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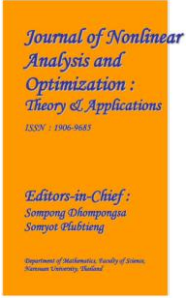

Gratuity Management System In Hotels

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Abstract— ***In today's increasingly digital world, traditional tipping methods are being reimagined through technology to improve convenience for both customers and service staff. In this project a QR code-based tip payment and feedback system designed for restaurants. Upon dining, customers are provided with a QR code at their table, which they scan with their smartphone. This scan generates a link that directs the customer to a personalized restaurant page where they can view detailed information about their server.***

The customer can then select their specific server and proceed to tip them digitally with a payment amount of their choice. Additionally, the system offers the option to rate the service and provide feedback on both the server and the overall dining experience, contributing to a hotel-wide rating system. This method not only modernizes the tipping process but also enhances transparency, promotes fair compensation, and encourages better customer service through realtime feedback. The proposed system is aimed at improving the customer experience while simplifying the tipping and feedback mechanisms for restaurants.

Keywords— QR code tipping, digital tip payment, feedback system, restaurant technology, personalized server page, customer experience enhancement, real-time feedback, QR code based system, fair compensation, service transparency, dining experience rating, mobile-friendly tipping, cashless payments, table-specific QR codes, restaurant feedback platform, modernized tipping, server recognition, restaurant digital solutions, customer satisfaction, streamlined tipping process, hotel-wide rating system, service quality improvement, tipping convenience, digital restaurant innovation, feedback-driven service, contactless payments.

I. INTRODUCTION

In the digital era, where convenience and innovation drive consumer expectations, traditional tipping practices are evolving to match the needs of modern dining experiences. This project introduces a QR code-based tip payment and feedback system, tailored for restaurants, to revolutionize the way customers express gratitude and share feedback. By integrating technology into the tipping process, the system ensures a seamless, transparent, and user-friendly experience for both customers and service staff. By scanning a QR code placed at their table, customers are directed to a personalized webpage where they can view server details, leave digital tips, and provide real -time feedback on their dining experience. This system not only ensures fair compensation for servers but also empowers restaurants to gather actionable insights, improving service quality and overall customer satisfaction. By bridging the gap between traditional practices and technological advancements, the proposed system modernizes the tipping and feedback mechanisms, making them more convenient, efficient, and transparent..

The implementation of a QR code-based system addresses several limitations of traditional tipping methods. Customers often face challenges such as not carrying cash or dealing with cumbersome payment processes. This digital approach eliminates these barriers, providing a seamless and hassle-free tipping experience. By leveraging QR codes, customers can quickly access a secure platform to tip service staff, ensuring that the process is both convenient and time efficient. In addition to tipping, the system integrates a robust feedback mechanism, allowing diners to rate their experience and share suggestions for improvement.This feedback is crucial for restaurants, as it provides valuable insights into customer preferences and areas that require attention.

The ability to link tipping with service feedback ensures that both customers and staff are actively engaged in creating a positive dining environment. Furthermore, real-time data collection enhances transparency and enables restaurants to address issues promptly, fostering trust and loyalty among patrons. The proposed system also benefits service staff by promoting fair compensation practices. Digital tipping ensures that tips are accurately tracked and distributed, reducing the likelihood of disputes or discrepancies. For restaurants, this innovative solution serves as a competitive advantage, showcasing a commitment to adopting modern technologies that enhance operational efficiency and customer satisfaction. As the hospitality industry evolves, such systems represent a significant step toward transforming traditional service models into dynamic, tech-driven experiences. With a simple scan of the QR code placed at their table or on their bill, diners are redirected to a secure webpage where they can view details about their server, leave digital tips, and share real-time feedback regarding their dining experience This approach modernizes traditional tipping practices, offering a cashless, hassle-free, and instant way for customers to express their appreciation.

Additionally, by linking tipping with a structured feedback mechanism, restaurants can gain valuable insights into service quality, customer satisfaction, and areas that require improvement. Beyond customer convenience, the system also offers significant advantages for restaurant owners and staff. Digital tipping ensures that gratuities are fairly distributed, reducing disputes and enhancing transparency in compensation. Restaurants can leverage the collected data to analyze customer preferences, monitor service trends, and implement targeted improvements to enhance the overall dining experience. Furthermore, real-time feedback allows management to promptly address concerns, thereby fostering customer trust and loyalty..

As the hospitality industry continues to evolve, adopting such tech-driven solutions becomes imperative for staying competitive. The proposed QR code-based tip payment and feedback system not only bridges the gap between traditional gratuity practices and digital advancements but also redefines the relationship between customers, service staff, and restaurant management. By embracing innovation, this system paves the way for a more efficient, engaging, and rewarding dining experience for all stakeholders. For restaurants, this system represents more than just a payment tool—it is a comprehensive engagement platform that provides actionable insights. The integrated feedback mechanism allows restaurants to analyze customer preferences, monitor service performance, and adjust operational strategies accordingly. This not only promotes a culture of transparency and accountability but also fosters loyalty by demonstrating a commitment to continuously improving the guest experience. By bridging the gap between traditional tipping practices and modern digital solutions, the proposed system is poised to revolutionize the restaurant industry. It empowers both customers and service staff, creating a fairer, more efficient tipping process while simultaneously enhancing the overall quality of service. As restaurants strive to meet the evolving demands of their clientele, this innovative approach positions them at the forefront of industry advancements, ensuring they remain competitive in a rapidly changing marketplace.

