Dmeter: Restaurant Automation System

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Abstract

The secret to any business's success is having satisfied customers. The restaurant industry is a highly competitive and dynamic one that demands efficient management to stay profitable and satisfy customer expectations. In this paper, we present the design and implementation of a restaurant management system that allows restaurant owners to control their many branches, personnel, and menus from a single interface. The system offers visitors an easy method to buy food online, have it delivered, and make payments through vibrant channels.

Keywords: Web Application, Databases, Restaurant Management, Unified Platform, Payment Gateway.

I. INTRODUCTION

In various prominent cafes, wait staff, waitresses are prone to missing out on tables or guests' calls throughout hectic hours potentially diminishing one's customers. While this is an ongoing issue, there is yet no product that dramatically enhances the communication between the wait staffs and the guests in the current request. Consequently, the idea is to build a system in which the guests may support their waitstaff effortlessly and aid the café boost overall effectiveness. An internal wired communication system will allow prompt notice to the wait staff when a client demands service. Moreover, waiters can also be more focused on serving their current guests and save their time and efforts by continually keeping a look out for the guests. On top of meeting the requirements of customers, restaurant owners may also cover the reaction time of their waitperson through the employment of this technology. As a result, the establishment becomes more effective and potentially raises morale while improving customer satisfaction.

II. EXISTING SYSTEM

The two existing systems being discussed in this study are the POS Software Restaurant Billing System and Petpooja Restaurant. The POS software solutions stated above are designed specifically for the restaurant, diners, cafe, with an emphasis on streamlining operations and enhancing profitability. The first system includes a comprehensive package of functions, including billing, force operation, account, and online integration. With real- time business data, it claims to aid restaurant owners to make informed judgement and be informed about their business from anywhere.

The alternate method, Petpooja, offers a central kitchen operation outcome, which is particularly handy for cafes with multiple locales.

Certain POS software systems can be complex and delicate to operate, necessitating expansive training and specialised knowledge to completely exploit all of its features and capabilities. Both of the POS software solutions discussed offer reasonable product, the cost of such software could be a worry for some firms, especially one with lower capital.

Software system is prone to specialised issues such as bugs, malfunctions, and security concerns. These difficulties can affect business operations and bear specialised support to fix. Since POS software systems are responsible for processing sensitive information such as client payment data, it's essential that the system has powerful security features in place to safeguard against data breaches and cyber-attacks.

III. PROBLEMS AND FINDINGS

In our findings, we notice that during peak hours customers have to stay for long times and request numerous times to staff to order, for the menu and also have to stay till the order has been fulfilled. In our research, we find out that these cafes use Excel to manage online orders and offline order which wastes resources and increase complexity and time to completion. The existing system doesn't have data collection system which restricts the potential for data analysis which can enable cafes to enhance their profit and makes better business decisions.

IV. FEATURES

The proposed system offers several features for eatery possessors and guests. Some of the pivotal features are listed below:

1) Branch Management: Owners can add new branches, view all branches, and manage staff for each branch using a single platform.

2) Staff Management: Owners can manage their staff members like cookers, waitpersons, and receptionists. They can assign different places and responsibilities to each staff member.

3) User-Friendly Interface: The system is designed to be user-friendly and easy to use. Guests can place orders and make payments with just a few clicks.

4) Customizable: The system is customizable and can be acclimatized to meet the specific conditions of different cafes. Owners can choose the modules that they need and customize them according to their preferences.

5) Real-Time Updates: The system provides real-time updates about the status of the order. This point helps guests to track their orders.

6) Online Ordering: Guests can order food online using the system. They can choose from colourful menu orders and customize their orders.

7) Payment: Guests can make online or cash payments. The system supports multiple payment options, including credit cards, debit cards, UPI, and net banking.

8) Order Status: Guests can track the status of their order using the web platform. The system provides real-time updates about the order status, including when the order is placed and delivered.

9) Constituents and Allergens: Guests can view the constituents and allergens present in the food. This point helps them make informed choices and avoid allergic responses.

