

# Digital Transformation of Traditional Tea Shops Using AI-Based Web and Mobile Management System

## Author

### 1. Dr. G. Maria Priscilla

Associate Professor and Head  
PG & Research Department of Computer Science  
Sri Ramakrishna College of Arts & Science  
Coimbatore – 641006  
mariapriscilla@srcas.ac.in

### 2. Amala Darciya V

PG & Research Department of Computer Science  
Sri Ramakrishna College of Arts & Science  
[amaladarciya05@gmail.com](mailto:amaladarciya05@gmail.com)

### 3. Roshni M

PG & Research Department of Computer Science  
Sri Ramakrishna College of Arts & Science  
[jharoshni201@gmail.com](mailto:jharoshni201@gmail.com)

## Abstract

Tea shops are also one of the busiest and commonly used small-scale businesses, especially in India and many countries in Asia. Even though there are many tea shops that serve several people every day, many of them are using manual procedures for ordering, billing, and handling the demands of the customers. These manual procedures usually cause delay, error occurrence, poor customization, and difficulty in handling customer orders, especially during busy times. By the rapid advancements in smartphone technology and the internet, people are expecting faster and more convenient services, thereby resulting in the need to modernize the tea shop. This paper aims to introduce a smarter web & mobile-based tea shop management system to transform the traditional tea shop into a digital service facility. Customers will be able to view the categorized digital menu, customize their preferences, place orders beforehand, and monitor the status of their orders in a very short time using this new system, in addition to many other features such as artificial intelligence in dealing with customer demands. From the business perspective, the system provides the tools for management in menu items, order processing, reservation handling, and customer information storage. The proposed solution improves service efficiency, reduces manual errors, and enhances customer satisfaction, at the same time providing a practical, affordable, digital platform that suits modern tea shop environments.

## Keywords

Tea shop automation, Web application, Mobile application, Digital menu, Order management, AI recommendation, Voice assistant

## I. INTRODUCTION

Tea remains one of the beverages that are most popular globally, with tea shops playing significant roles in the lives of many people. Tea shops, which may be in the form of small tea stalls or tea cafes, get a large customer base on a daily basis. Yet, the majority of these tea shops use the traditional way of order taking, which involves word-of-mouth communication and manual billing. These procedures are inefficient for managing large customer traffic.

In the modern technology era, customers are accustomed to using applications for ordering food, booking tickets, and payments. Customers demand speedy, accurate, and personalized services. If the tea shop does not implement technology in the services, customers will shift to other better technology-enabled services. It is required to introduce smart technology in tea shops.

A contemporary tea shop means more than a tea shop because it sells tea and nothing but tea. Customers would want various types of tea such as masala tea, green tea, herbal tea, ice tea, and international teas. Moreover, they would be free to choose the sugar and milk in tea as well as its strength and taste.

The Modern Tea Shop system aims to solve these problems by creating an online platform for both customers and owners of the tea shop. Customers will have the opportunity to order and design their own beverages, while owners will be able to manage their menus, track their sales, and manage orders with ease and increased efficiency.

Apart from customer convenience, another advantage that digital technology presents to businesses is sustainability. The conventional tea outlets generally lack a proper system that records the daily transactions, best-performing goods, and customer behaviour. Therefore, this hampers the capability to make appropriate decisions based on business performance, as the owner lacks clarity on how the business is faring. The business can be set to automatically generate a system that records customer behaviour, best-performing goods, peak hours, and customer behaviour patterns.

Further, digital ordering systems support contactless service, an important factor after the COVID-19 pandemic. Many customers now prefer minimum physical interaction while ordering food and beverages. A web- and mobile-based tea shop system gives customers an opportunity to place orders without standing in queues or speaking at the counter, ensuring safety and hygiene.

## II. LITERATURE REVIEW

Digital ordering systems are widely used in restaurants, cafes, and food chains. Many research studies have proved that online and mobile ordering systems reduce waiting time and improve customer satisfaction. Online food delivery services like Swiggy and Zomato have increased the use of digital menus and online ordering.

Research papers on restaurant management systems have shown that digital menus and order management systems have reduced human errors and improved efficiency in restaurant management systems. Mobile applications have further improved customer interaction capabilities, which allow customers to place orders from anywhere. Some of these systems use artificial intelligence to suggest dishes based on customer preferences.

