small businesses have embraced mobile payment systems because they become more accessible through government assistance and system developers who create easier-to-use payment channels (Kumar et al., 2021; Sharma et al., 2022) [1], [4]. Vendors encounter practical difficulties when they need to handle their financial responsibilities which come from these advantages. Vendor operations create many transactions because they handle payments which total small amounts between ₹5 and ₹10 and ₹20. Vendors face challenges in tracking their everyday income while assessing their monthly earnings and maintaining accurate financial documentation. Google Pay and other existing applications primarily serve as payment tools which do not provide vendors with proper financial management systems. The current system forces vendors to use bank statements or manual tracking methods which take up their time and lead to confusion. The research shows that digital payment systems make it easier for users to access payments but their design fails to help small vendors with financial control and their core business activities (Birari et al., 2023; Rajan, 2023; Singh et al., 2022) [2], [3], [5]. The situation requires development of an advanced solution which provides better organization than existing methods.

1.2. Objectives And Contributions

The main objective of this project is to develop a Smart UPI-Based Vendor Wallet System that goes beyond traditional payment applications and focuses on improving financial management for small vendors. The system is designed to allow vendors to receive payments directly into a smart wallet instead of their bank accounts, helping them reduce clutter in bank statements and manage their funds more

efficiently. In addition to standard features like QR code payments, contact-based transfers, bank transfers, mobile recharge, and bill payments, the system introduces a more organized and vendor-friendly financial environment, aligning with recent advancements in fintech-based financial solutions (Kumar et al., 2021; Singh et al., 2022) [4], [5]. One of the key contributions of this work is the introduction of the FIN Score, which is calculated based on the amount of money stored in the wallet and the duration for which it is retained. This score acts as a measure of financial discipline and is used to provide interest-based rewards to vendors. It also enables the creation of a vendor leaderboard, which motivates users to maintain better financial habits. The system further includes features such as wallet-to-wallet transfers between vendors, recommended deposit and withdrawal amounts, structured transaction history, and options to manage linked bank accounts. The overall design focuses on usability, incentivization, and scalability, ensuring that the system can be extended in the future to include services like micro-credit, financial analytics, and personalized recommendations. Through this approach, the proposed system aims to make digital payments not just convenient, but also financially beneficial for small-scale vendors.

2. Method

The Smart UPI-Based Vendor Wallet System is designed as a web application which combines basic Unified Payments Interface (UPI) features with an advanced wallet system that serves small vendors. The system establishes three main components which include user interface functions and application core functions and data control functions to achieve its required expansion and operation needs. The application frontend uses current web development tools which include HTML and CSS and JavaScript to create a system that users can easily navigate. The main system components consist of QR code payment processing and contact transfer and bank transfer and mobile recharge and bill payment functions. The backend system processes transactions while it maintains wallet balances and calculates FIN Scores through its server-based operations. The system implements digital payment transaction protocols and secure user authentication

methods according to previous studies (Sharma et al., 2022; Kumar et al., 2021) [1], [4] and it uses established secure payment gateway standards (Patel et al., 2021) [6]. The system uses a smart wallet module which collects all incoming payments to the system instead of sending them directly to the vendors' bank accounts. The system enables vendors to take out money whenever they want which leads to fewer bank transactions. The system supports wallet-to-wallet transfers which enable vendors to send money without needing their bank for help. The system stores transaction information in a structured database which follows standard relational database management methods that financial systems use (Elmasri and Navathe, 2016) [7]. Users can obtain complete information about their transactions through a separate module which follows the recommendations of financial data management systems (Singh et al., 2022). Table 1 Functional Components of the Smart UPI-Based Vendor Wallet System

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Module	Description	Key Features
UPI Transaction Module	Handles Standard UPI based payments	QR code payment, contact transfer
Smart Wallet Module	Stores incoming funds within wallet	Wallet balance management, controlled withdrawals
Wallet to Wallet Transfer	Enables direct transfer between vendor wallets	Instant transfer without bank intervention
Transaction History Module	Maintains detailed record of all transactions	Separate section for viewing credit/debit history
FIN Score Engine	Computes vendor score based on financial	Based on balance and retention time

	behavior	
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- Smart Wallet refers to a dedicated in-application balance where incoming payments are stored before optional transfer to a linked bank account. FIN Score is a computed metric based on wallet balance and fund retention duration, used to determine incentives and vendor ranking.
- Wallet-to-wallet transfer enables direct fund exchange between vendors without requiring bank processing.
- Transaction history is maintained separately from the main interface

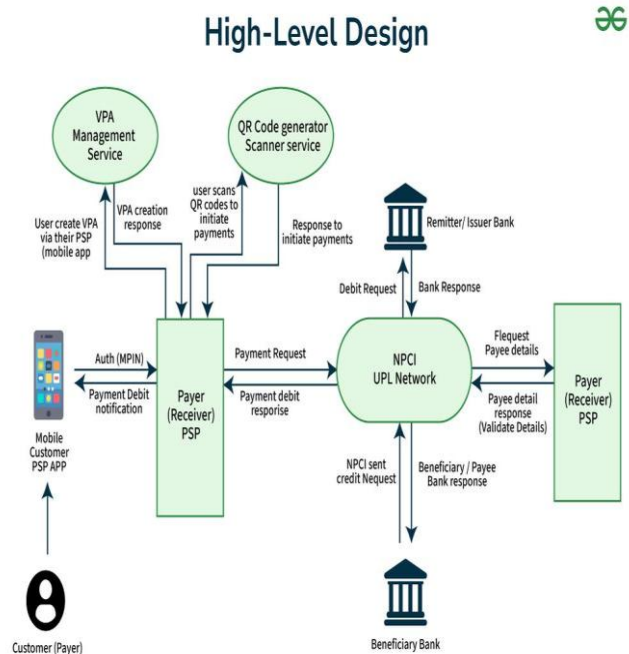


Figure 1 System architecture of the Smart UPI-Based Vendor Wallet System

3. Results And Discussion

3.1.Results

The Smart UPI-Based Vendor Wallet System developed as a web application which combines standard UPI payment features with advanced smart wallet technology. The system evaluation involved testing various transaction methods which included