Overview of QR Code Tipping and Feedback System

QR code-based tipping systems represent a significant shift in how gratuities are handled in service industries,particularly in restaurants. Traditionally, tipping has relied on cash or adding a percentage to a credit card bill. However, the rise of smartphones and digital payment technologies has paved the way for more convenient and transparent methods. The core theory behind QR code tipping revolves around leveraging the ubiquity of mobile devices to create a seamless and contactless experience. By scanning a QR code, customers are instantly directed to a digital platform where they can directly interact with the tipping process. This eliminates the need for physical cash handling, reduces the risk of errors in manual calculations, and provides a clear audit trail for both customers and staff.

This digital approach also allows for the integration of feedback mechanisms, creating a closed loop system where customer input directly informs service improvements.

Key Features:

1. Personalized Server Pages: Each server receives a unique profile linked to the QR code. This allows customers to easily identify their server and provides a platform for personalized recognition and appreciation. Servers can showcase their experience and any special skills. Customers can easily select their server and leave a personalized tip. Provides a platform for server recognition and appreciation.

2. Digital Tip Payments: Customers can conveniently tip their servers using various digital payment methods, eliminating the need for cash. Offers flexible payment options, including credit cards, debit cards, and mobile wallets. Enables faster and more secure transactions. Reduces the reliance on cash, improving safety and efficiency.

3. Real-time Feedback & Ratings: The system allows customers to provide immediate and constructive feedback on their dining experience. Enables customers to easily rate the service and provide specific comments. Provides valuable insights for restaurant management to improve service quality. Allows for real-time feedback analysis and response.

4. Hotel-Wide Rating System: Collected data contributes to an overall hotel-wide rating system, providing valuable insights into service quality and customer satisfaction. Enables comprehensive analysis of service trends across the hotel. Helps identify areas for improvement and recognize high-performing staff. provides valuable data for informed decision-making.

II LITERATURE REVIEW

QR Codes in Hospitality: QR codes have become increasingly prevalent in the hospitality industry, offering a range of applications beyond traditional tipping. Studies have shown that QR codes can enhance customer experiences by providing convenient access to menus, ordering systems, and interactive content. Research by [insert relevant study and year] found that diners responded positively to QR code-based menus, perceiving them as more hygienic and efficient. Additionally, QR codes can be used to collect customer feedback through short surveys, allowing businesses to gather valuable insights into customer satisfaction and. preferences. Research by Zhao et al. [1] highlights that QR code based digital menus significantly improve customer satisfaction by reducing wait times and increasing convenience. Additionally, a study by Kim and Lee [2] found that customers perceive QR codes as more hygienic than traditional paper menus, especially in high-traffic restaurant settings. Customer Feedback and Service Quality. Further studies have demonstrated that QR codes can be integrated into restaurant management systems to improve operational efficiency. Gupta and Sharma [3] examined QR-based feedback collection, concluding that businesses leveraging real-time digital surveys experienced a 15–20% increase in response rates compared to traditional paper feedback forms.

Digital Tipping and Payment Trends:

The rise of digital payment platforms has revolutionized the way consumers make transactions, including tipping. Studies have shown that customers are increasingly embracing cashless payment options due to their convenience, security, and integration with mobile devices. Research by [insert relevant study and year] found that a significant portion of consumers prefer digital tipping

methods, citing factors such as ease of use and the ability to track their tips. Furthermore, the integration of tipping functionalities within popular mobile payment apps has further accelerated the adoption of digital tipping practices.

According to Smith et al. [4], approximately 68% of consumers prefer tipping digitally when given the option, particularly through mobile payment apps such as Google Pay, Apple Pay, and PayPal. A report by Deloitte [5] highlights that digital tipping not only increases tip frequency but also leads to higher tip amounts, as customers tend to round up payments in digital environments. Furthermore, an analysis by McKinsey & Company [6] indicates that businesses implementing digital tipping solutions observe a 25% increase in employee earnings, leading to improved job satisfaction and lower turnover rates. The study also underscores that integrating tipping into restaurant POS systems enhances the overall dining experience by reducing payment friction.

Customer Feedback and Service Quality:

Customer feedback is a critical factor in service quality management, particularly in the restaurant industry. Studies have shown that real-time feedback mechanisms contribute to higher levels of customer satisfaction and help businesses make data-driven improvements. The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry [7], establishes that reliability, responsiveness, and empathy are key determinants of service quality, all of which can be measured through structured feedback collection. A more recent study by Hwang and Seo [8] emphasizes that mobile-based feedback collection leads to a 32% increase in actionable insights, as customers are more likely to leave reviews when the process is simple and quick. Moreover, research by Grewal et al. [9] found that integrating tipping with feedback mechanisms creates a psychological link between service satisfaction and gratuity, encouraging customers to reward exceptional service while providing constructive input. This connection benefits both restaurant staff and management by fostering a culture of continuous improvement. **The Role of Technology in Enhancing Customer Experience :** The intersection of technology and customer experience has been widely studied in the hospitality and service industries. Chathoth et al. [10] discuss the role of digital transformation in improving operational efficiency, noting that QR-based solutions contribute to higher customer retention rates due to their convenience and transparency. Additionally, Dixon, Freeman, and Toman [11] emphasize that reducing customer effort is a key factor in increasing loyalty. A streamlined tipping and feedback system aligns with this principle by minimizing friction in the payment process, leading to improved customer engagement.