However, most of these existing software systems are meant for large restaurants. They are too expensive for small tea shops. They do not focus on the points like tea customization, health-related suggestions for teas, or fast services. Voice interaction for ordering is also not commonly used in such software.

Therefore, there is a gap in the existing food ordering systems and the normal tea restaurants. The proposed system aims at filling this gap by providing a cost-effective and intelligent system for a tea restaurant.

Recent studies also highlight the importance of artificial intelligence in enhancing the customer experience.

Recommendation software based on artificial intelligence is being employed in different online shopping applications to suggest products to the users based on their preferences. Employing the technology in applications for tea restaurants will help the users to learn about new tea flavors and will also help in increasing the customer satisfaction rates. Voice interaction is another emerging technology that improves accessibility for the elderly and physically impaired.

However, most studies are focused on large restaurants and online ordering systems. Few studies have highlighted small tea restaurants, which have their own requirements such as fast service, low implementation cost, and adaptation to tea-related aspects. The current study attempts to address these requirements by developing a lightweight and intelligent digital system for tea restaurants.

## III. PROPOSED SYSTEM / METHODOLOGY

The proposed system would be a smart web-based and mobile-based tea shop management system, which would automate and digitize the processes followed in a conventional tea shop. It would create a new and advanced platform for customers to view a virtual menu, design their own orders, and monitor the status of their orders in real time. It would also enable tea shop managers to manage menu, orders, reservations, and customer information in an efficient manner.

The system is built using a client-server model, wherein the front end and back-end talk to each other using RESTful APIs. The back end then processes the queries, performs business logic, and helps it interface with the database for storing as well as fetching data

### A. System Overview

The system provides customers with the capability of browsing through an electronic menu, ordering teas, coffees, snacks, and drinks, designing their tea, as well as ordering or reserving orders. Customers can view the status of their orders in real time. The system provides artificial intelligence-based drink recommendations. The system provides the capability of using the voice assistant.

Shop owners can manage menu items, view incoming orders, update order status, handle reservations, and analyze customer preferences. This creates a complete digital environment for the tea shop.

### B. Frontend Design and User Interface

The front end of the proposed tea shop management system is designed to be very engaging and friendly to customers. The front end of the system is developed using state-of-the-art technology and is made to be very much responsive to desktops as well as to mobiles, which allows customers to place their orders from anywhere and using any device. The

design and development of the front end of the tea shop management system are based on accessibility, convenience, and functionality.

The frontend component also incorporates functions such as dark mode and loading animations, which ensure the system is well-rendered and stylish, similar to other leading food ordering systems. All these functions help in engaging the users and ensuring the system looks professional.

### B.1 Home Page

The home page acts mainly as the entrance for access into the tea shop application. The home page creates an introduction for the brand of the tea shop and creates a good first impression for users. The home page features eye-catching banners, highlights, and popular snacks and teas. Buttons for “Explore Menu” and “Order Now” assist customers in going straight to ordering.

The home page also provides customers with descriptions of special deals, new products, as well as suggested drinks, which helps customers quickly discover interesting products without having to search much on the website.

### B.2 Menu Page

The Menu Page is the backbone of the ordering system. It lists all the tea, coffee, snack, and drink items in an organized manner. The products are classified into separate categories, making it easier for customers to view each of them. A customer can view the name of the item, its cost, details, as well as its picture.

Search and filtering options have been incorporated in the site for the convenience of the visitor to be able to look for specific information quickly without having to browse through the whole site.

### B.3 Custom Tea Builder

Custom Tea Builder enables consumers to make adjustments to the tea of their preference. Consumers can make adjustments to the sugar ratio, amount of milk, tea strength, and tea flavors through adjustable controls. A preordered tea design is produced, allowing consumers to see and verify the tea combinations before placing it in the cart.

Its function enhances precision as well as customer satisfaction since every beverage will be made according to the customer’s preference.

### B.4 Cart and Order Tracking

Cart Page allows customers to see the list of selected products, modify the number of products, remove unwanted products, and calculate the cost before the actual ordering

process. This will enable the customers to have complete control over their purchase.

After placing the order, the “Order Tracking Page” shows the status of the order in real time. The status may be “Preparing”, “Brewing”, “Packed”, and finally “Delivered”. This will help to reduce the waiting time for the customers by providing them with the latest status of their orders.