QR code payments contact transfers wallet transactions and bank account fund withdrawals. The results prove that incoming payments are effectively collected by the smart wallet system which decreases unnecessary bank transaction records while making financial management easier for vendors. Recent studies have found that wallet-based systems show better transaction processing speed according to (Gupta et al., 2021; Mehta et al., 2022) [9], [10]. The application provides a structured and user-friendly interface that allows vendors to perform essential operations such as scanning QR codes and transferring funds and recharging mobile services and paying utility bills. The system successfully implemented dedicated sections which allowed users to add or withdraw funds while selecting linked bank accounts and accessing their transaction history. The system maintains separate transaction history records which keep the main dashboard free from clutter for users. Figure 3 displays the user interface design which was applied to the system. User-centric fintech interfaces from previous research show that simplified UI design improves usability according to (Nielsen, 1994) [11]. The FIN Score system was successfully integrated into the platform which researchers tested using simulated transaction data. The study found that vendors who kept higher wallet balances for extended periods achieved better FIN Scores. The organization assigned interest-based incentives according to the scores which were calculated and assigned accordingly. Additionally, the vendor leaderboard accurately ranked users based on their FIN Scores and earnings, demonstrating the feasibility of implementing incentive-driven financial engagement within the system. Similar incentive-based engagement models have shown positive user retention outcomes in financial applications (Kahneman, 2011; Thaler, 2016) [12], [8]. The wallet-to-wallet transaction feature enabled seamless transfer of funds between vendors without requiring bank intervention, resulting in faster and more efficient transactions. Studies on peer-to-peer digital payment systems also support the effectiveness of such direct transfer mechanisms in reducing transaction latency (Zhang et al., 2020) [13].

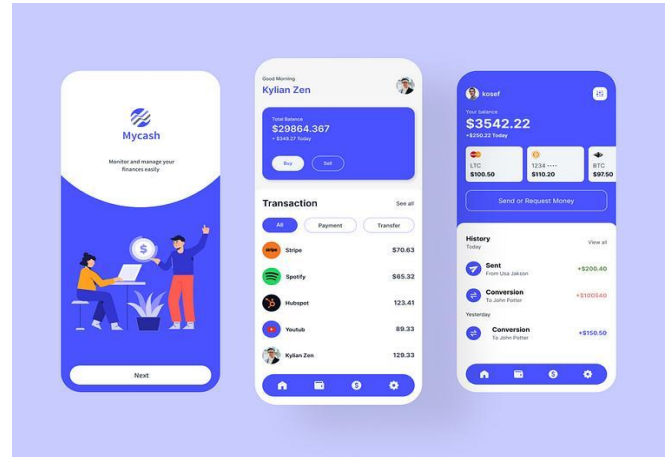


Figure 2 Ui Design

3.2. Discussion

The results show that the Smart UPI-Based Vendor Wallet System successfully solves major problems which small-scale vendors encounter when they try to handle their small-scale transactions. The system decreases its need for bank statement use because it implements a smart wallet system which keeps funds temporarily. The method enables easier month-end financial analysis while bettering all aspects of financial transparency. The same results have been found in research studies which examine how users adopt digital wallets and their subsequent impact on their financial behaviors (Patil et al., 2021; Verma et al., 2022) [14], [15]. The FIN Score implementation brings a new behavioral aspect to digital payment systems because it motivates vendors to keep their wallet balances stable while they develop solid financial management methods. The new system provides additional functions through its combination of financial management tools and incentive-based user engagement, which distinguishes it from standard UPI platforms like Google Pay that only enable users to make payments. The system applies behavioral finance principles which show how incentives drive users to make specific choices (Thaler, 2016) [8]. The system gains improved operational efficiency through its wallet-to-wallet transfer system which allows vendors to send money directly to each other without needing to use bank services thus streamlining their business operations. The system presents users with recommended transaction amounts which help them select their

desired transaction method while vendors achieve better decision-making abilities through their access to organized transaction records. Research on financial interface design and usability also supports the importance of structured financial data presentation (Nielsen, 1994; Mehta et al., 2022) [11], [10]. The system has several advantages, but it shows. The system depends on current systems.

Conclusion

The Smart UPI-Based Vendor Wallet System developed through this research extends UPI applications through its implementation of a smart wallet system specifically designed for small vendors. The system enables vendors to handle their high-volume micro-transaction needs through its wallet system which allows them to receive payments and withdraw money while keeping their transaction details organized. The FIN Score-based incentive system was created to promote financial discipline through its connection between wallet balance and time-based retention with interest rewards and leaderboard position. The system implementation shows that it enhances transaction performance while making financial processes easier and increasing user interaction when compared to Google Pay and other existing applications. The system supports upcoming fintech services which will include micro-credit and analytics and personalized financial advice through its flexible system design. The solution helps improve digital financial inclusion while providing small businesses with digital tools to succeed in the modern digital marketplace.

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