V. LITERATURE SURVEY

[1] The Impact of Food Service Attributes on Customer Satisfaction

In a rural university cafeteria, this study sought to determine the effects of various food service characteristics on patron satisfaction. Over the course of five weeks, 676 cafeteria patrons, academics, staff, and students completed a survey. Closed-ended questions were utilised in the survey to gauge participant satisfaction with the qualities of the meal service as well as the quality of the environment, service, and cuisine. In order to analyse the data and assess the existence and strength of significant associations between various research variables, Pearson correlation coefficients were used. The findings demonstrated that customer satisfaction with various service characteristics was above average and that all service characteristics significantly and favourably impacted general satisfaction.

[2] Smart Restaurant Management and Ordering System.

This paper illustrates the vital role of customers in the current food sector in determining the quality of restaurants and their meals. When assessing client satisfaction, timely and high-quality service delivery is a crucial consideration. Customers frequently give their preferred cuisine and seating choices top priority when choosing a restaurant. Customer dissatisfaction may result from incorrect orders being served or from delayed service. These problems are addressed by the internet business "Foody," which offers customers precise, effective services through bespoke menus created for each customer's preferences. Modern IT ideas like Business Intelligence, Data Mining, Predictive Analysis, and Artificial Intelligence are used in the smartphone app.

[3] Real- Time Process operation System in a Restaurant by participating Food Order Information.

In this paper, a real-time process management system for full-service restaurants is introduced, which makes use of an advanced point-of-sale (POS) system to allow workers in the dining room and kitchen to share order information. The system enables dining hall employees to keep an eye on customer situations via a monitor while allowing kitchen staff to check all customer orders in real-time by dish and elapsed time. This system's implementation can improve restaurant preparation procedures and lower customer complaints. The study supports the system's efficacy in enhancing restaurant operations.

[4] Development of Smart Restaurant Application for Dine-In.

This study focuses on the effects of the coronavirus epidemic on the food and beverage sector and offers a potential way for restaurants to continue operating and providing services despite the pandemic. To limit interactions between consumers and staff and to cut down on waiting times, the suggested solution calls for the implementation of an online reservation and ordering system. Customers can reserve tables online, check in using a QR code, choose and confirm menu items using their smartphone, and pay electronically using the app's reservation and ordering

systems. The application's goal is to give customers a secure and effective way to enjoy dining while abiding by pandemic restrictions.

We also did our own research from local cafes restaurant/café like The Local Katta, Noori Caterers, Hotel Satish, Nirmal Sai Chinese & tandoori Corner were using restaurant management software like Petpooja, Limetray and Menson hotel manager and some restaurant used catalogues to store their order data. We took the note of features which these existing systems provided and convinced some of the local restaurants which were using catalogue to use our system.

VI. PROPOSED METHODOLOGY

The food and beverage (F&B) sector is rising, and cafés are continuously seeking to find new ways to improve their offers and boost consumer's satisfaction. To solve these issues, we offer an automation solution for many cafes and their chains. The proposed system offers various features that can allow restaurant owners to streamline their operations and enhance customer experiences. The proposed system includes various features that might allow restaurant owners to optimise their operations and enhance consumer satisfaction. Some of the essential aspects are below

The system may accommodate several cafes and their chains. Restaurant owners can manage their business from a single platform. The system gives different panels for diverse places, similar as client, manager, and other personnel. Each panel is customised to accommodate the needs of the administration. The system offers different order options, including in- house, takeaway, home delivery, and pre-order. Customers can choose the order type that suits their preferences. The system enables cash and online payment modes. Customers can choose the payment system that's convenient for them. The system can calculate bills and generate checks for customer.

VII. OBJECTIVE

The restaurant industry is a competitive field, and enterprises need to stay ahead of the wind to remain appropriate. The arrival of technology has brought substantial changes to the industry, making it easier for cafes to serve their customers more. A completely functional food ordering website is our approach to deliver convenience to customers and generate earnings for the restaurant.

By combining all the necessary systems under one banner, a restaurant automation system can profit both end - user and owners. Administrator, same as guests, can access the eatery's services smoothly. With a food ordering website, customers may place orders from the convenience of their homes or offices. Consumers can tailor their orders, pick between numerous payments choices, and track their orders.

