



# **RESTAURANT BOT**

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## **ABSTRACT**

This report presents the development of the Restaurant Bot, a comprehensive restaurant management system, as a final year project. Designed specifically for small-scale restaurants, the Restaurant Bot addresses the challenge of fragmented software solutions in the industry. It aims to consolidate various operational aspects, including point-of-sale transactions, inventory management, employee scheduling, customer relationship management, and financial reporting into a single, integrated platform. The primary goal is to enhance operational efficiency, reduce costs, and improve the customer service experience for small restaurants. The project involves an extensive analysis of the current landscape of restaurant management systems, identifying gaps in existing solutions and user requirements. By synthesizing experiential insights from working in a restaurant, feedback from industry personnel, and a comprehensive evaluation of current technologies, the project outlines the need for a unified system. The Restaurant Bot is designed to be user-friendly, reliable, and customizable, catering to the unique needs of small restaurants. It promises to offer a seamless, efficient, and cost-effective solution, filling a significant gap in the market. This report details the project's scope, objectives, design considerations, and functional requirements, aiming to provide a holistic solution that empowers small restaurants to compete effectively in the market.

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# **1. INTRODUCTION**

## **1.1. The Problem Statement**

The current landscape of restaurant management reveals a significant challenge, particularly for small-scale establishments. Despite the availability of various specialized software solutions, there is a noticeable absence of a unified, comprehensive system that addresses all key areas of restaurant management. This fragmentation requires restaurants to rely on multiple systems to manage operations effectively, leading to issues with data integration, consistency, increased operational complexity, training difficulties, and higher costs. Restaurants, especially smaller ones, face the dilemma of either investing in multiple necessary management software or adhering to manual processes to save costs. Manual management, however, is labour-intensive, error-prone, and lacks the efficiency and insights of digital systems, putting these establishments at a competitive disadvantage. Furthermore, the reliance on multiple systems complicates training and increases the likelihood of operational mishaps due to the need to learn and navigate through different software interfaces. The goal of this project is to develop the Restaurant Bot, a comprehensive and integrated restaurant management system tailored to the needs of small restaurants. This system aims to simplify operations, reduce costs, and provide a holistic view of the restaurant's operations. It will cater to the diverse needs of various stakeholders within a restaurant, including owners, managers, kitchen staff, and wait staff, addressing their specific challenges and requirements. The Restaurant Bot will focus on key aspects such as financial reporting, inventory management, customer analytics, employee scheduling, task delegation, order tracking, reservation management, and effective communication tools. By integrating these functions into a single platform, the system will not only save costs but also simplify usage and training. The project aims to fill the existing market gap by offering a holistic, user-friendly, and cost-effective solution that enhances the competitiveness of small restaurants in the market.

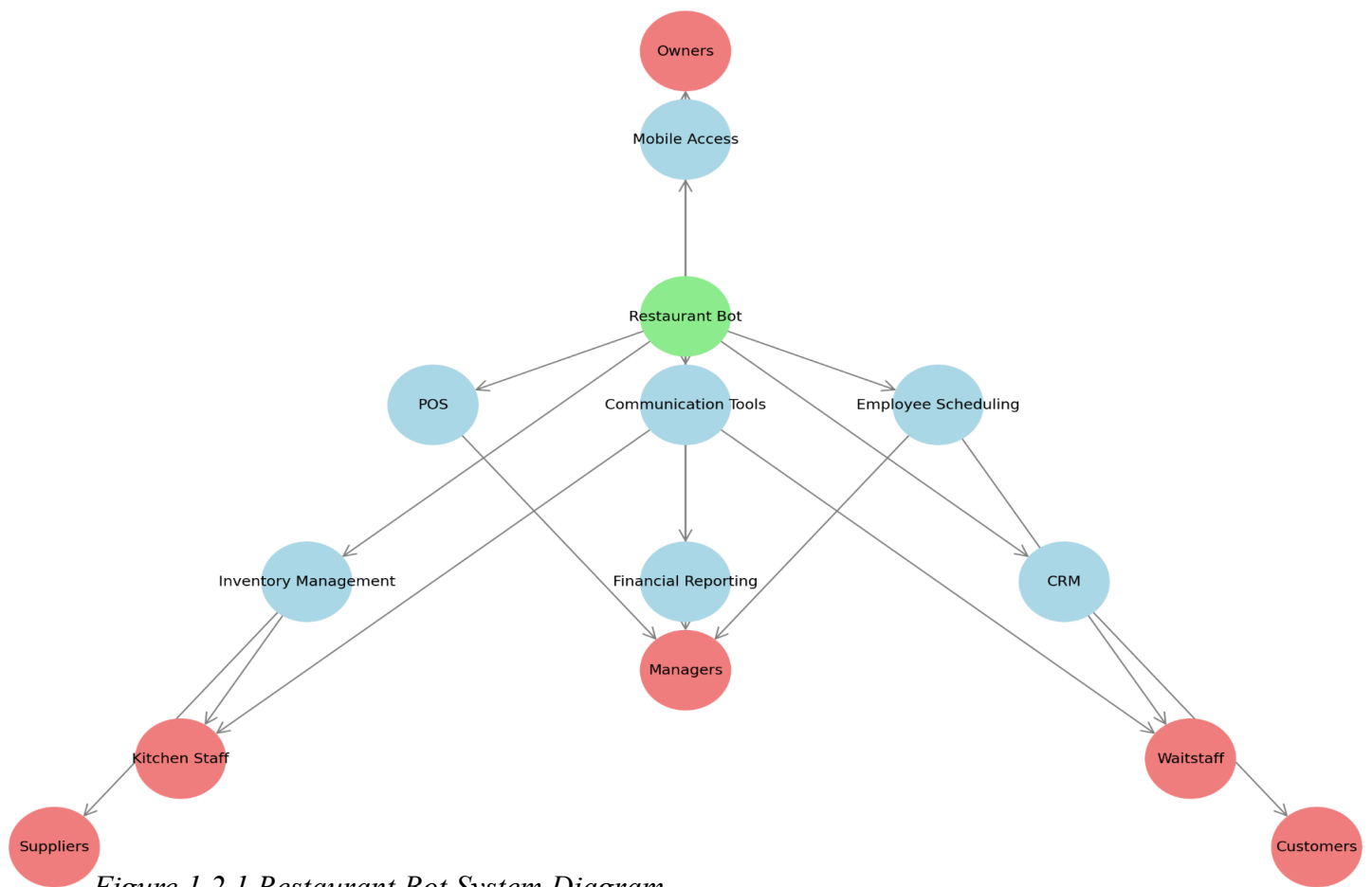
## **1.2. Scope of Project**

- Goals and Objectives:

- To design and develop Restaurant Bot, an all-in-one restaurant management system tailored for small-scale restaurants.
- To provide a comprehensive solution that integrates various aspects of restaurant management, including point-of-sale operations, employee scheduling, inventory management, customer relationship management, and financial reporting.
- To enhance operational efficiency, reduce costs, and improve the customer service experience.
- Features and Functionalities:
  - Point-of-Sale Operations: Streamlined interface for handling transactions, orders, and payments.
  - Employee Scheduling: Tools for creating and managing staff schedules, tracking work hours, and handling shift swaps.
  - Inventory Management: Real-time tracking of stock levels, automated reordering, and waste tracking.
  - Customer Relationship Management: Database for customer information, preferences, and history, along with tools for targeted marketing and feedback collection.
  - Financial Reporting: Comprehensive reporting on sales, expenses, profits, and other financial metrics.
  - Integrated Communication Tools: Seamless communication between front-end and back-end staff, including kitchen display systems and waitstaff alerts.
  - Mobile Accessibility: Mobile application for remote management and access to the system by managers and staff.
- Deliverables:
  - A fully functional Restaurant Bot software is accessible on multiple platforms (desktop, tablet, mobile).