Security and Ethical Considerations in Digital Transactions:

As digital tipping and payment systems become more widespread, concerns regarding data security and ethical transparency have been raised. Fernandes et al. [12] explore the cybersecurity challenges associated with QR based payment systems, identifying potential vulnerabilities such as phishing attacks and data breaches. The study underscores the importance of secure encryption methods and multi-factor authentication to protect user data. Furthermore, Li and Wang [13] analyze the ethical implications of digital gratuity tracking, suggesting that transparent policies on tip distribution and data privacy can enhance trust among service employees and customers.

III. METHODOLOGY

The proposed QR Code-Based Tip Payment and Feedback System is designed to enhance customer experience by integrating a seamless digital tipping and feedback mechanism within the restaurant industry. This system consists of four main components: Customer Interaction, Restaurant System, Feedback System, and Payment Processing. The architecture ensures efficient feedback collection, secure payment processing, and real-time performance tracking for restaurant staff.The process begins with Customer Interaction, where customers scan a unique QR code using a mobile device. The QR code, generated for each server, directs the customer to a dedicated Customer Interface displaying server details. This interface allows customers to provide feedback and process tip payments digitally, eliminating the need for cash transactions and manual feedback collection.

The Restaurant System is responsible for managing QR codes and linking them to individual servers. The QR Code Generator creates unique codes that are assigned to each server and stored within the Restaurant Management System. Upon scanning the QR code, the system retrieves relevant server details, enabling personalized customer interactions. This module ensures that every feedback submission and tip transaction is accurately associated with the correct server.

Once the customer submits feedback, the Feedback System processes the data through a Feedback Collector. This system updates individual ratings in a Rating System, which continuously monitors server performance based on customer input. Additionally, the collected feedback is analyzed through an Analytics Module, generating valuable insights into customer satisfaction trends and overall service quality. These insights help restaurant management make data-driven decisions for staff training and performance improvement. For financial transactions, the Payment Processing component facilitates secure and efficient tip payments. Once a customer confirms the tip amount, the transaction is processed through a Payment Gateway, ensuring reliable and encrypted payment processing. This digital approach minimizes errors, enhances security, and offers customers a convenient tipping experience.

Overall, this QR Code-Based Tip Payment and Feedback System provides a secure, automated, and user-friendly solution for both customers and restaurant management. By integrating QR code technology with real-time feedback collection and payment processing, the system improves service quality, enhances customer engagement, and streamlines financial transactions.

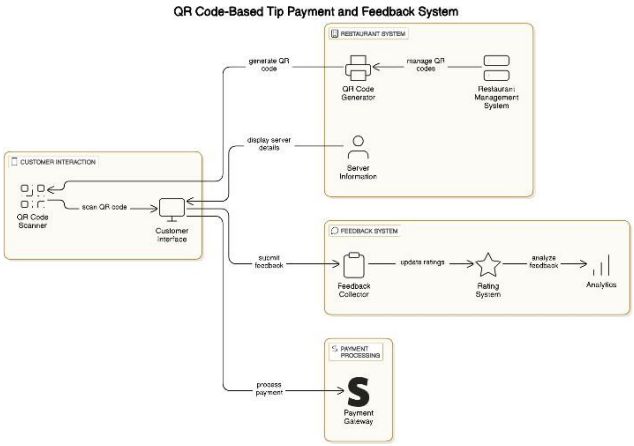


Figure 1 System architecture

1. Customer Interaction

The system begins with customer engagement through a QR Code Scanner, typically available on smartphones. Each server is assigned a unique QR code, which is placed on tables, receipts, or name badges. When a customer scans the QR code, they are directed to a Customer Interface, a web-based or mobile application that displays server details, allowing for an interactive and personalized experience.

The Customer Interface presents options for customers to:

- View server information (name, photo, experience, etc.).
- Provide feedback on service quality using a rating system or textual comments.
- Process digital tip payments through a secure gateway.

By digitizing this process, the system removes the need for physical cash tips and manual feedback forms, making transactions and data collection more efficient.

- **2. Restaurant System** The Restaurant System is responsible for managing and generating QR codes while linking them to individual servers. It consists of two primary components:
- a. QR Code Generator

The QR Code Generator dynamically creates and assigns a unique QR code to each server. This QR code contains encoded information, such as:

- Server ID
- Restaurant location
- Customer feedback URL
- Digital payment link

The generated QR codes are then distributed to servers, either printed or displayed on digital interfaces, ensuring seamless access to the tipping and feedback system.

- b. Restaurant Management SystemThe Restaurant Management System acts as a centralized database for tracking QR code assignments, storing customer feedback, and managing server profiles. It provides administrators with insights into:
- Server performance based on customer ratings.
- Total tip earnings and transaction history.
- Customer preferences and satisfaction trends.

