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Review Article

Restaurant Management System (RMS) for Annapurna Restaurant and Cold Drinks

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Abstract: The Restaurant Management System (RMS) for Annapurna Restaurant and Cold Drinks is designed to streamline operations and enhance customer service through a dual-module approach. The Admin module allows restaurant owners to efficiently manage staff, oversee inventory, and monitor order statuses and billing in real-time. The Staff module enables employees to take and manage orders, track attendance, and update inventory if authorized, ensuring smooth day-to-day operations. This RMS not only reduces manual errors but also fosters better communication between staff and management, resulting in a more organized and customer-focused dining experience.
In line with the final year project, the system incorporates data analytics, offering insights into sales trends, inventory usage, and customer preferences. These features empower the restaurant to make informed decisions, optimize stock levels, and adjust menu offerings based on data-driven analysis. Overall, the RMS reflects the growing importance of technology in improving efficiency and customer satisfaction.

Keywords: Manage Order, Manage Staff Details, Inventory Management, Smart order Technique, Real-time Order Status.

1. Introduction

The Restaurant Management System (RMS) is an innovative software solution designed to streamline the operations of Annapurna Restaurant and Cold Drinks, focusing on enhancing efficiency and improving customer service. In the competitive landscape of the food service industry, effective management of resources, orders, and staff is crucial for success. This project aims to create a comprehensive system that encompasses various functionalities, enabling the restaurant to operate smoothly and effectively. The RMS is structured around two primary modules: the Admin module, designed for the restaurant owner, and the Staff module, aimed at employees. The Admin module provides capabilities to manage staff, track inventory, and monitor table - wise order status and billing. This feature is particularly important in optimizing operational workflows and ensuring that management has real- time access to essential data. The Staff module allows employees to take and manage orders based on customer preferences, mark attendance, and update inventory when authorized by the Admin.

By implementing this system, Annapurna Restaurant aims to minimize operational inefficiencies, reduce errors in order processing, and enhance the overall dining experience for customers. The integration of these modules will facilitate better communication among staff members and between the kitchen and front-of- house operations. Moreover, the RMS will provide valuable insights through data analytics, helping the restaurant make informed decisions regarding inventory management and menu offerings.

As the restaurant industry evolves, with increasing customer expectations and technological advancements, this project addresses the need for an adaptive management solution. The Restaurant Management System not only aims to improve operational efficiency but also to foster a more engaged and satisfied workforce, ultimately leading to a better experience for patrons.

This project serves as a vital tool in navigating the complexities of restaurant management and is expected to play a significant role in the success and growth of Annapurna Restaurant and Cold Drinks. Through its development, the RMS will contribute to a modernized approach to restaurant operations, enhancing both productivity and customer satisfaction.

2. Literature Review

2.1 Square for Restaurants

Square for Restaurants is a comprehensive point-of-sale (POS) system designed to streamline restaurant operations. It

offers a wide range of features such as order management, table mapping, and menu customization, all integrated into a user-friendly interface. The system supports both dine-in and takeout services, allowing restaurants to manage their entire service workflow efficiently. One of its key strengths is its flexibility, making it suitable for various types of food businesses, from quick-service cafes to full-service dining establishments. Square for Restaurants integrates seamlessly with payment processing, inventory tracking, and customer management tools, which helps improve overall operational efficiency. Its cloud-based nature allows restaurant owners and managers to monitor their business in real-time, whether on-site or remotely. Additionally, it offers features like customer feedback collection and analytics, providing valuable insights to enhance customer satisfaction and business performance. The system's pricing structure is scalable, with different tiers available depending on the restaurant's size and needs, making it accessible to both small businesses and larger enterprises. [1]