- User manual and training materials for staff and management.
  - Technical support and maintenance plan for system updates and troubleshooting.
- Target Users:
  - Small-scale restaurants, cafes, and eateries.
  - Restaurant owners, managers, kitchen staff, and waitstaff.
- Constraints:
  - The project will focus on small to medium-sized restaurants, not large chains or franchises.
  - Budget limitations for development and implementation.
  - Adherence to data privacy laws and regulations regarding customer and employee information.
- Assumptions:
  - Users have the basic technical proficiency to operate standard software systems.
  - The restaurant has the necessary infrastructure for implementing a digital management system (e.g., internet access, and devices).



*Figure 1.2.1 Restaurant Bot System Diagram*

## **2. BACKGROUND**

### **2.1. What is Restaurant Management?**

Restaurant management refers to managing day-to-day operations within a restaurant or similar setting. It encompasses various tasks and responsibilities, from overseeing company finances and facilitating business growth to overseeing marketing, managing the workforce, and delivering a great customer experience. (Revfine.com, 2022)

### **2.2. What is a Restaurant Management System?**

A restaurant management system is software developed expressly for the needs of the restaurant sector. Commonly referred to as restaurant management software, these tools are designed to help managers and other key personnel with essential management duties. Such systems can offer a holistic, all-in-one package, blending point-of-sale elements like payment processing with sophisticated back-end options, including employee scheduling, inventory control, and a reservations system. Nonetheless, there are restaurant management systems that specialize in particular operational areas. (Revfine.com, 2022)

### **2.3. What Technologies are currently most popular in Restaurants?**

- 2.3.1. Touchscreen POS Terminals for Restaurants: Modern touchscreen Point of Sale (POS) technologies boost restaurant efficiency. These durable, fast-operating terminals are powered by user-friendly restaurant POS software, streamlining order placement and enhancing revenue generation. Many systems feature customer-facing displays for increased order precision and include integrated credit card and mobile payment options, supporting NFC, EMV, and MSR.
- 2.3.2. Order and Pay at the Table: In response to COVID-19, the significance of safety, speed, and efficiency in dining has escalated. Contactless and pay-at-table technologies have become crucial, with Toast Mobile Order & Pay™ offering guests the convenience of ordering and paying from their devices. This enhances guest comfort, improves table turnover, reduces labor costs, and offers valuable customer insights.
- 2.3.3. Handheld POS Systems for Restaurants: Handheld POS systems enable servers to finalize checks in one table visit, boosting order speed and

accuracy. This efficiency allows for faster table turnover and reduced customer waiting times. Such systems not only enhance operational efficiency but also improve guest interaction.

- 2.3.4. Contactless Payment Solutions: The demand for contactless/mobile payment methods has risen significantly post-COVID-19. These solutions ensure guest and staff safety by enabling tap, dip, or swipe payments, aligning with social distancing guidelines.
- 2.3.5. Self-Order Kiosks in Restaurants: Self-order kiosks are increasingly popular, with over half of guests considering them important for their dining experience. These kiosks offer an enhanced digital experience, and guest autonomy in ordering, and can lead to higher average checks and order volume while addressing staffing challenges.
- 2.3.6. Kitchen Display Screens (KDS): KDS are replacing traditional ticket printers in many restaurants due to their eco-friendliness and efficiency. Displayed on walls or counters, they help kitchens stay organized, fulfill orders accurately, and synchronize with the front-of-house operations.
- 2.3.7. Printers in Restaurants: Despite the rise of digital solutions, many full-service restaurants still prefer paper receipts, requiring thermal printers for the front-of-house and impact printers for the kitchen. These printers, especially impact printers, are useful for their attention-grabbing printing process and color differentiation in order slips.
- 2.3.8. Cash Drawers: While POS technology advances, traditional cash drawers remain essential for cash management. Modern practices include syncing cash drawers with POS systems for transaction recording and enhanced security measures like regular emptying and overnight locking.
- 2.3.9. Integrated Online Ordering Solutions: Online ordering and off-premise dining, vital during the COVID-19 crisis, are expected to continue post-crisis. Integrated online ordering systems allow direct ordering from the restaurant, avoiding third-party fees and improving the guest experience. Research indicates a sustained preference for takeout and delivery, with many guests favoring direct online orders with

restaurants. (toast, n.d.)

The current landscape of restaurant management systems reveals a significant challenge for the industry, especially for small-scale restaurants. While there are numerous specialized software solutions available, each focusing on distinct aspects of restaurant management such as employee scheduling, customer relationship management, inventory tracking, and point-of-sale operations, there is a noticeable absence of a unified, all-in-one solution that comprehensively addresses all these areas. This fragmentation in software offerings means that restaurants often need to rely on multiple systems to manage their operations effectively. For instance, a restaurant might use one software for employee scheduling and time tracking, another for managing reservations and customer relationships, a separate system for inventory management, and yet another for handling point-of-sale transactions and financial reporting. This not only complicates the management process but also leads to issues of data integration and consistency. When data is spread across multiple platforms, it becomes challenging to gain a holistic view of the restaurant's operations, leading to inefficiencies and potential errors. Moreover, the cost of subscribing to multiple software solutions can be prohibitively high, particularly for small restaurants operating with tight budgets. These establishments often find themselves in a predicament where they must choose between investing in essential management software or sticking to manual processes to save costs. Unfortunately, manual management is labour-intensive, prone to errors, and lacks the efficiency and insights provided by digital systems. This can put smaller restaurants at a competitive disadvantage, especially when compared to larger establishments that have the resources to invest in comprehensive digital solutions. Additionally, the reliance on multiple systems can lead to increased training time and complexity for staff. Each system comes with its interface and set of functionalities, requiring separate training sessions. This not only consumes valuable time but can also be overwhelming for staff, particularly in an industry known for high turnover rates. When employees have to learn and navigate through multiple software systems, it can lead to reduced productivity and increased chances of operational mishaps. Furthermore, the integration of data across different systems can be a technical challenge. Restaurants often face difficulties in ensuring seamless communication and data transfer between disparate software solutions. This lack of integration can lead to disjointed operations, where critical information is siloed in one system and not accessible in another,

hindering the decision-making process. The current scenario in restaurant management systems, characterized by a lack of comprehensive, integrated solutions, poses significant challenges for small restaurants. The reliance on multiple, disjointed software solutions not only increases operational complexity and costs but also impacts the efficiency and effectiveness of restaurant management. This creates a substantial need for an all-encompassing, affordable restaurant management system that can cater to the diverse needs of small restaurants, simplifying operations and enabling these establishments to compete more effectively in the market.