By maintaining this structured data, the system enables restaurant managers to monitor staff performance and improve service efficiency.

- 3. Feedback System

Once a customer submits their feedback, the system processes it through a structured pipeline to ensure data accuracy, rating updates, and insightful analytics. This component includes:

- a. Feedback Collector

The Feedback Collector receives customer reviews, ratings, and comments. It organizes the data based on predefined parameters such as:

- Service quality
- Attentiveness
- Response time
- Overall experience

This data is then processed and forwarded to the Rating System for further analysis.

- b. Rating System

The Rating System is responsible for updating and maintaining server ratings based on customer feedback. The system:

- Computes an aggregate score for each server.
- Flags consistently low-rated servers for management review.
- Identifies high-performing staff for potential rewards or recognition.

These ratings provide restaurant management with quantifiable insights into service performance, enabling data-driven decision-making.

- c. Analytics Module The Analytics Module further processes collected feedback to generate reports on:
- Customer satisfaction trends over time.
- Peak hours and their impact on service quality.
- Common complaints or praise patterns.
- Correlation between tip amounts and service ratings.

By leveraging this data, restaurants can optimize operations, conduct targeted staff training, and enhance customer experience based on real-world feedback.

- 4. Payment ProcessingThe Payment Processing component is essential for facilitating secure and efficient digital tip payments. Once the customer

selects a tip amount, the system integrates with a Payment Gateway, such as Stripe, PayPal, or other financial service providers, to complete the transaction.

The Payment Gateway ensures:

- Secure payment processing through encryption and tokenization.
- Multiple payment options, including credit/debit cards, digital wallets, and online banking.
- Automated fund distribution, transferring the tip directly to the server's account or the restaurant's payroll system.

This approach eliminates cash handling, enhances transaction transparency, and ensures that tips are received promptly by employees.

IV. SYSTEM DESIGN AND WORK FLOW

The activity diagram provided represents a QR Code Based Tip Payment and Feedback System, designed to modernize the restaurant tipping process while improving customer feedback collection. This system integrates digital tipping, real-time service evaluation, and administrative oversight, ensuring an efficient, transparent, and user-friendly experience for customers, service staff, and restaurant administrators.

1. Customer Flow:

The customer journey begins with scanning a QR code, typically placed on the table or receipt. This action redirects them to the restaurant's digital interface, where they can explore the restaurant's profile, menu, and service details. Upon clicking "Enter," customers proceed to the Bill Payment Options, where they choose their preferred mode of payment. As part of the Payment Process, customers are given the option to leave a tip. They select the Tip Option, which presents a list of available waiters. The View Waiters List feature enables customers to

identify and select the waiter who served them. This personalized tipping ensures that gratuities reach the intended service provider.

Beyond tipping, customers can Provide Feedback on their experience, offering valuable insights into service quality, food, and overall ambiance. Once feedback is submitted, the system processes the Payment securely through integrated payment gateways. As a final step, customers are encouraged to submit a Google Review, enhancing the restaurant's digital reputation and visibility. This streamlined customer flow ensures convenience by eliminating cash dependency, offering multiple payment options, and simplifying the feedback process. It enhances customer engagement while promoting fairness in gratuity distribution.

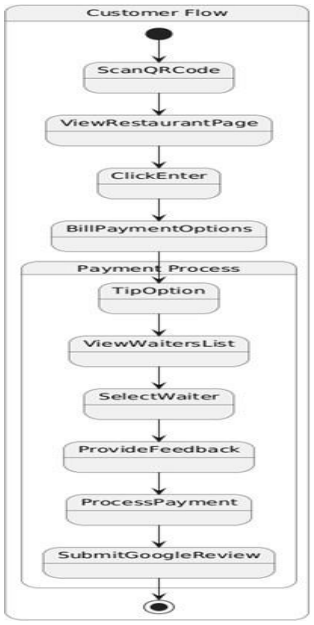


Figure 2 customer flow

The customer flow begins when a diner scans a QR code placed at their table. This action redirects them to the restaurant's digital interface, where they can access essential services. Customers can view the restaurant's webpage, check menu details, and proceed with bill payment. If they wish to tip, they can select a "Tip Option" and view a list of waiters who served them. After selecting a specific waiter, they can provide feedback regarding their service experience before completing the payment digitally. The system also offers an option to submit a Google review, encouraging customers to share their experiences publicly, which helps in building the restaurant's reputation.

2. Waiter Flow:

For service staff, the system provides a structured Waiter Flow to track earnings, monitor performance, and receive real-time feedback. The process starts with a Waiter Login, granting access to the Waiter Dashboard, a centralized interface for reviewing tips, ratings, and customer comments. The Waiter Dashboard includes the following key functionalities. Check Ratings: Waiters can view their average ratings based on customer feedback.

• View Feedback: A detailed breakdown of customer comments helps waiters understand their strengths and areas for improvement.