2.2 Toast

Toast is a leading point-of-sale (POS) system specifically designed for the restaurant industry, known for its robust functionality and ease of use. It provides an all-in-one platform for managing restaurant operations, including order processing, payment integration, inventory management, and staff scheduling. Toast also offers advanced tools for online ordering, delivery, and contactless payment, which have become essential for modern restaurant operations. Its highly customizable nature allows businesses to tailor the system to their specific needs, whether they run a small cafe or a large chain. In addition, Toast provides detailed analytics and reporting, helping restaurants optimize performance by tracking sales, labor costs, and customer preferences. The system is known for its scalability and integration with third-party apps, making it adaptable to various restaurant models. With its focus on improving customer experience and operational efficiency, Toast has become a popular choice among restaurants looking for a comprehensive and reliable POS solution. [2]

2.3 Light speed Restaurant

Light speed Restaurant is a cloud-based point-of-sale (POS) system designed to cater to the specific needs of restaurants, offering a wide array of features that support seamless operations. It is particularly beneficial for both full-service and quick-service restaurants, providing flexibility in handling dine-in, takeout, and delivery orders. The platform's real-time analytics and reporting tools allow managers to make data-driven decisions by tracking sales, performance, and customer preferences. Light speed Restaurant also integrates with multiple third-party applications for payment processing, marketing, and loyalty programs, making it a versatile solution for businesses seeking to enhance customer engagement and streamline operations. Its scalability allows it to support small independent restaurants as well as larger chains, while its mobile capabilities ensure staff can efficiently manage orders from tablets or handheld devices. With its focus on efficiency, customer experience, and business growth, Light speed is a comprehensive solution for modern restaurants aiming to stay competitive.[3]

2.4 Restaurant365

Restaurant365 is an all-in-one restaurant management software designed to streamline accounting, operations, and inventory management for restaurants. It stands out by integrating core financial management tools with daily operational workflows, offering features like automated accounting, real-time inventory tracking, and labor management. Restaurant365 helps restaurants consolidate financial data from multiple locations, making it particularly beneficial for multi-unit operators and franchise chains. The platform offers robust reporting and analytics tools, enabling managers to track performance metrics such as food costs, labor efficiency, and profitability in real-time. Additionally, it integrates with other popular POS systems, payroll services, and vendors, allowing restaurants to maintain smooth operations without needing multiple disjointed systems. Its cloud-based structure ensures accessibility and collaboration, giving owners and managers the ability to manage finances, inventory, and staff schedules from any location. With its focus on reducing manual administrative tasks and improving financial transparency, Restaurant365 empowers restaurant businesses to make data-driven decisions that enhance operational efficiency and profitability. Regular updates and customer support ensure that users benefit from the latest features and best practices in restaurant management. By fostering a more organized and efficient workflow, Restaurant365 not only saves time and resources but also enables restaurants to deliver exceptional customer experiences, ultimately driving growth and success in a competitive market.[4]

2.5 7shifts

7shifts is workforce management software specifically designed for the restaurant industry, focusing on simplifying employee scheduling, communication, and labor management. This platform addresses the unique challenges faced by restaurant operators by providing an intuitive interface that allows managers to create and manage schedules easily, track employee availability, and communicate changes in real time. Additionally, 7shifts offers tools for time tracking and payroll integration, ensuring accurate compensation for employees and streamlining payroll processes. The platform also includes a mobile app, allowing staff to view schedules, request time off, and communicate with team members from their smartphones, fostering better engagement and collaboration among the workforce. With its emphasis on enhancing operational efficiency and employee satisfaction, 7shifts has become a popular choice among restaurant managers looking to improve labor management and create a positive work environment. Its scalability makes it suitable for businesses of all sizes, from single-location eateries to large restaurant chains. [5]

2.6 Café Coffee Day (CCD)

Café Coffee Day (CCD) is one of India's largest coffee chains, known for its casual dining experience and a diverse menu that features a wide variety of coffee beverages, snacks, and desserts. Established in 1996, CCD has played a significant role in popularizing coffee culture in India,

appealing to a broad demographic that includes students, professionals, and families. The brand's strategy focuses on creating a welcoming ambiance in its outlets, encouraging customers to spend time socializing or working in a relaxed environment. Additionally, the company leverages technology to enhance customer experience, incorporating digital payment systems and loyalty programs that foster customer engagement and retention. CCD also adapts to evolving consumer preferences by introducing innovative products and seasonal offerings, such as cold brews and specialty beverages. Despite facing challenges from increasing competition and changing market dynamics, CCD continues to expand its presence both domestically and internationally, striving to maintain its position as a leader in the Indian coffee market. The brand's commitment to sustainability, community engagement, and quality makes it a notable player in the food and beverage industry. [6]