## **2.4. Top Restaurant Management Systems**

- 2.4.1. **OpenTable** provides a comprehensive platform designed for the hospitality industry, offering a range of features to streamline operations and enhance customer service. This includes online reservation management, allowing for efficient booking and scheduling. Additionally, the service offers table management and seating optimization, which helps maximize space and improve guest experiences. For customer relationship management, OpenTable includes guest management and CRM features, aiding in maintaining and analyzing customer interactions. The platform also provides email marketing tools, enabling restaurants to effectively communicate with their clientele. Finally, OpenTable offers reporting and analytics, delivering valuable insights into various aspects of restaurant operations and customer preferences (Restaurant IE, n.d.).
- 2.4.2. **7shifts** is a comprehensive workforce management platform designed specifically for the restaurant industry. It provides efficient employee scheduling and shift planning tools, facilitating the organization of staff work hours. The platform also includes time tracking and compliance features, ensuring adherence to labor laws and regulations. A key aspect of 7shifts is its labor cost optimization, which helps in managing payroll expenses effectively. For team collaboration, it offers communication tools that enable seamless interaction among staff members. Additionally, 7shifts features a manager log book and task management capabilities, aiding in the smooth operation and administration of daily tasks and long-term planning (7shifts, n.d.).
- 2.4.3. **When I Work** is a user-friendly employee management tool that

streamlines various aspects of workforce scheduling and communication. It features an intuitive employee scheduling system with a drag-and-drop interface, simplifying the process of organizing work shifts. The platform also includes a time clock and attendance tracking functionality, ensuring accurate record-keeping of employee work hours. An important aspect of When I Work is its capability to manage employee availability and facilitate shift swaps, allowing for flexible scheduling adjustments. The tool enhances team coordination through its messaging and notification features, enabling effective communication among staff members. Additionally, When I Work offers integration with various payroll providers, making the process of payroll management more seamless and efficient (wheniwork.com, n.d.).

- 2.4.4. **Deputy** is a versatile workforce management solution that offers a range of features for efficient staff administration and scheduling. It facilitates rostering and schedule creation, allowing managers to organize and plan work shifts with ease. The platform also includes time and attendance tracking, ensuring accurate monitoring of employee work hours. A standout feature of Deputy is its auto-scheduling capability, which takes into account staff availability and roles to automatically generate optimal work schedules. For managing staff performance, Deputy provides tools for performance management, helping managers track and evaluate employee performance. Additionally, the platform offers workplace communication tools, fostering effective communication and collaboration among team members. These features make Deputy a comprehensive tool for managing various aspects of a workforce (Deputy, n.d.).
- 2.4.5. **Tripleseat** offers a specialized solution for event management and booking, catering primarily to the hospitality and events industry. This platform streamlines the process of managing and booking events, making it easier for businesses to organize and handle various types of events. Alongside event management, Tripleseat provides a Customer Relationship Management (CRM) system, enabling businesses to

efficiently track and manage client information. The platform also includes features for lead management and tracking, which assist in nurturing potential clients and following up on sales opportunities. Essential to the management of events and client interactions, Tripleseat offers tools for document and contract management, ensuring that all agreements and necessary paperwork are handled efficiently. Furthermore, the platform is equipped with reporting and analytics capabilities, offering insights into event performance and client engagement, which are vital for strategic planning and decision-making (Tripleseat, n.d.).

2.4.6. **Clover POS** is a versatile and customizable point-of-sale system designed to cater to various business needs. It stands out with its ability to be tailored to different business requirements, providing a personalized user experience. Additionally, Clover POS incorporates comprehensive inventory management features, enabling businesses to efficiently track and manage their stock levels. The system also offers employee management and tracking capabilities, allowing for effective supervision and organization of staff activities and performance. To enhance customer relationships, Clover POS includes customer engagement tools, fostering better interaction and communication with clients. Furthermore, the platform is equipped with a reporting and analytics dashboard, providing valuable insights and data analytics to help businesses make informed decisions. This combination of features makes Clover POS a robust solution for managing sales, inventory, staff, and customer interactions (www.clover.com, n.d.).

2.4.7. **HotSchedules** is a comprehensive workforce management platform designed to streamline restaurant operations and enhance staff coordination. It features intelligent scheduling for staff, enabling managers to create and manage work schedules effectively and efficiently. The platform also provides labor management and reporting tools, offering insights into labor costs and productivity. Time clock and compliance monitoring are integral components of HotSchedules, ensuring that businesses adhere to labor laws and regulations while tracking employee work hours accurately. For staff flexibility and



improved communication, it includes features for shift swapping and team communication, facilitating easy shift changes and fostering a collaborative work environment. Additionally, HotSchedules offers integration with point-of-sale (POS) and other systems, allowing for a seamless connection between scheduling, sales data, and operational management. This integration streamlines processes and improves the overall efficiency of managing a restaurant or hospitality business (Fourth, n.d.).

- 2.4.8. **Yelp Guest Manager** offers a suite of tools designed to enhance the efficiency and customer service of front-of-house operations in the hospitality industry. This platform integrates various aspects of front-of-house management, providing a centralized system for overseeing daily operations. A key feature is its waitlist and reservation management, which simplifies the process of handling guest bookings and reduces wait times. Additionally, Yelp Guest Manager includes kiosk and table management functionalities, facilitating the effective allocation and management of dining space. For restaurants offering takeout services, the platform provides takeout order management, streamlining the ordering process for both staff and customers. An innovative aspect of Yelp Guest Manager is its customizable floor plans and guest flow tracking, allowing restaurants to optimize their seating arrangements and manage guest traffic efficiently. These features collectively contribute to a smoother, more organized dining experience for both customers and staff (restaurants.yelp.com, n.d.).
- 2.4.9. **Square Online** provides a comprehensive platform for businesses seeking to establish and enhance their online presence. It offers website creation services with options for custom domains, enabling businesses to create a unique and professional online identity. A significant feature of the platform is its online ordering and delivery integration, which streamlines the process of managing orders and accommodating delivery requests, crucial for businesses in the retail and food service sectors. Additionally, Square Online includes inventory and order management tools, helping businesses keep track of stock levels and efficiently process orders. To assist in customer outreach and retention,

the platform offers email marketing and customer engagement tools, facilitating direct communication with customers and promoting business offerings. Lastly, Square Online provides data analytics and reporting features, offering valuable insights into business performance and customer behaviour, essential for informed decision-making and strategic planning (Square, n.d.).

- 2.4.10. **Compeat** is an all-encompassing restaurant management software that focuses on streamlining back-office operations and financial processes. It offers comprehensive back-office and accounting features, which are essential for efficient financial management and record-keeping. The software is equipped with POS integration and polling, allowing for seamless data synchronization and real-time insights from the point-of-sale systems. This integration is crucial for accurate and up-to-date financial tracking. Compeat also handles order and invoice processing, simplifying the workflow associated with managing supplier orders and billing. Payroll processing is another key feature, enabling the efficient management of staff salaries and wages. Additionally, the software provides robust inventory management and financial reporting tools, assisting restaurants in maintaining optimal stock levels and generating detailed financial reports for better business analysis and decision-making (xtraCHEF, n.d.).