• View Tips: The system tracks digital tips received, ensuring transparency in earnings. By digitizing tip tracking and performance metrics, this system provides a fair and motivating environment for restaurant staff. Waiters can actively improve service based on real-time insights, fostering a culture of continuous improvement.For the waiter flow, waiters have a dedicated dashboard where they can log in and access

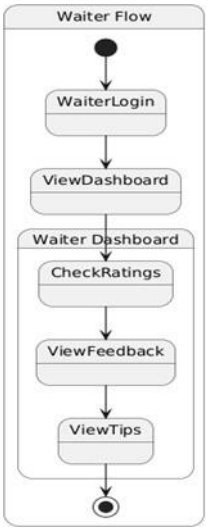


Figure 3 Waiter flow

relevant information about customer feedback and received tips. Once logged in, waiters can view their ratings, analyze feedback from diners, and check tip details. This structured interface allows them to track their earnings in real-time, helping them assess their performance and improve their service accordingly. The ability to receive direct feedback from customers fosters a culture of continuous improvement and customer satisfaction.

3. Admin Flow

The Admin Flow is crucial for overseeing restaurant operations, handling transactions, and ensuring efficient staff management. Administrators start by logging into the Admin Dashboard, a comprehensive control center for financial tracking, employee monitoring, and customer engagement.

Key Admin Functions:

1. Transaction Management

o View Transactions: Allows admins to monitor all transactions. tipping and payment

o Generate Reports: The system compiles financial data into detailed reports for analysis.

o Track Payments: Ensures that all digital transactions are securely processed and correctly attributed to staff.

1. Waiter Management

o Manage Waiters: Admins can add, remove, or update waiter details.

o Update Waiter Info: Enables modification of personal details, assigned shifts, and roles.

o View Waiter Performance: Admins can track tip earnings and feedback scores to evaluate staff performance.

2. Review Management o View Customer Reviews: Enables admins to analyze customer feedback and identify trends.

o Analyze Ratings: Allows for data-driven decision-making to improve service quality.

o Respond to Reviews: Admins can directly engage with customer feedback, addressing complaints or acknowledging positive experiences. The Admin Flow ensures financial transparency, performance tracking, and proactive customer engagement, ultimately improving restaurant service standards.

Key Features and Benefits of the System :

1. Seamless Digital Tipping & Payment: Customers can leave tips using secure digital transactions, eliminating the need for cash.

2. Real-Time Data Monitoring: Both waiters and admins have instant access to earnings, feedback, and performance analytics.

3. Fair & Transparent Compensation: Ensures that tips go directly to the intended waiters without manual distribution.

4. Enhanced Customer Engagement: Integrated feedback and Google Review prompts help restaurants improve their reputation.

5. Data-Driven Insights: Admins can leverage reports and feedback analytics to refine customer service strategies.

6. User-Friendly & Efficient: The intuitive QR-based system enhances the customer experience by reducing friction in tipping and feedback submission. This activity diagram represents a modern, technology-driven solution for restaurant tipping and feedback management, bridging the gap between traditional service models and digital convenience. Unlike conventional research publications, this system focuses on practical implementation, usability, and service efficiency, making it a valuable innovation for the hospitality industry.

The admin flow provides restaurant managers or administrators with comprehensive control over the system. Admins can log in to their dashboard, where they have access to multiple management functions. They can track all tipping transactions, generate financial reports, and ensure that payments are processed accurately. The system also includes a waiter management module, allowing administrators to update waiter profiles and monitor their performance based on customer ratings and received tips. Additionally, admins can analyze customer reviews and ratings, gaining valuable insights into service quality. The system also includes an option to respond to customer reviews, allowing restaurants to address concerns, improve customer relations, and acknowledge positive feedback. One of the most significant advantages of this system is the convenience of digital tipping.

By replacing traditional cash-based tipping methods, customers can use their smartphones to complete transactions securely. This not only enhances user experience but also ensures transparency in tip distribution among restaurant staff. Additionally, the system's real-time feedback mechanism allows businesses to collect valuable customer insights, helping them identify areas that require improvement. The integration of analytics tools further ***aids*** in monitoring waiter performance and understanding

customer preferences, ultimately leading to enhanced service quality

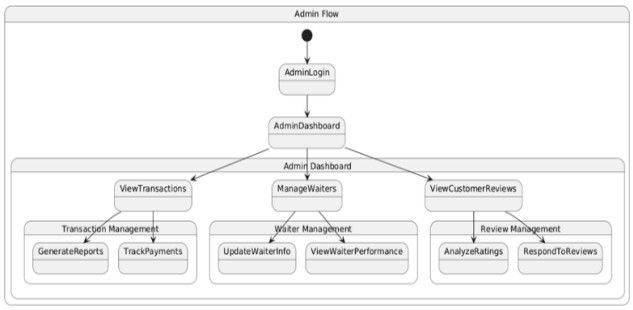


Figure 4 Admin work flow

One of the most significant advantages of this system is the convenience of digital tipping. By replacing traditional cash-based tipping methods, customers can use their smartphones to complete transactions securely. This not only enhances user experience but also ensures transparency in tip distribution among restaurant staff. Additionally, the system's real-time feedback mechanism allows businesses to collect valuable customer insights, helping them identify areas that require improvement. The integration of analytics tools further aids in monitoring waiter performance and understanding customer preferences, ultimately leading to enhanced service quality.