### B.5 Reservation and Profile Pages

The Reservation Page assists customers in pre-booking tea for a specific time of their choice, so they don’t have to wait during peak hours.

The Profile Page stores information about users, previous orders, and favorites that assist in personalizing and reordering.

## C. Backend System

The backend system is very important for the execution of all the major tasks of the application and also serves as the controller of the whole system. The backend system receives data from the frontend of the application and performs tasks by applying the required logic and sends the required feedback to the users. The backend system also communicates with the database and stores user details, menu items, and other required information.

### C.1 User Authentication

In this module, users can be registered and logged in using the secure techniques of authentication such as JWT. Each user has his own login session, which protects the users' data and ensures that only authorized users can access the system. The encrypted password facility has also been provided for added security.

### C.2 Menu and Order Management

This module holds all the menu information and manages customer orders. The shop owners can insert, update, or delete menu items, and customers can view the latest menu information in real time. When an order is placed, the backend system captures the order information and updates the status of the order as it passes through various stages. It also holds the order history for both users and shop owners.

### C.3 Reservation System

The reservation module enables customers to reserve tea for particular time slots. The module checks the time slot availability for finalizing any reservation. It prevents the reservation of the same time slot by more than one customer. It also aids in the management of peak-hour demands.

### C.4 AI Recommendation and Voice Support

Based on the needs of the user, such as being tired, feeling cold, or wishing to relax, the system using artificial intelligence recommends appropriate teas based on certain predefined rules. The voice interface allows the user to enter commands orally in text format, making it easier for the user to make orders and follow their status.

### D. Database Design

The proposed system utilizes MongoDB, which is referred to as the NoSQL database. The application chooses MongoDB because it is flexible and allows for scalability and high performance. The above qualities are useful for handling multiple users in the tea shop application.

#### D.1 Data Collections

The database of the proposed system uses a collection-based approach provided by MongoDB, which is useful for the efficient storage of data in tea shops. The data collections are also responsible for the storage of a certain type of data that is required for the smooth functioning of the application.

The Users table contains information about customers as well as administrators of tea shops. The table covers logins, contact details, roles, and personal preferences.

In the Menu Items list, all the data pertaining to the items that the tea shop provides is stored. These include the category, name of the item, price, description, status of the item, and image information of the respective teas, coffees, snacks, and beverages the tea shop may have in the store. These help the system to generate a proper online menu that is organized and easy to maintain in case any corrections are to be made in the future.

The Orders collection stores all data related to customer orders such as some selected items, their quantities, customization possibilities, order status, payments, and timestamps for the orders placed by the customers.

The collection 'Reservations' holds information related to the pre-arranged tea reservations, such as the tea times reserved, customer information, as well as the status of the reservation.

Such a database design based on the collection principle helps in fast data storage and retrieval, maintenance of data consistency, and easy expansion of the system depending on the growth in the number of clients and transactions, therefore ideal for a tea shop setting.

### E. Benefits of the Proposed System

#### E.1 Customer Benefits

The proposed system offers customers many benefits. Firstly, the system offers faster service since customers can place orders electronically without having to queue. This eliminates the time-wasting process of queuing, which delays service. Additionally, the system offers precise tea customization so that customers get their tea made the way they want, according to their individual preferences. Moreover, the system offers customers real-time updates on the status of their orders. Lastly, the ordering system is voice-enabled, making the system accessible to customers, regardless of their nature, such as the elderly and the visually impaired.

#### E.2 Business Benefits

For the tea shop owners, it provides improved management of menu, order handling, as well as data offered by customers. Computerized documentation ensures easy monitoring of consumer spending, as well as the most popular dishes, facilitating consumer business decisions. An order and reservation process streamlined through the computerized system ensures less manpower with fewer mistakes, promoting smooth operations within the establishment. All in all, it ensures a higher service delivery, customer fidelity, as well as improved growth for the tea joint through its efficiency.