The analysis of various restaurant management systems highlights a notable gap in the market, particularly for small restaurants seeking an all-encompassing, cost-effective solution. Current offerings in the industry, as evidenced by the features of platforms like OpenTable, 7shifts, When I Work, Deputy, Tripleseat, Clover POS, HotSchedules, Yelp Guest Manager, Square Online, and Compeat, cater to specific aspects of restaurant management. These include reservation and table management, employee scheduling, event booking, point-of-sale operations, and back-office functions. However, each system specializes in certain areas and does not provide a comprehensive, integrated solution that covers all the needs of a small restaurant. This gap presents an opportunity for the development of the Restaurant Bot, a proposed management system aimed at addressing the unique challenges faced by small restaurants. The goal of the Restaurant Bot project is to create a system that is not only affordable but also rich in features, making it accessible and useful for every restaurant, regardless of size or budget. The design of Restaurant Bot will be

carefully crafted, taking into account the needs and workflows of all key stakeholders in a restaurant setting. This includes the owner, manager, kitchen staff, and wait staff, each of whom has distinct requirements and challenges. For the owner, the focus will be on providing a comprehensive overview of the restaurant's operations, including financial reporting, inventory management, and customer analytics. This will enable owners to make informed decisions about their business and track its performance effectively. Managers will benefit from features that facilitate employee scheduling, task delegation, and performance tracking, streamlining the day-to-day operations and ensuring the smooth functioning of the restaurant. The system will also include tools for efficient communication between the manager and the staff. For kitchen staff, Restaurant Bot will offer features like real-time order tracking, inventory level alerts, and streamlined communication with the front-of-house team. These features will help in managing the kitchen operations more effectively, ensuring that food preparation and delivery are done efficiently. Wait staff will be provided with tools to manage reservations, customer preferences, and orders. This will not only improve the customer service experience but also make the process of order-taking and table management more efficient. Moreover, the system will integrate various functions into a single platform, reducing the need for multiple software solutions. This integration will not only save costs but also simplify training and usage, as staff will need to learn and interact with only one system. The development of Restaurant Bot is aimed at filling the existing market gap by providing a holistic, user-friendly, and cost-effective solution tailored to the diverse needs of small restaurants. The next chapter of this project will delve into the specifics of Restaurant Bot's design and functionality, ensuring that it effectively meets the requirements of all stakeholders involved in the restaurant's operations.

### 3. SYSTEM ANALYSIS AND DESIGN

#### 3.1. Needs Assessment

##### 3.1.1. Identifying Requirements

The requirements can be identified from the following sources:

- **Experiential Insights from Working in a Restaurant**
  - **Role and Observations:** My journey as a part-time waiter in a bustling restaurant provided a unique vantage point to understand the restaurant's multifaceted requirements. My role enabled me to witness the interplay of customer service, operational efficiency, and team coordination.
  - **Customer Interactions:** Direct engagement with customers offered insights into their preferences and satisfaction, crucial for service optimization.
  - **Operational Intricacies:** Collaboration with kitchen staff and management illuminated key operational aspects like inventory management and quality control, underscoring the need for smooth communication and workflow efficiency.
  - **Supply Chain Understanding:** Interactions with suppliers highlighted the significance of a reliable supply chain for the consistent availability of quality ingredients.
- **Feedback from Industry Personnel through Surveys**
  - **Survey Design and Distribution:** A comprehensive survey was distributed among various restaurant industry members, aiming to capture a wide spectrum of perspectives.
  - **Diverse Insights:** Responses from chefs, managers, front-house staff, and suppliers provided a detailed picture of the industry's needs, covering aspects from kitchen efficiency to customer service nuances.
  - **Identified Themes and Challenges:** Analysis of survey

results revealed crucial themes and challenges in areas such as staff training, inventory management, and customer relationship strategies.

- **Analysis of Current Systems in the Industry**
  - **Exploration of Existing Systems:** A detailed examination of operational, management, and customer service systems prevalent in the industry was conducted.
  - **Understanding Technological Frameworks:** This included studying point-of-sale systems, inventory management software, and customer relationship management tools, understanding their implementation, and identifying areas for improvement.
  - **Trends in Digitalization and Automation:** The exploration also focused on emerging trends shaping the restaurant industry's future.

### 3.1.2. Analysis of the Current Systems

The restaurant industry is increasingly adopting specialized software and platforms to enhance efficiency, streamline operations, and improve customer service. An analysis of the current systems reveals a diverse range of functionalities tailored to meet the specific needs of the industry.

- **Reservation and Table Management (OpenTable):** OpenTable provides a robust platform for online reservation management, allowing restaurants to efficiently manage bookings and customer flow. Its table management and seating optimization features help maximize dining space usage and enhance guest experiences. OpenTable's inclusion of CRM features and email marketing tools also enables restaurants to maintain a strong connection with their clientele and personalize communication.
- **Workforce Management (7shifts, When I Work, Deputy, HotSchedules):** Platforms like 7shifts, When I Work, Deputy, and HotSchedules offer comprehensive solutions for employee scheduling, time tracking, and labor cost management. These systems facilitate efficient organization of staff work hours, adherence to labor laws, and

effective team communication. Features like auto-scheduling, shift swapping, and integration with payroll providers streamline workforce management, which is crucial for the labor-intensive restaurant industry.

- **Event Management and Booking (Tripleseat):** Tripleseat addresses the needs of the hospitality and events sector by providing tools for managing and booking events. Its CRM system and document management features to aid in handling client information and contracts, crucial for businesses that regularly host events.
- **Point-of-Sale System (Clover POS):** The Clover POS system stands out with its customizable interface and comprehensive inventory management. Its capabilities in employee tracking and customer engagement tools provide a holistic approach to managing sales, inventory, and customer relationships.
- **Front-of-House Management (Yelp Guest Manager):** Yelp Guest Manager offers functionalities for waitlist and reservation management, kiosk and table management, and takeout order management. These features help optimize front-of-house operations, from managing guest flow to handling takeout services.
- **Online Presence and Order Management (Square Online):** Square Online supports businesses in establishing an online presence with website creation and online ordering capabilities. This platform is particularly valuable for businesses expanding into or focusing on online sales and delivery.
- **Back-Office and Financial Management (Compeat):** Compeat provides an all-in-one solution for back-office and financial management, integrating with POS systems for real-time financial insights. Its features for payroll processing, order and invoice processing, and inventory management are essential for the financial and administrative aspects of restaurant management.

Each of these systems addresses specific operational challenges within the restaurant industry. From managing reservations and optimizing table turnover to efficient workforce scheduling and financial management, these tools collectively contribute to streamlined

operations, improved customer experiences, and enhanced financial control. The integration of these systems into the daily operations of restaurants represents a significant shift towards technology-driven management, aiming to increase efficiency, reduce costs, and improve service quality in the highly competitive restaurant industry.

### **3.2. User Analysis**

#### **3.2.1. Target Users**

- WaitStaff

3.2.1.1. KitchenStaff

3.2.1.2. Manager

3.2.1.3. Owner

#### **3.2.2. User Needs and Expectations**

3.2.2.1. **Ease of Use:** Both staff and managers prioritize user-friendly interfaces in restaurant management systems. Systems should be intuitive, requiring minimal training for effective use. This includes straightforward navigation, clear menus, and simple procedures for common tasks like order entry, reservation management, or schedule creation.

3.2.2.2. **Speed:** In the fast-paced environment of a restaurant, speed is crucial. Systems must process transactions swiftly, update information in real-time, and allow for quick access to necessary features. This is especially important for point-of-sale systems, where delays can lead to customer dissatisfaction and hamper service efficiency.

3.2.2.3. **Reliability:** Dependability is a non-negotiable aspect. Users expect these systems to operate consistently without crashes or errors, particularly during peak hours. This includes reliable uptime for reservation platforms, accurate tracking in inventory management, and consistent performance in workforce scheduling.