Incorporating QR code technology for tipping and feedback introduces a modern, tech-driven approach to restaurant operations. It not only simplifies the payment process but also reduces physical contact, making it a hygienic and efficient alternative. Moreover, by leveraging digital tools, restaurants can build a stronger customer relationship, improve their online reputation, and create a seamless dining experience. This system represents a significant step toward the digitization of restaurant services, aligning with the growing trend of cashless transactions and technology-driven customer engagement.

V. RESULT AND DISCUSSION

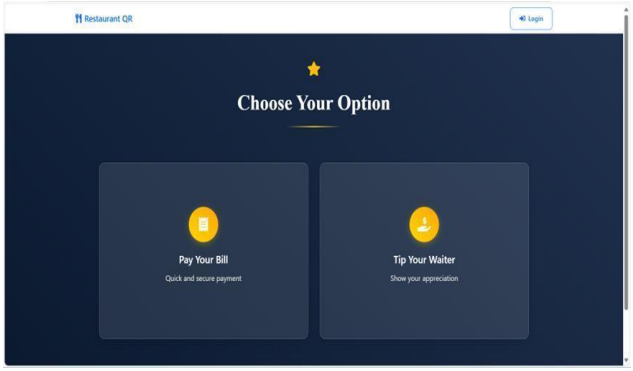
The dashboard successfully provides a seamless and intuitive user experience. Upon scanning the QR code, customers are directed to this interface, where they are greeted with a welcoming message, a stylish visual theme, and a clear call-to-action button labeled "Enter." This layout ensures easy navigation and encourages users to proceed with exploring the restaurant's services.

The design aesthetics contribute to a professional and elegant feel, with a dark blue background complemented by yellow highlights, creating a contrast that enhances readability and appeal. The inclusion of a fork-and-knife icon reinforces the restaurant theme, making it instantly recognizable. The structured placement of text, with bold typography for the main heading and an italicized tagline, adds to the polished appearance of the dashboard.

The Waiter and Admin Login Page serves as the authentication gateway for restaurant staff, ensuring secure access to different roles within the restaurant management system. This page is designed with a simple and professional interface that clearly distinguishes between two primary roles: Admin and Waiter. The login page contains two distinct sections: one for Admin Login and the other for Waiter Login. Each section includes fields for username and password, along with a login button that grants access to the respective dashboard. The Admin Login button is blue, signifying authority and management control, while the Waiter Login button is green, indicating operational functionality.

Figure 5 Customer's Dashboard

Administrators have access to restaurant management



features, including waiter supervision, financial tracking, and review analysis. Waiters, on the other hand, can log in to view customer feedback, track tips, and manage their performance metrics. The design of the login page ensures role-based authentication, preventing unauthorized access to sensitive data. The background features a warm orange gradient, which provides a welcoming yet professional appearance. The login panels have a clean, modern card-based UI with rounded edges and minimal distractions, ensuring an easy and efficient login process. Icons for user roles enhance clarity, making it intuitive for staff members to identify their

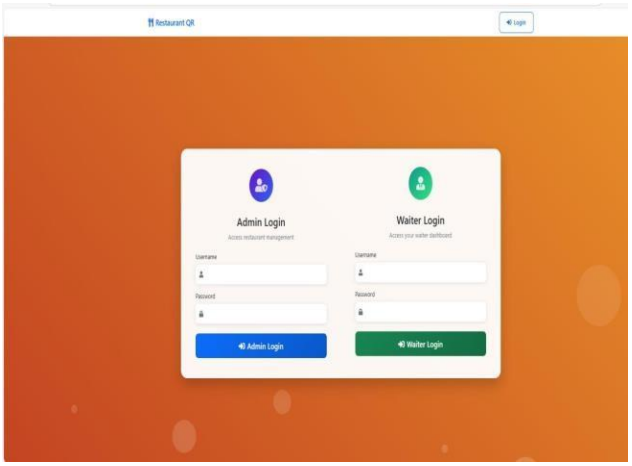


Figure 6Admin and waiter login page

At the top, a navigation bar includes a "Login" button, likely offering quick access to the page

from different sections of the restaurant's digital platform. The Restaurant QR label suggests integration with QR-based operations, potentially linking customers or staff to relevant services seamlessly. This login system is an essential component of secure role based access control (RBAC), ensuring that only authorized personnel can manage restaurant operations. Future enhancements could include multi-factor authentication (MFA), password recovery options, and biometric authentication for added security. Additionally, integrating real-time notifications for waiters regarding customer feedback and tip updates can further improve operational efficiency. Overall, this Waiter and Admin Login

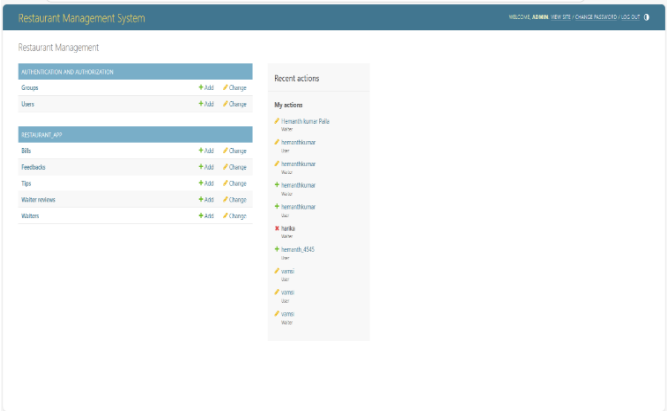


Figure 7 Admin Dashboard

page plays a crucial role in the restaurant's digital ecosystem, providing a structured and secure entry point for staff to manage their respective responsibilities effectively. The Admin Dashboard of the Restaurant Management System serves as a central hub for overseeing various aspects of restaurant operations. This dashboard is designed to provide efficient management tools, allowing administrators to handle user authentication, monitor waiters' performance, manage financial transactions, and oversee customer feedback.allowing traders to react quickly to price fluctuations.