2.7 Posist

Posist is a cloud-based restaurant management software solution designed to help restaurant businesses automate their operations across various segments, from small cafés to large restaurant chains. The platform offers a wide range of features that cater to point-of-sale (POS) needs, kitchen order management, inventory control, customer relationship management (CRM), and more. Posist is known for its scalability, making it suitable for both single-location

restaurants and multi-location chains. Posist also integrates with food delivery platforms, accounting software, and payment gateways to provide an all-in-one solution for restaurant owners. Its cloud-based system allows real-time access to business data from any device, providing comprehensive control over operations.

Moreover, Posist offers advanced analytics, including sales forecasting and wastage reports, which help restaurant owners optimize their processes and enhance profitability. The application is also known for its offline functionality, allowing restaurant operations to continue seamlessly even without an internet connection. With features aimed at improving operational efficiency, Posist helps restaurant owners reduce manual work, improve accuracy, and ensure smooth workflow across all departments. [7]

2.8 Petpooja

Petpooja is comprehensive, cloud-based restaurant management software designed to simplify and automate various aspects of restaurant operations. Aimed at small to medium-sized restaurants, Petpooja offers an all-in-one solution that addresses key operational challenges such as inventory management, order processing, billing, and staff management. The application integrates seamlessly with food delivery platforms like Zomato, Swiggy, and payment gateways, ensuring smooth online order processing and transactions. Petpooja stands out because of its focus on usability, affordability, and integration capabilities, making it a popular choice for restaurants that need a cost-effective and scalable solution. Its user-friendly interface makes it easy for restaurant staff and managers to adopt, while the cloud- based architecture allows access to real-time data from any location. By providing detailed reports and analytics, Petpooja empowers restaurant owners to make data-driven decisions, leading to increased efficiency, minimized wastage, and enhanced customer satisfaction.

The application also focuses on building customer loyalty through integrated CRM and feedback systems, helping restaurants retain customers and improve service quality. Overall, Petpooja is a reliable tool for restaurant owners seeking to optimize daily operations without the need for extensive technical expertise. [8]

2.9 Rezku POS

Rezku POS is a cloud-based restaurant point-of-sale and management system designed to streamline restaurant operations, especially in fine dining, casual dining, and bar settings. The platform provides robust tools for inventory management, order taking, staff management, and reporting. One of Rezku's standout features is its detailed table management system, which allows restaurants to manage seating arrangements, reservations, and order flows seamlessly. Rezku POS offers offline capabilities, meaning restaurants can continue operating even without an internet connection and all data will sync automatically once the connection is restored. The system integrates with third-party services, including delivery apps and payment gateways, offering a holistic approach to restaurant management. [9]

2.10 Revel

Revel Systems is an advanced cloud-based POS platform designed for both quick-service and full-service restaurants. It offers a highly customizable solution that integrates key aspects of restaurant management, such as order management, inventory tracking, and customer engagement, into one platform. Revel Systems is well-suited for multi-location restaurants, providing tools for managing complex operations across different outlets. One of Revel's unique features is its hybrid architecture, allowing the system to operate offline if the internet goes down, ensuring that businesses can continue to function smoothly without disruption. Revel also provides deep data analytics, helping restaurants optimize menu performance, reduce wastage, and increase profitability. The platform integrates with various payment gateways, accounting software, and food delivery services, offering a seamless experience for restaurant owners. [10]

3. Objective

- Streamline Operations: Automate management of staff, inventory, and orders.
- Enhance Customer Service: Improve response times and order management.
- Improve Inventory Control: Real-time tracking to minimize waste and ensure availability.
- Facilitate Staff Management: Efficient management of employee information and attendance.
- Generate Insights: Provide analytical tools for

informed decision-making.