- 3.2.2.4. **Flexibility and Customization:** Restaurants vary in their operations, so management systems must be flexible and customizable to cater to different needs. This includes adjustable settings in POS systems, customizable scheduling tools in workforce management platforms, and tailored marketing campaigns in CRM systems.
- 3.2.2.5. **Integration Capabilities:** Seamless integration with other systems and platforms is highly valued. Users expect easy connectivity between various management systems, like integrating POS data with inventory management or workforce scheduling tools with payroll services.
- 3.2.2.6. **Data Security and Privacy:** With the increasing handling of customer and business data, users expect robust security measures to protect sensitive information. This includes secure handling of financial transactions, customer data privacy, and employee information confidentiality.
- 3.2.2.7. **Comprehensive Reporting and Analytics:** Users expect detailed reporting and analytics features to make informed business decisions. This includes sales reports, customer behavior analytics, workforce productivity analysis, and inventory level tracking.
- 3.2.2.8. **Support and Training:** Adequate support and training resources are essential for users to utilize the system effectively. This includes accessible customer support, detailed user guides, and training materials or sessions.
- 3.2.2.9. **Mobile Accessibility:** With the rise of mobile technology, users increasingly expect mobile accessibility for management systems. This enables managers and staff to manage tasks and view important information on the go, enhancing flexibility and responsiveness.
- 3.2.2.10. **Cost-Effectiveness:** Users expect these systems to offer value



for money. This means competitive pricing, clear billing processes, and a demonstrable return on investment through improved efficiency and increased revenues.

### **3.3. Functional Requirements**

#### **3.3.1. Core Features**

- 3.3.1.1. Employee Management System
- 3.3.1.2. Order Management System
- 3.3.1.3. Menu Management System
- 3.3.1.4. Generate Reports
- 3.3.1.5. Supplier/Contractor Management System

#### **3.3.2. Non-Functional Requirements**

- 3.3.2.1. Performance Efficiency:** The system should process transactions and update information in real-time with a response time not exceeding 2 seconds under normal load conditions.
- 3.3.2.2. Scalability** The system should be capable of scaling to accommodate increased data volume and user load without significant degradation in performance.
- 3.3.2.3. Reliability and Availability:** The system should be operational and accessible 99.9% of the time, with minimal downtime for maintenance or updates. Automatic data backup every 24 hours to prevent data loss.
- 3.3.2.4. Usability** The user interface should be intuitive and user-friendly, allowing new users to become proficient with basic functions within one hour of training.
- 3.3.2.5. Security** Implementation of strong data encryption and secure protocols for all transactions and data storage. Compliance with relevant data protection regulations (e.g., GDPR, PCI DSS) for handling customer and payment information.

- 3.3.2.6. Compatibility** The system should be compatible with common operating systems (Windows, macOS, Linux)
- 3.3.2.7. Maintenance and Support** Regular system updates and patches should be provided. Customer support should be available 24/7 with a maximum response time of 4 hours for critical issues.
- 3.3.2.8. Data Integrity and Accuracy** The system should ensure high accuracy of data entry with error rates below 0.1%. Mechanisms for data validation and error-checking should be in place.
- 3.3.2.9. Customizability:** The system should allow for customization of features such as reports, dashboard views, and user roles to meet specific restaurant needs.
- 3.3.2.10. Interoperability** Ability to integrate seamlessly with external systems like payment gateways, accounting software, and third-party delivery services.

## 4. IMPLEMENTATION

The Restaurant Bot's development was carefully thought out and carried out in three phases. This methodical process eased the integration of varying technologies and supported stepbystep testing and improvement of the bot's functions.

### 4.1. Phase 1: Initial Prototyping with Tkinter

**Objective:** The aim of this stage was to quickly create a simple, working interface to experiment with basic features such as menu management and order handling in a controlled setting.

#### **Tkinter Development:**

- **Implementation Details:** The tkinter library from Python was used to build a basic graphical user interface (GUI). This GUI acted as the initial interactive version of the Restaurant Bot, equipped with fundamental capabilities like adding, modifying, and removing menu items, as well as recording and monitoring orders.
- **Features Implemented:**
  - **Menu Item Configuration:** Users have the ability to add new items to the menu, providing details like name, price, and category.
  - **Order Management:** The system supports entering and reviewing orders, displaying both current and past orders in a straightforward list.
- **Challenges and Limitations:** The desktoponly nature of Tkinter limits use to one machine at a time. This is a major issue as restaurants need a system that multiple users can access at once from different platforms and devices.

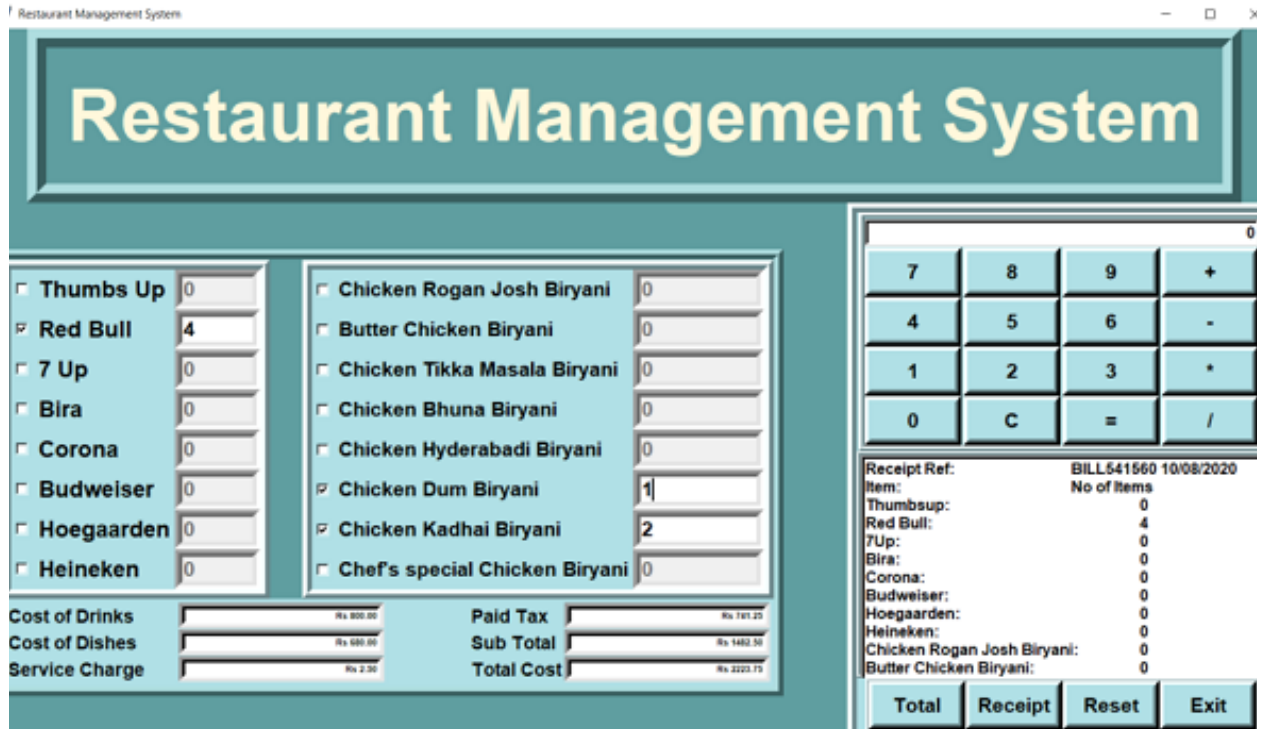


Figure 4.1.1 Tkinter Design for Restaurant Bot

```
class RestaurantManagementSystem:
    def __init__(self, root):
        self.root = root
        self.root.title("Restaurant Management System")

        self.customer_name = tk.StringVar()
        self.customer_contact = tk.StringVar()

        self.items = {
            "Burger": 100,
            "Pizza": 200,
            "Pasta": 150,
            "Sandwich": 80,
            "Salad": 90
        }

        self.orders = {}

        self.gst_percentage = 18

        self.create_gui()

    def create_gui(self):
        details_frame = tk.LabelFrame(self.root, text="Customer Details")
        details_frame.pack(fill="x", padx=10, pady=10)

        name_label = tk.Label(details_frame, text="Name:")
        name_label.grid(row=0, column=0, padx=5, pady=5, sticky="e")
        name_entry = tk.Entry(details_frame, textvariable=self.customer_name)
        name_entry.grid(row=0, column=1, padx=5, pady=5, sticky="w")

        contact_label = tk.Label(details_frame, text="Contact:")
```

Figure 4.1.2 Code Snippet for Tkinter Prototype

## 4.2. Phase 2: Transitioning to Flask

**Objective:** To improve the system by moving it to Flask, a webbased framework. This change aims to allow several users to use the system simultaneously and handle requests and sessions more flexibly.