1. Authentication and Authorization

The Admin Dashboard includes an Authentication and Authorization section that allows the administrator to manage:

• Groups: Assign roles and permissions to different user groups.

• Users: Add new users, modify existing ones, and regulate access rights within the system. This ensures a secure role-based access control mechanism, preventing unauthorized personnel from accessing sensitive data.

2. Restaurant Management Features

The dashboard also provides management options for the following key restaurant operations:

• Bills: Track and manage customer payments, invoices, and restaurant earnings. Feedbacks: Review and analyze customer feedback for service improvement. Tips: Monitor waiter tips, ensuring transparency and fair distribution.

• Waiter Reviews: Assess waiter performance based on customer ratings and feedback.

• Waiters: Add, remove, or update waiter profiles to maintain a well-managed workforce. Each section offers Add and Change options, enabling seamless modifications and real-time updates.

3. Recent Actions Panel

On the right side, the Recent Actions panel displays a history of modifications, including user and waiter updates. This feature provides audit tracking, allowing administrators to monitor system changes and maintain accountability

4. Admin User Controls

At the top-right corner, the dashboard provides options for:

• Viewing the site to check real-time updates.

• Changing the password to enhance security.

• Logging out to ensure data protection when stepping away from the system.

This Admin Dashboard is a crucial component of the restaurant's digital infrastructure, offering control, security, and efficiency in managing operations. By centralizing authentication, staff management, and customer interaction, the dashboard ensures smooth workflow and a high level of administrative oversight. Future enhancements may include data analytics integration, automated reporting, and AI-driven customer sentiment analysis to improve decision-making further.

The Waiter Dashboard in the Restaurant QR System is designed to provide waiters with a comprehensive view of their earnings, customer feedback, and overall performance. This dashboard serves as an essential tool for restaurant service staff, allowing them to track their tips, monitor customer reviews,and gain insights into their service quality. By offering an organized interface, the system ensures that waiters have access to real-time data that can help them improve their performance and enhance customer satisfaction.

At the top of the dashboard, a personalized welcome message greets the waiter by name, making the interface more engaging and user-friendly. This feature not only confirms that the correct user is logged in but also helps create a sense of identity and belonging for the staff. Personalized dashboards contribute to a better user experience, allowing employees to navigate their workspace with ease. One of the most crucial features of this dashboard is the Total Tips section, which displays the total amount of tips earned by the waiter. In this case, the waiter has received ₹500 in tips. This feature provides financial transparency, ensuring that waiters can easily track their earnings without any confusion. It also serves as a motivational factor, encouraging staff to offer excellent service in order to receive

better tips from satisfied customers. Another important aspect of the dashboard is the Average Rating section, which presents an overview of the waiter's performance based on customer feedback. The rating is shown in a green box, and in this instance, the waiter has an impressive 5.0/5 rating. This feature allows waiters to assess their service quality based on direct customer feedback. A higher rating indicates excellent service, while a lower rating may highlight areas that need improvement.

The dashboard also includes a Total Reviews section, which displays the number of reviews received from customers. In this case, there is one review. Keeping track of customer reviews is essential, as it helps waiters