Its convenience boosts the client experience and makes them more likely to return to the eatery.

For eatery owners, an eatery automation system supplies a complete result for managing their operations. The system allows owners to handle their menus, personnel, and guests from a centralized platform. They can seamlessly track their deals, cover their personnel, and adjust their menu to match customer need. The system also enables owners to automate procedures such as billing and order processing, minimizing expenditures and freeing up staff time.

VIII. SYSTEM ARCHITECTURE

The proposed system has two web ends, one for owners and one for customers. The proprietor's dashboard has multiple panels, including the dashboard, which provides a detailed assessment of the eatery's operations. Owners can add new branches, manage personnel, view all orders, menus, and orders, and handle transactions. The system allows owners to manage different branches via a single platform, which saves time and effort.

On the other hand, the client side provides a user-friendly interface for online ordering, payment, and tracking the status of their order. Customers can view the ingredients and allergens present in the dish, which helps them make informed decisions. The system provides various ordering options, such as online ordering, takeaway, and dine- in.

Data Flow
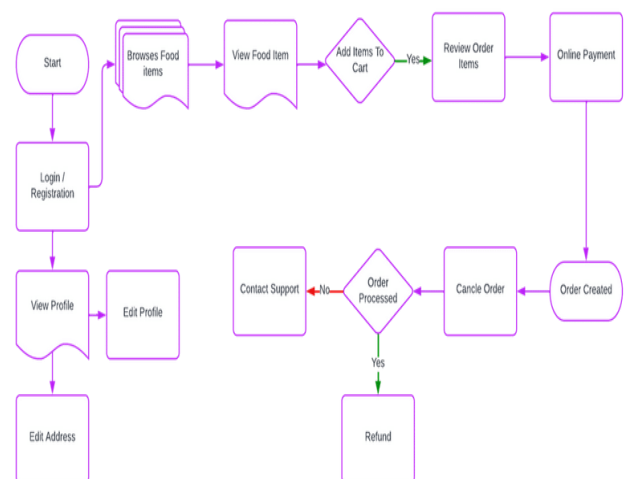
a) Customer DFD (Fig. 1)

The DFD diagram for customer functions consists of four main components: "Customer", "Orders", "Menu", and "Payment".

The "Customer" component includes processes for managing customer details such as adding new customers, updating existing customer records, and deleting customer records.

The "Orders" component includes processes for managing the orders placed by customers such as adding a new order, updating an existing order, and deleting an order.

The "Menu" component includes processes for managing the menu items such as displaying the menu, updating menu items, and adding new menu items.

The "Payment" component includes processes for managing the payment details such as calculating the total amount due, accepting payment, and generating a receipt.

ER diagram (fig 3)
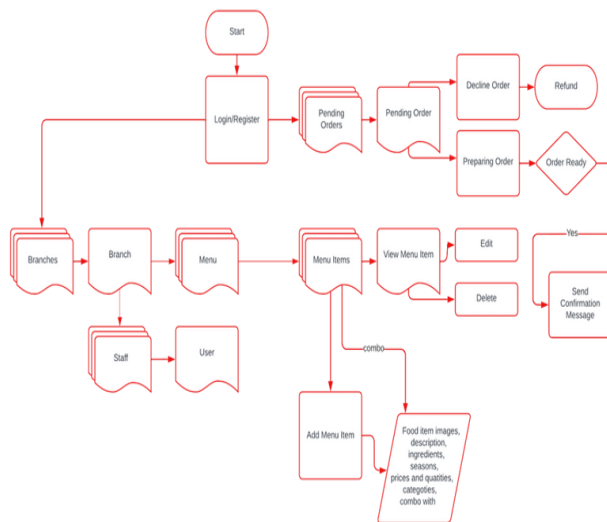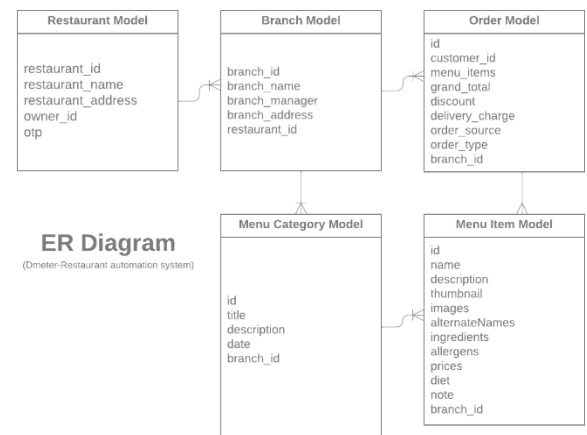
b) Customer DFD (fig 2)