- Establish protocols for monitoring inventory turnover rates and analysing sales data to minimize waste and improve cost efficiency.
- Adopt digital timekeeping solutions to track employee attendance accurately, facilitating better payroll management and compliance with labor regulations.

4. Procedure

4.1 Procedure for methodology

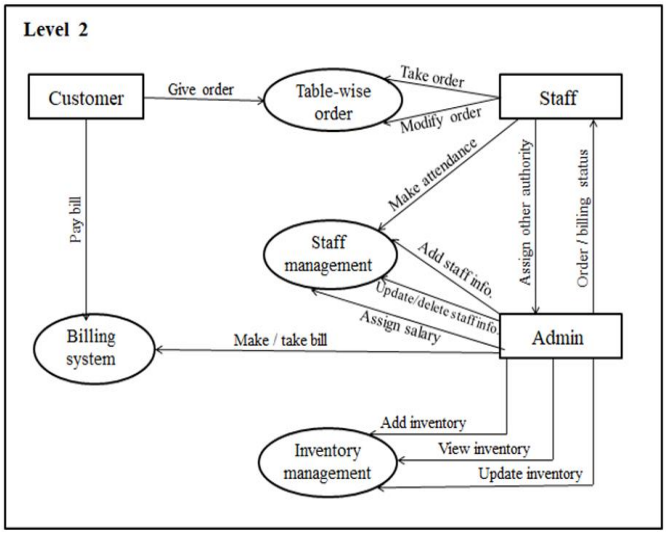


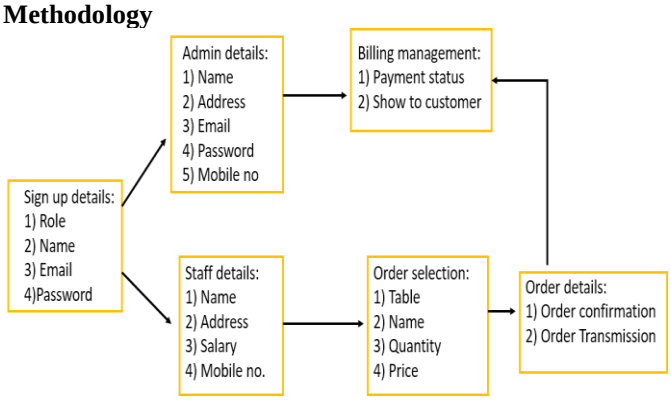
Fig. 1 DFD Level 2

Explanation

The diagram depicts a Level 2 Data Flow Diagram (DFD) for a Restaurant Management System (RMS) for Annapurna Restaurant and Cold Drinks. The diagram shows the interactions between various components of the system, including the customer, staff, admin, billing system, and inventory management. The customer places an order, which is taken by the staff. The staff can modify the order, and the admin can assign other authorities. The admin also manages the staff, including making attendance and managing billing status. The billing system handles the payment process. The inventory management component is responsible for adding, viewing, and updating inventory.

It intricate interactions between key components of the system. It begins with the customer, who places an order that is taken by the staff. The staffs have the capability to modify this order based on customer requests, ensuring flexibility in service. The admin module oversees the entire operation, managing staff roles, attendance, and billing processes. The billing system handles payment transactions, providing updates to both staff and admin on payment statuses. Meanwhile, the inventory management component allows the admin to add, view, and update stock levels, ensuring that the restaurant is adequately supplied. This DFD effectively highlights how data flows between customers, staff, and management, optimizing operations and enhancing overall customer experience in a competitive food service environment.

Methodology



Title: RMS for Annapurna Restaurant and Cold Drinks

Fig. 2 Methodology diagram for RMS.