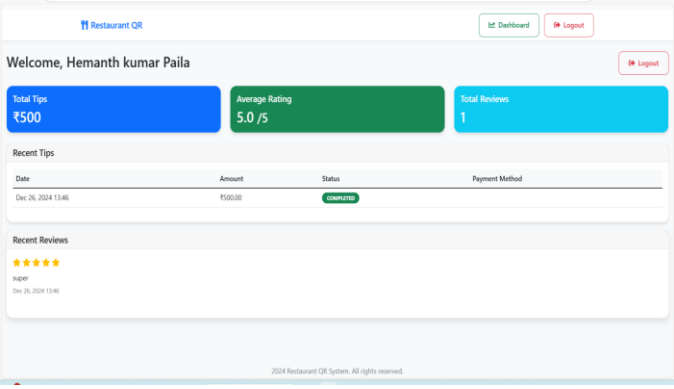


Figure 8 Waiters dashboard

understand how frequently customers provide feedback and whether any improvements are necessary. More reviews generally indicate an engaged customer base that values the restaurant's service quality. A Recent Tips section provides a detailed transaction history, showing the date and time when tips were received, the amount, and the payment status. This section ensures that waiters can verify their earnings and maintain a clear record of their financial transactions. Such transparency eliminates doubts and discrepancies regarding tips, contributing to a fair and trustworthy work environment. Customer reviews play a significant role in improving service quality, and the Recent Reviews section highlights the most recent customer feedback. In this case, a customer has given a 5-star rating along with a positive comment ("super"). By displaying feedback along with the date and time, the system enables waiters to analyze their strengths and areas for improvement. Positive feedback can serve as motivation, while constructive opportunities for professional growth. criticism provides to ensure smooth navigation, the dashboard includes two essential buttons at the top-right corner: Dashboard and Logout. The Dashboard button allows waiters to return to the main panel and access additional features, while the Logout button ensures secure exit from the system, preventing unauthorized access to sensitive information. These navigation controls enhance the system's usability and security, ensuring a seamless experience for waiters. Overall, the Waiter Dashboard in the Restaurant QR System is an effective and well-organized tool that provides waiters with crucial insights into their performance. By integrating real-time data on earnings, customer feedback, and service Ratings, the system helps waiters stay motivated, accountable, and focused on delivering excellent customer service. This user-friendly interface contributes to a more efficient and transparent restaurant management system, benefiting both the staff and the overall dining experience.

VI. FUTURE SCOPE

Advanced Data Analytics for Feedback Insights

One of the potential future enhancements is the integration of advanced data analytics capabilities to extract actionable insights from customer feedback. By leveraging machine learning and artificial intelligence, the system can identify trends in customer preferences, common complaints, and areas requiring improvement. Advanced sentiment analysis could classify feedback into positive, negative, or neutral categories, providing restaurant management with a clear picture of their service quality. These analytics can also help predict customer behavior and enable personalized marketing strategies, such as targeted promotions based on dining habits. Additionally, real-time dashboards could display visualized data, such as feedback trends, server ratings, and tipping patterns. These insights would enable restaurants to make informed decisions to enhance customer satisfaction and optimize staff performance.

Integration with Restaurant POS Systems

Integrating the tipping and feedback system with existing Point of Sale (POS) systems can streamline operations and improve efficiency. This integration would allow the system to automatically link customer orders with server details, eliminating the need for manual input and reducing errors. By integrating payment processing within the POS system, the tipping process becomes seamless for both customers and staff. Furthermore, the POS integration could support features like automated revenue sharing among staff based on tips received and performance metrics. It could also provide restaurant management with a unified platform to view sales, tips, and feedback in one place, reducing administrative overhead and enhancing operational visibility.

Multi-Language Support for Diverse User Base

To cater to a diverse customer base, the system can be enhanced with multi-language support. By offering the interface in multiple languages, customers from different linguistic backgrounds can interact with the platform effortlessly. This feature would include language detection based on the customer's device settings or manual language selection options. Multi-language support ensures inclusivity, improving the customer experience and increasing the likelihood of receiving feedback from international diners. Additionally, servers and staff could also benefit from language-specific interfaces, making the system accessible to a multilingual workforce. Future updates can also include localized cultural preferences,

such as adapting feedback questions or tipping practices based on regional norms. This localization would enhance the system's adaptability to various markets and improve its adoption rate globally .Automatically link customer orders with server details, eliminating the need for manual input and reducing errors. By integrating payment processing within the POS system, the tipping process becomes seamless for both customers and staff. Furthermore, the POS integration coould support features like automated revenue sharing among staff based on tips received and performance metrics. It could also provide restaurant management with a unified platform to view sales, tips, and feedback in one place, reducing administrative overhead and enhancing operational visibility.Advancements will enable the platform to stay ahead of competitors while offering traders a comprehensive, intelligent, and secure trading ecosystem.

VII. CONCLUSION

The Digital Tipping and Feedback System was designed to address the limitations of traditional tipping methods by providing a modern, digital solution. The system integrates QR code technology, a user-friendly interface, and backend components to streamline the tipping process, enable structured feedback collection, and promote transparency in tip distribution. The project involved:

• Developing a QR Code-based System to facilitate tipping and feedback submission.

• Implementing a responsive web and mobile interface for administrators. customers, waitstaff

• Creating a robust backend architecture to ensure reliability, scalability, and data integrity.

• Testing the system rigorously for functional accuracy, usability, performance, and security. Overall, the project achieved its objectives by offering a seamless, efficient, and transparent tipping and feedback mechanism. Achievements

and Contributions Key Achievements:

1. Enhanced Customer Experience:

   o Customers now have an intuitive platform for cashless tipping and detailed feedback submission.

2. Increased Transparency:

   o Direct allocation of tips to servers ensures fair compensation, promoting staff motivation and satisfaction.

3. Scalable and Reliable System:

   o The system is capable of handling high user traffic while performance and reliability.

4. Innovative Features: maintaining

   o Integration of structured feedback and real-time ratings provides actionable insights for restaurant management.

Contributions: 1. To Customers:

Offers a hassle-free, cashless tipping method and an avenue to voice their feedback effectively.

2. To Waitstaff:

EMPOWERS SERVERS WITH VISIBILITY INTO THEIR PERFORMANCE AND RECOGNITION FOR THEIR SERVICE.

3. TO RESTAURANT MANAGEMENT:

Provides tools for monitoring customer satisfaction and staff performance, enabling data-driven decisions.

4. TO RESEARCH AND DEVELOPMENT:

Demonstrates a novel approach to modernizing traditional tipping systems, paving the way for further innovations in the hospitality sector.

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