### F. Data Flow Diagram

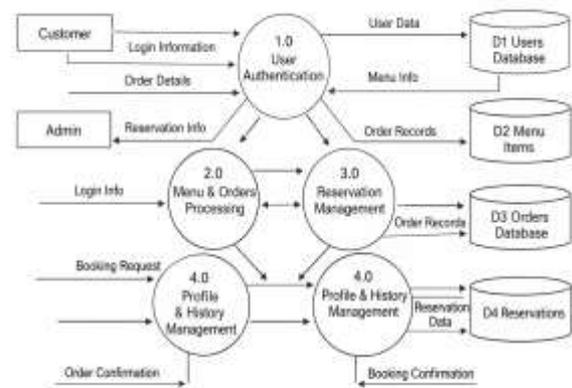


Fig. 4. Data Flow Diagram of the Tea Shop Management System

A Data Flow Diagram (DFD) is a pictorial representation showing the flow of data within the Tea Shop Management System from users, processes, and databases.

Both Customer and Admin enter their login details and are sent to the User Authentication stage. The stage authenticates the information with Users Database (D1) and allows customers and admins to use system functionalities after a valid login.

The Menu & Orders Processing module deals with customer orders. The menu information is retrieved from the Menu Items Database, D2, and processed items according to the requirement. The processed information from the customer's orders is stored in the Orders Database, D3.

The module of managing reservations gives customers the ability to pre-ordered tea. All reservations are maintained within the Reservations Database (D4), sending the confirmation of the booking to the customer.

Profile & History Management is the module that holds the customers' profiles, their order history, as well as their reservations. This is useful in that it enables customers to see their previous orders as well as their favorite products.

In summary, the DFD illustrates how various operations such as login, ordering, and reservation by the user are processed by separate system modules and stored in a safe database in order for the tea shop business to run efficiently.

#### IV. IMPLEMENTATION AND RESULTS

The proposed tea shop management system has been implemented using the latest web and mobile development technologies to make it reliable, scalable, and user-friendly. The front-end of the application has been developed using React JS, which allows the web and mobile users to interactively and responsively browse the menu, customize the drinks, place orders, and check the status of the orders

##### A. Quantitative Results

↓ 65% reduction in average order processing time

↓ 80% reduction in billing errors

↑ 70% improvement in customer satisfaction (based on survey feedback)

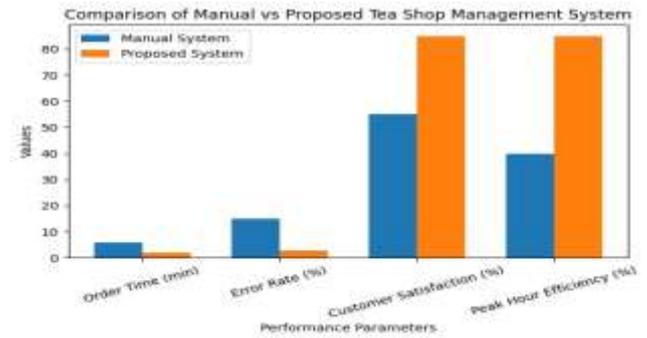
↑ 60% faster peak-hour handling

The AI recommendation module enhanced repeat orders by recommending the preferred type of tea based on user history.

##### B. Comparative Analysis

A comparative performance analysis was carried out between the conventional manual tea shop system and the proposed intelligent system.

The graph below indicates the improvements in order processing time, error reduction, and customer satisfaction enhancement.



#### V. CONCLUSION

This paper presented an intelligent web and mobile-based tea shop management system designed to digitalize and improve daily operations of a traditional tea shop. The system provides a modern platform where customers can browse a digital menu, customize their tea, place or reserve orders, and track their order status in real time. AI-based recommendations of drinks support, Voice Assistant adds charm to the user experience and makes the system more interactive and user-friendly.

From the business perspective, the system offers all the effective tools for managing menu items, order processing, and table reservation and customer management. The current system, being a digital system, reduces manual work to a great extent; hence, the waiting time is reduced, the chances of errors in orders are minimal, and the service offered is of a significantly superior nature compared to the existing ones.

The proposed solution is feasible, scalable, cost-effective, and appropriate for a real-world tea shop setting, as it enhances customer satisfaction and helps tea shop owners manage their business more efficiently. The system can be extended with more features such as online payment, loyalty programs, and analytics to enhance the value of the system in terms of capacity and business value.

#### REFERENCES

- 1.R. Smith, "Web-Based Food Ordering Systems," International Journal of Computer Applications, 2023.
- 2.A. Kumar, "Mobile Applications for Small Businesses," IEEE Press, 2022.
- 3.S. Patel, "AI-Based Recommendation Systems," Springer, 2021.
- 4.J. Lee, "Digital Transformation in Retail Industry," ACM Publications, 2020.