### Flask Setup:

**Implementation Details:** Switching to Flask changed how we structured the project's backend. I used Flask's features to help with dynamic content and interactions on the web. This phase involved a few essential steps:

- **Initializing Flask App:** I began by creating a basic Flask application. I did this by setting up the Flask environment, creating a secret key for secure sessions, and making sure the app could handle web requests and responses.
- **Route Definition:** I carefully defined routes in the Flask app. These routes are crucial for our restaurant management system and they connect to different functions that do tasks like adding users, managing menu items, updating supplier info, and handling orders. This way of organizing routes helps keep the application scalable and easy to upkeep.
- **Database Integration:** Flask's compatibility with databases such as MySQL improved how data was managed. By using tools like FlaskMySQLdb, the application could connect to a MySQL database effectively handling all data interactions at the back end. This setup secured and streamlined data exchanges between the server and the database.

**Advantages of Flask:** Transitioning to Flask brought numerous benefits to the project:

- **Handling Multiple Requests:** Flask can manage many requests at once. This is especially useful in busy settings like restaurants where various users, including staff and management, need access simultaneously.
- **Dynamic Web Page Creation:** With Flask's Jinja2 engine, it was possible to create web pages that change dynamically. This meant web pages could reflect updates immediately, reacting to user interactions and changes in backend data.
- **Simplified Database Operations:** The integration of Flask with MySQL

simplified the coding needed for database tasks, streamlining operations without compromising security or efficiency.

### **User Interface Enhancement:**

- **GUI Redesign:** The application's user interface was completely transformed using HTML, CSS, and JavaScript to develop a fresh, responsive web interface. This update aimed at bettering functionality and visual appeal, ensuring users enjoy a smooth experience on both desktops and mobile devices.
- **Adding Interactive Features:** I used JavaScript widely to incorporate interactive components into the website like realtime forms for entering data, dropdown menus for making selections, and popup dialogs for confirmations. These features allow user interactions without page reloads.

Improving user experience speed and smoothness was a key goal.

- **CSS for Responsive Design, Bootstrap:** a CSS framework, helped make the web interface responsive. This meant it could adjust to various screen sizes and orientations, which is essential since restaurant staff often use tablets and smartphones.

```

@app.route('/addemployee')
def addemployee():
    return render_template('addemployee.html')

@app.route('/')
def login():
    return render_template('login.html')

@app.route('/addmenu')
def addmenu():
    return render_template('addmenu.html')

@app.route('/empindex')
def empindex():
    return render_template('empindex.html')

@app.route('/addsupplier')
def addsupplier():
    return render_template('addsupplier.html')

@app.route('/viewmenu')
def viewmenu():
    con = dbConnection()
    cursor = con.cursor()
    cursor.execute('SELECT * FROM addmenu')
    view_details = cursor.fetchall()
    print(view_details)
    return render_template('viewmenu.html', view_details=view_details)

```

*Figure 4.2.1 Code Snippet for Flask Routing*

#### 4.3. Final Phase: Integrating Flask with MySQL and Enhancing Functionality

**Objective:** The final phase aimed to integrate a reliable MySQL database to manage application data effectively and complete the development of all complex functionalities.

##### MySQL Database Integration:

- **Setup and Configuration:** A MySQL database setup was implemented to hold comprehensive information such as user details, menu elements, order information,

and transaction records.

- **Database Operations:** Advanced features were included in the app, enabling it to carry out complex database tasks. These involved advanced queries helpful for reporting, analytics, and updating orders in realtime.
- **Data Integrity and Normalization:** Special care was taken with foreign key constraints and transaction controls to ensure reliable data during simultaneous operations.

```
insert into `managerlogin`(`user_id`,`password`,`person`) values ('MAN001','456','Manager');
/*Table structure for table `ownerlogin` */
DROP TABLE IF EXISTS `ownerlogin`;
CREATE TABLE `ownerlogin` (
  `user_id` varchar(50) NOT NULL,
  `password` varchar(50) NOT NULL,
  `person` varchar(50) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*Data for the table `ownerlogin` */
insert into `ownerlogin`(`user_id`,`password`,`person`) values ('OWN001','123','owner');
/*Table structure for table `registerusers` */
DROP TABLE IF EXISTS `registerusers`;
CREATE TABLE `registerusers` (
  `name` varchar(50) NOT NULL,
  `email` varchar(50) NOT NULL,
  `phone` varchar(50) NOT NULL,
  `user_id` varchar(50) NOT NULL default '',
  `password` varchar(50) NOT NULL,
  `person` varchar(50) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*Data for the table `registerusers` */
insert into `registerusers`(`name`,`email`,`phone`,`user_id`,`password`,`person`) values ('jay','jay@gmail.com','7894561254','EMP001','123','Employee'),
('jay','jay@gmail.com','7894561254','EMP001','123','Employee'),('aa','aa','456','EMP002','123456','Employee'),('sdsd','sdsd@gmail.com','9898999999','EMP003','123456','Employee'),
('sss','sss@gmail.com','8600306078','EMP004','789','Employee');
```

Figure 4.3.1 Code Snippet for MYSQL Database User

```
insert into `addsupplier`(`image_file`,`suppliername`,`stype`,`mobilenr`) values ('static/menuimages/stuff-img-02.jpg','Thomas','vegetables supplier','9856324756');
/*Table structure for table `bill` */
DROP TABLE IF EXISTS `bill`;
CREATE TABLE `bill` (
  `item_name` varchar(255) NOT NULL,
  `item_price` varchar(255) NOT NULL,
  `bill_datetime` datetime NOT NULL,
  `user_id` varchar(255) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
/*Data for the table `bill` */
insert into `bill`(`item_name`,`item_price`,`bill_datetime`,`user_id`) values ('drink 1','85','2024-03-20 11:32:22',''),('lunch 1','355','2024-03-20 11:41:00',''),('diner
1','550','2024-04-02 15:45:58','OWN001'),('lunch 1','355','2024-04-02 15:47:03','OWN001'),('drink 1','85','2024-04-02 16:38:12','OWN001'),('drink 2','150','2024-04-02
16:49:23','OWN001'),('lunch 1','355','2024-04-02 17:48:39','EMP001'),('drink 1','85','2024-04-02 18:06:06','MAN001'),('diner 1','550','2024-04-02 18:37:38','MAN001'),('lunch
1','355','2024-04-02 18:44:20','MAN001'),('drink 2','150','2024-04-02 18:50:24','MAN001'),('diner 1','550','2024-04-02 19:18:20','MAN001'),('diner 1','550','2024-04-02
19:25:10','MAN001'),('lunch 1','355','2024-04-02 19:42:41','MAN001'),('drink 1','85','2024-04-02 20:03:57','MAN001');
/*Table structure for table `bills` */
DROP TABLE IF EXISTS `bills`;
CREATE TABLE `bills` (
  `item_name` varchar(255) NOT NULL default '',
  `item_price` varchar(255) NOT NULL default '',
  `bill_datetime` datetime NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

Figure 4.3.2 Code Snippet for MYSQL Database Bills



## Completing Application Functionality:

- **Comprehensive Menu Management:** New abilities were introduced to dynamically handle menu items. This included uploading photos for the items, along with their categorization and pricing strategies.
- **Sophisticated Order Processing:** The system had the capability for detailed order processing activities.

The system now allows customers to personalize their orders, track their order status, and handle their past orders easily.

Recent enhancements to the user interface have made it responsive and adaptive, improving usability on various devices such as desktops, tablets, and mobile phones.