The Restaurant Management System (RMS) is structured around two key modules: the Manager Module and the Staff Module, each with distinct roles and responsibilities. The Manager, who holds the highest level of authority, oversees core functionalities such as inventory management, where they can add, update, and monitor stock levels to ensure seamless operations. They also manage staff by adding or removing team members, assigning roles, and handling scheduling and attendance. Additionally, the Manager can monitor orders by viewing table-wise statuses, oversee billing by approving transactions, and generate reports for financial analysis. In contrast, the Staff Module operates with limited authority, focusing primarily on day-to-day operations. Staff members are responsible for taking customer orders, entering them into the system, and communicating with the kitchen or bar. If authorized, they can also update inventory when items run low and mark their own attendance for record-keeping. The process flow begins with the Manager assigning tasks or roles to staff, such as creating accounts or granting inventory permissions. Staffs then execute their responsibilities based on these assignments, while the Manager continuously oversees operations, monitors performance, and checks inventory levels throughout the day. At day's end, the Manager may generate reports to review the overall performance of the restaurant. This hierarchical structure ensures that the RMS operates smoothly, with clearly defined roles based on authority levels for both managers and staff.

The hierarchical structure of the Restaurant Management System (RMS) enhances operational efficiency by clearly defining roles for both the Manager and staff. The Manager oversees critical functions such as inventory management, staff scheduling, and order monitoring, enabling swift decision-making to maintain smooth operations. Meanwhile, staff members focus on order taking and inventory updates, ensuring effective communication with the kitchen. This division of responsibilities fosters accountability and teamwork, ultimately leading to improved customer service and a more organized dining environment.

SQLite Database Overview for RMS

In developing the Restaurant Management System (RMS) for Annapurna Restaurant and Cold Drinks, SQLite has been selected as the database solution due to its lightweight, self-contained nature, which simplifies setup and maintenance. This file-based database allows for efficient storage and retrieval of data without the overhead of a server, making it ideal for a smaller-scale application. The RMS schema will include key tables such as Users, Orders, Menu Items, and Inventory, establishing relationships where, for example, one user can have multiple orders, and one menu item can appear in various orders. CRUD operations will be implemented seamlessly, enabling staff to create new orders, read order statuses, update inventory levels, and delete outdated records. While SQLite does not support native user management, access controls can be enforced at the application level to ensure data security. Additionally, the simplicity of SQLite facilitates easy backup through file copying, ensuring data integrity through robust transaction management. Although it is not designed for high-concurrency environments, SQLite can handle moderate traffic efficiently, allowing for quick querying and reporting on sales and inventory levels. Overall, SQLite's integration within the RMS will provide an effective and efficient data management solution, enhancing operational efficiency and supporting the restaurant's goals for improved customer service.

Security Measures

To ensure the security of the Restaurant Management System (RMS), several critical measures will be implemented. First, a robust user authentication system requiring unique usernames and strong passwords will be established, potentially enhanced by multi-factor authentication (MFA) for added security. Role-based access control (RBAC) will restrict user access to functionalities relevant to their roles, minimizing the risk of unauthorized actions. Data encryption protocols, such as TLS, will protect sensitive information both in transit and at rest. Regular backups of the database will be scheduled to prevent data loss, while detailed audit logs will track user activities, providing accountability and facilitating the detection of suspicious actions. Firewalls and intrusion detection systems (IDS) will safeguard the RMS from external threats.

5. Future Scope

In the future, the Restaurant Management System (RMS) can be significantly enhanced by incorporating several advanced features. One of the most impactful additions would be an online ordering and delivery module, enabling customers to place orders via a mobile app or website. This expansion would not only increase the restaurant's reach but also cater to the growing demand for convenience in dining options. To further enhance customer engagement, a customer feedback and rating system could be implemented, allowing diners to provide reviews and suggestions. This valuable feedback would help the restaurant continually improve service quality and adapt to customer preferences.

Additionally, introducing a loyalty program would incentivize repeat visits by offering rewards, discounts, or exclusive offers, thereby fostering customer loyalty and retention. Integrating AI-powered sales forecasting could optimize inventory management by predicting demand trends, minimizing waste, and ensuring that popular items are always in stock. Furthermore, integrating with Point of Sale (POS) systems would streamline billing and financial tracking, creating a more cohesive operational workflow.

A dedicated mobile app for staff could enhance order management, enabling real-time updates on order status and facilitating better communication between front-of-house and kitchen staff. This app could also allow employees to track their schedules and manage tasks more efficiently. Moreover, implementing digital payment options, including mobile wallets and contactless payments, would enhance customer convenience, making transactions quicker and more secure.