The data flows between the components of the DFD diagram for staff and customer functions represent the flow of data between the different processes involved in managing the restaurant operations. For example, the "Staff" component interacts with the "Orders" and "Inventory" components, which, in turn, interact with the "Reports" component.

Similarly, the "Customer" component interacts with the "Orders" and "Menu" components, which, in turn, interact with the "Payment" component.

The DFD diagrams for staff and customer functions provide a clear understanding of the data flows and processes involved in managing restaurant operations from the perspective of staff and customers. These diagrams can be used to identify potential bottlenecks, improve processes, and streamline restaurant operations to provide a better dining experience for customers.

The restaurant management SaaS tool ER diagram is a conceptual representation of the system's data model that consists of several entities and their relationships.

The "Restaurant" entity represents the core restaurant entity and contains attributes such as the name, address, and contact details of the restaurant.

The "Branch" entity is a child entity of the "Restaurant" entity and represents the different branches of the restaurant. It has a unique identifier and is associated with a specific "Restaurant" entity.

The "Category" entity represents the different categories of menu items offered by the restaurant. It has a unique identifier, a name, and a description attribute.

The "Menu Item" entity represents the different items that can be ordered at the restaurant. It is associated with a specific "Category" entity and contains attributes such as the name, description, price, and image of the item.

The "Order" entity represents the orders placed by customers. It is associated with a specific "Branch" entity and contains attributes such as the order ID, date and time of the order, customer name, and the total amount of the order.

The "Staff" entity represents the employees working at the restaurant. It is associated with a specific "Branch" entity and contains attributes such as the staff ID, name, contact details, and role within the restaurant.

The ER diagram's relationships are defined as follows:

A "Restaurant" entity can have multiple "Branch" entities, which allows the system to support multiple restaurants and their branches.

A "Branch" entity can have multiple "Category" entities, allowing each branch to have its own catalogue of categories.

A "Category" entity can have multiple "Menu Item" entities, allowing for easy management of a restaurant's menu items.

An "Order" entity can be associated with only one "Branch" entity but can contain multiple "Menu Item" entities, making it possible for a customer to order multiple items from a single branch.

A "Staff" entity can be associated with only one "Branch" entity, making it easier to manage the staff for each branch.

The ER diagram's relationships and entities enable the restaurant management SaaS tool to handle multiple restaurants and their branches, efficiently manage the catalogue of categories, menu items, orders, and staff for each branch, and provide a scalable solution for restaurant management.

IX. RESULTS AND ANALYSIS

The system allows eatery owners to manage their operations from a single platform, which can enhance their effectiveness and reduce resource wastage. The system offers various order types and payment methods, making it easier for customers to place orders and make payments. Customers can also view the ingredients and allergens of the meal they order, which can help them make informed choices. The system can calculate invoices and generate bills for customers, thereby reducing the burden on restaurant employees and insure accurate billing. The method allows restaurant owners to manage their employees, including cooks, waitpersons, and receptionists, which can improve worker effectiveness and lessen scheduling conflicts

X. CONCLUSION

In this research, we applied a technique that can be deemed useful and the proposed restaurant automation system offers several features for owners and customers. The system aims to streamline restaurant operations and deliver a better dining experience to customers. The system is scalable and can be adjusted to fit the specific requirements of different eateries. We believe that the proposed solution can assist restaurant owners to increase their profits and enhance customer satisfaction.

XI. REFERENCE

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