```
@app.route('/save_bill', methods=['POST'])
def save_bill():
    # Extract bill data from the request
    bill_data = request.json

    try:
        con = dbConnection()
        cursor = con.cursor()
        # Ensure that the bill_data contains 'item_name' and 'item_price' keys
        item_name = bill_data.get('item_name')
        item_price = bill_data.get('item_price')
        if item_name is not None and item_price is not None:
            # Get current date and time
            current_datetime = datetime.now()

            # Insert bill data along with the current date and time into the database
            cursor.execute("INSERT INTO bills (item_name, item_price, bill_datetime) VALUES (%s, %s, %s)", (item_name, item_price, current_datetime))
            con.commit()
            con.close()
            return jsonify({'message': 'Bill saved successfully'})
        else:
            return jsonify({'error': 'Missing item_name or item_price in request'}), 400 # Return HTTP 400 for bad request
    except Exception as e:
        return jsonify({'error': str(e)}), 500 # Return HTTP 500 for internal server error

@app.route('/download_bill_pdf', methods=['POST'])
def download_bill_pdf():
    # Receive selected items from the request
    selected_items = request.json

    # Create PDF canvas
    pdf_buffer = create_bill_pdf(selected_items)

    # Prepare response with PDF file for download
    response = make_response(pdf_buffer)
```

*Figure 4.3.3 Code Snippet for Flask Save and Download Bills*

```

@app.route('/editmenu', methods=["GET","POST"])
def editcourse():
    if request.method == "POST":
        f2 = request.files["choosefile1"]
        print ("choosefile1",f2)
        menuname = request.form.get("menuname")
        print ("menuname",menuname)
        price = request.form.get("price")
        category = request.form.get("category")
        productid = request.form.get("productid")

        filename_secure = secure_filename(f2.filename)
        f2.save(os.path.join(app.config['IMAGE_UPLOADS_UPDATE'], filename_secure))
        filenamepath = os.path.join(app.config['IMAGE_UPLOADS_UPDATE'], filename_secure)
        filename55 = filename_secure
        print ("filenamepath",filenamepath)
        print ("menuname",menuname)
        print ("price",price)
        print ("category",category)
        print ("productid",productid)