These enhancements not only aim to improve operational efficiency and customer satisfaction but also position Annapurna Restaurant as a forward-thinking establishment in a competitive market. By embracing technology and innovative features, the RMS can significantly contribute to the restaurant's growth and adaptability in an ever-evolving industry landscape.

1)A. Figures and Tables

Table 1. Modules and function list

Module	Function
Admin	• Staff Management • Inventory Management • Order Monitoring and Billing
Staff	• Order Management • Inventory Updates

2) B. Explaination

The figures and tables detailing the modules of the Restaurant Management System (RMS) highlight the distinct functions of the Admin and Staff modules, which are crucial for efficient restaurant operations. The Admin module encompasses several key functions, including staff management, inventory management, and order monitoring and billing. Through staff management, the admin can oversee employee roles, track attendance, and ensure optimal staffing levels. Inventory management allows the admin to add and update stock items, monitor inventory levels, and generate alerts for low stock, ensuring that the restaurant remains well-supplied. Additionally, the order monitoring and billing function enables the admin to oversee customer orders in real-time, manage payment processes, and address any discrepancies, thereby enhancing operational efficiency. In contrast, the Staff module focuses on daily operational tasks, facilitating order management and inventory updates. Staff members can efficiently take and modify customer orders, ensuring timely communication with the kitchen. They also play a role in updating inventory records, reporting stock levels to the admin, and contributing to a collaborative approach to inventory management. Together, these modules streamline operations and enhance the overall dining experience at Annapurna Restaurant and Cold Drinks.

6. Conclusion

In conclusion, the Restaurant Management System (RMS) for Annapurna Restaurant and Cold Drinks is designed to significantly enhance the restaurant's operational efficiency and elevate customer service by integrating essential features such as inventory management, order processing, and staff coordination. By implementing this system, the restaurant can streamline workflows and minimize manual errors, enabling staff to operate more efficiently and focus on delivering an outstanding dining experience to customers. The RMS is intended to address current operational challenges, such as disorganization in order processing and inefficiencies in inventory tracking, which can negatively impact the restaurant's overall performance.

Furthermore, the RMS empowers management with the ability to make data-driven decisions through its built-in analytics. By analyzing sales trends, customer preferences, and inventory usage, the management team can optimize menu offerings, monitor stock levels, and anticipate customer demands more accurately. This data-driven approach helps reduce food waste, optimize costs, and improve profitability, making it easier to adjust strategies based on customer behavior and market trends.

Additionally, the integration of admin and staff modules within the system fosters smooth communication and collaboration between different teams, ensuring that front-of-house and kitchen operations run in sync. This enhanced coordination reduces delays in order fulfillment and ensures that the restaurant can meet customer expectations consistently.

Ultimately, the RMS not only improves day-to-day operations but also strategically positions Annapurna Restaurant for long-term success in an increasingly competitive market. By embracing technology and adapting to the evolving needs of the food service industry, the RMS helps the restaurant increase efficiency, improve customer satisfaction, and drive sustainable growth.

7. Declarations

Funding
The authors declare that no funds were received for this research.

Conflict of interest
The authors declare that they have no conflict of interest.

Ethics approval and consent to participate
This study did not require ethics approval as it did not involve human or animal subjects.

Consent for publication
The authors consent to the publication of this manuscript in its current form.

Data availability
The data that support the findings of this study are available from the corresponding author upon reasonable request.

Materials availability
The materials used in this study are available upon request from the corresponding author.

Code availability
The code that supports the findings of this study is available from the corresponding author upon reasonable request.

Authors' Contributions
Author-1 (Vidya Maskar) guided the project, offering support in conceiving the study and ensuring academic alignment. Author-2 (Samiksha Bhosale) designed the methodology and analysed the data. Author-3 (Swapnaja Kumbhar) drafted the manuscript. Author-4 (Taniskha Karande) designed the research. Author-5 (Vaishnavi Chaudhari) reviewed and edited the manuscript. All authors have read and approved the final version.

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