        con = dbConnection()
        cursor = con.cursor()
        sql2 = "UPDATE addmenu SET choosefile = %s, price = %s, category = %s, menuname = %s WHERE id = %s;"
        val2 = (filenamepath, price, category, str(menuname), productid)
        cursor.execute(sql2,val2)
        con.commit()
        return redirect(url_for('manager_view_menu'))

```

*Figure 4.3.4 Code Snippet for Flask Edit Menu*

## **5. EVALUATION AND RESULTS**

### **5.1. Survey Design and Distribution**

To effectively measure the impact and performance of the Restaurant Bot, we designed detailed surveys and questionnaires. These tools aimed to gather both qualitative and quantitative feedback from a select group of industry professionals, including restaurant owners, managers, and staff. The survey featured a mix of multiple-choice questions, rating scales, and open-ended responses, ensuring comprehensive coverage of the participants' experiences and thoughts. The distribution of these questionnaires was carried out online to facilitate easy participation and maximize response rates across a diverse group of users.

### **5.2. Beta Testing Process**

Participants were provided access to a beta version of the Restaurant Bot, which they incorporated into their daily operations. This practical application allowed them to fully engage with the system and provided them with a clearer perspective on its functionality and integration into their work environment. Feedback was collected systematically through the online platform. Participants were encouraged to detail their experiences, both positive and negative, and to offer suggestions for improvements. This process was essential for gathering actionable insights that could directly influence further development.

### **5.3. Analysis of Feedback**

The feedback received was meticulously compiled and analyzed to identify prevailing trends and common themes. Here's how the feedback was organized:

Aspect Evaluated	Positive Feedback	Suggestions for Improvement
Usability	High ease of use, intuitive navigation.	Request for customizable UI options.
Functionality	Efficient order processing and menu management.	Addition of advanced analytics features.
Interface Design	Clean and responsive design.	Enhancements for better mobile responsiveness.
Overall Performance	Fast response times, reliable operation.	Integration with more third-party services.

*Table 5.3.1 Feedback Analysis*

#### **5.4. Documenting Feedback**

All responses, data, and insights from the surveys were documented thoroughly. For a more in-depth review, the detailed survey results and the full questionnaires are included in the appendix of this report. This comprehensive documentation supports the analysis presented and provides a foundation for the ongoing development of the Restaurant Bot.

This evaluation phase has played a pivotal role in understanding how well the Restaurant Bot meets the needs of its users and what improvements can be made to enhance its effectiveness and usability.

## **6. FUTURE WORK**

The development and implementation of the Restaurant Bot have laid a solid foundation for a comprehensive restaurant management system. However, technology and market dynamics are constantly evolving, presenting new challenges and opportunities. To maintain relevance and effectiveness, continuous improvements and expansions are essential. This section outlines potential areas for future work that can enhance the capabilities of the Restaurant Bot and ensure its long-term success.

### **6.1. Integration with Emerging Technologies**

Advancements in artificial intelligence (AI), machine learning (ML), and the Internet of Things (IoT) offer significant opportunities for enhancing restaurant management systems. Future development efforts could focus on:

- **AI-driven Customer Service:** Implementing chatbots and virtual assistants to handle reservations, customer inquiries, and feedback more efficiently.
- **Predictive Analytics:** Utilizing ML algorithms to analyze sales data and customer preferences to forecast trends, optimize menu offerings, and manage inventory more effectively.
- **IoT for Operations Management:** Integrating IoT devices such as smart appliances, sensors, and wearables to streamline operations, enhance food safety, and improve the working conditions of staff.

### **6.2. Enhanced Mobile Functionality**

As mobile devices continue to dominate personal and professional landscapes, enhancing the mobile capabilities of the Restaurant Bot will be crucial. This includes:

- **Responsive Mobile Design:** Ensuring that all functionalities are fully optimized for mobile devices, providing a seamless user experience regardless of device or platform.
- **Mobile-first Features:** Developing mobile-specific features such as location-based services, push notifications for promotions or changes in schedule, and mobile payment options.

### **6.3. Expanded Customization Options**

Each restaurant has unique needs based on its menu, customer base, and operational style. Future versions of the Restaurant Bot could include:

- **Modular Feature Implementation:** Allowing restaurants to choose which features to implement based on their specific needs, reducing complexity and costs for smaller establishments.
- **User-defined Interfaces:** Enabling more in-depth customization of the user interface to reflect the brand and preferences of the restaurant, improving user engagement and satisfaction.

### **6.4. Improved Data Security and Compliance**

As restaurant management systems handle sensitive data, including customer information and financial transactions, enhancing security measures is imperative. Future work should focus on:

- **Advanced Encryption Methods:** Implementing state-of-the-art encryption techniques to protect data both at rest and in transit.
- **Compliance with Global Standards:** Ensuring the system meets international data protection regulations such as GDPR, HIPAA, or CCPA, adapting to new legal frameworks as they evolve.

### **6.5. Sustainability Features**

Incorporating sustainability into the core of restaurant operations is becoming increasingly important. Future enhancements could include:

- **Waste Management Tools:** Developing features that help restaurants reduce waste through better inventory management and waste tracking.
- **Energy Efficiency Analytics:** Providing analytics on energy consumption patterns and offering suggestions for reducing environmental impact.

## **6.6. Community and Collaboration Platforms**

Building a community around the Restaurant Bot can foster collaboration and innovation. Future developments could introduce:

- User Forums and Feedback Channels: Creating platforms where users can share tips, discuss challenges, and provide direct feedback to developers.
- Collaborative Feature Development: Allowing users to suggest and vote on new features or improvements, aligning development efforts with the actual needs of users.

## **6.7. Expanding Market Reach**

Finally, considering global expansion and localization of the Restaurant Bot will be essential to cater to international markets. This involves:

- Multi-language Support: Developing versions of the software in multiple languages to accommodate non-English speaking users.
- Localization of Content and Features: Adapting the software to meet the legal, cultural, and operational requirements of different regions.

## 7. CONCLUSION

The development and evaluation of the Restaurant Bot as part of this final year project have provided significant insights into the needs and operations of small to medium-sized restaurants. The project successfully achieved its primary goals of designing an integrated restaurant management system that simplifies operations, reduces costs, and enhances customer service experience through a single platform. The systematic approach taken—from initial prototyping with Tkinter to the full integration using Flask and MySQL—ensured that each phase contributed to a robust, user-friendly system.

Feedback from the beta testing phase, detailed in the appendix, has been instrumental in validating the effectiveness of the Restaurant Bot, as well as in identifying areas for further refinement. The positive responses regarding the system's usability, functionality, and interface design affirm that the Restaurant Bot addresses many of the pain points currently experienced with existing fragmented restaurant management solutions. Moreover, the constructive suggestions for improvements have outlined a clear path for future enhancements that can make the Restaurant Bot even more powerful and user-friendly.

As the restaurant industry continues to evolve, particularly with increasing digitalization, the Restaurant Bot is well-positioned to grow and adapt. Future developments, as discussed, will focus on incorporating advanced technologies such as AI and IoT, which will further improve the efficiency and capabilities of the system. Moreover, expanding customization options and improving mobile functionality are expected to meet the rising demands of a modern restaurant's dynamic environment.

In conclusion, the Restaurant Bot stands as a testament to the potential of integrated solutions in streamlining restaurant management, improving operational efficiency, and enhancing the dining experience. It promises not only to meet the current demands of the industry but also to adapt to its future changes, continuing to offer value to its users and maintain its relevance in an increasingly competitive market.



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## **APPENDIX**

### **A1. Introduction**

This appendix provides the detailed results and analysis of the beta testing survey conducted for the Restaurant Management Software as part of the Final Year Project at the University of Limerick, supervised by Dr. Nikola Nikolov. The survey aimed to collect valuable feedback from restaurant industry professionals regarding the usability, functionality, and overall effectiveness of the software.

### **A2. Survey Methodology**

**Objective:** To evaluate the Restaurant Bot in terms of its user interface, functionality, and integration within restaurant operations.

**Dates of Survey:** April 23-24, 2024

**Number of Participants:** 8

**Distribution Method:** Online via Microsoft Forms

**Types of Questions:** Included single-choice, rating scales, open-ended, and Net Promoter Score questions.

### **A3. Survey Questions and Responses**

#### **Section 1: Respondent Information**

##### **Q3. Role in Restaurant:**

**Choices:** Restaurant Owner, Restaurant Manager, Waitstaff/Server, Chef/Cook, Other  
**Responses:**

- **Restaurant Owners:** 2
- **Restaurant Managers:** 3
- **Waitstaff/Servers:** 1
- **Chefs/Cooks:** 1
- **Other:** 1

#### **Section 2: Usability**

**Q4. How intuitive did you find the navigation within the Restaurant Bot?**

**Responses:** Most respondents found the navigation intuitive, citing ease of access to features. Suggestions included improving the visibility of certain tools.

**Q5. Were you able to find all the features you needed easily?**

- Yes: 6
- No: 2

**Q6. Did you encounter any difficulties while using the system?**

Responses indicated minor issues related to search functionality and feature discoverability.

**Q7. How would you rate the learning curve required to effectively use the Restaurant Bot?**

**Average Rating:** 7.5/10

**Q8. What improvements would you suggest to make the interface more user-friendly?**

**Common themes:** Requests for a more customizable dashboard and more intuitive access to advanced features.

**Section 3: Functionality**

**Q9. Were all the functionalities you expected from a restaurant management system present?**

- Yes: 5
- No: 3

Missing functionalities noted were real-time analytics and employee scheduling integration.

**Q10. How well did the order management process work during peak hours?**

**Average Net Promoter Score:** 8/10

**Q11. Were there any functions you felt were missing from the system that should be added?**

**Responses:** Suggestions included more detailed customer relationship management tools and integration with external food delivery platforms.

**Q12. Did the system handle menu updates and modifications efficiently?**

- Yes: 6
- No: 2

Comments on "No" responses centered on the need for a simpler, more direct method for updating menu items.

**Q13. How effectively did the system integrate with existing workflows in your restaurant?**

**Average Net Promoter Score:** 7/10

Feedback indicated that while integration was generally smooth, some customization options to better align with specific operational processes would be beneficial.

#### **Section 4: Interface Design**

**Q14. How do you rate the aesthetic appeal of the user interface?**

**Average Rating:** 8.5/10

**Q15. Was the information displayed in a way that was easy to understand and read?**

- **Yes:** 7
- **No:** 1

**Q16. How did the design of the interface facilitate or hinder your tasks?**

**Responses:** Most found the design facilitated tasks by providing clear, logical navigation. One noted it hindered tasks when multiple windows were needed simultaneously.

**Q17. Were there any aspects of the interface that felt cluttered or overly complicated?**

**Responses:** Two respondents felt that the menu management section was cluttered and suggested simplifying the visual elements used.

**Q18. What changes would you recommend to improve the visual design of the system?**

Recommendations included using more contrasting colors for better visibility, reducing the number of pop-ups, and incorporating more intuitive icons.

#### **Section 5: Overall Performance**

**Q19. How would you rate the overall speed and responsiveness of the system?**

**Average Rating:** 9/10

**Q20. Did you experience any system crashes or downtime?**

Responses indicated minor downtime during updates, with suggestions for smoother transition periods.

**Q21. How reliably did the Restaurant Bot perform during high-demand scenarios?**

**Average Net Promoter Score:** 7/10

**Q22. Was the system's performance consistent over time or did you notice any degradation in speed or responsiveness?**

**Responses:**

- **Yes:** 5 (Noticed consistent performance)
- **No:** 3 (Noticed some degradation especially during peak operational hours)

**Q23. What enhancements would you suggest to improve system performance?**

**Common suggestions included:**

- Enhancing server capacity during peak hours.
- Optimizing the database for faster queries.

- Regular updates and maintenance schedules to ensure optimal performance.

## **Section 6: Additional Comments**

### **Q24. Do you have any additional comments, suggestions, or feedback regarding the Restaurant Bot software?**

General positivity about the system's impact on daily operations, with constructive feedback focused on expanding features and enhancing user training.

## **A4. Key Insights and Future Recommendations**

Usability: Enhance navigation cues and access to help resources within the application.

Functionality: Integrate real-time analytics and comprehensive employee management features.

Performance: Address any issues related to system stability during updates and high-demand periods.