"CafeEase: A Comprehensive Coffee Shop Management System for Café De Vito with QR-Based Ordering, Real-time Notifications, and Integrated Inventory Control"

A non-thesis Project
Presented to the Faculty of the
College of Computer Studies
MINDORO STATE UNIVERSITY
Calapan City Campus
Masipit, Calapan City, Oriental Mindoro

In Partial Fulfillment
of the Requirements for the Course of
APPLICATION DEVELOPMENT AND EMERGING TECHNOLOGY

Calsena, Leoven Q.
Del Rosario, John Paul M.
Herrera, Adley O.
BSIT III-F1

October 2023

TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION

In this chapter, researchers will thoroughly examine the fundamental aspects of the project, thereby establishing a solid basis for the system that lies ahead.

Project Context

In response to the dynamic landscape of the contemporary food and beverage industry, this project emerges as a strategic response to the evolving demands of the market. With the help of digital solutions and smart technologies, the "CafeEase" initiative seeks to completely transform the traditional coffee shop model. Based on a synthesis of relevant research findings and field advancements, this attempt aims to match the resulting system with state-of-the-art industry standards.

The foundational research of Singh et al. (2022), who examined the deployment of a Smart QR-based Restaurant Dine-in System, is largely responsible for the inspiration behind this project. The "CafeEase" concept is based on research into QR code technology as a means of facilitating efficient ordering procedures.

Simultaneously, the analysis and design ideas presented by Sidabutar et al. (2023) in their investigation of a Web-

based Information System for Coffeeshop Management using Design Thinking are incorporated into the project's process. Using design thinking is essential to creating a user-centric interface that makes it easy and pleasant for customers and staff to interact with the coffee shop.

Demartini et al. (2018) and Manjula et al. (2021) have provided insights into the larger context of digitalization in the food business that have a substantial impact on the strategic positioning of the "CafeEase" system. With a specific emphasis on digital transformation to address operational difficulties and capitalize on future opportunities within the food retail sector, the project is strategically linked with recognized market trends.

The project's promotional strategy is informed by strategic insights from Ahamat et al. (2022) regarding innovation marketing in the food and beverage industry. The "CafeEase" system uses new technology to not only meet market demands but also to make a significant contribution to the continuous story of innovation in the larger food and beverage industry.

Furthermore, the study conducted by Daradkeh and colleagues (2023) provides a critical viewpoint, focusing on the enhancement of digital presence as a means of enhancing

consumer value in fast-food outlets. "CafeEase" is positioned to improve coffee businesses' online visibility by providing a cutting-edge system that streamlines order tracking and creates a direct line of communication between customers and staff.

In conclusion, "CafeEase" fills a distinct niche at the intersection of technical innovation and the changing needs of the food and beverage business. The system intends to be a pioneering solution that enhances the customer experience, streamlines operational processes, and contributes significantly to the ongoing digital transformation in the field of coffee shop management by synthesizing insights from current research.

Objectives

The study aims to design, develop, and implement a Comprehensive Coffee Shop Management. The system aims to enhance the experience for customers and streamline the workflow for staff, ultimately contributing to the overall success and efficiency of the coffee shop.

Specifically, this study aims to:

- Develop a user-friendly and intuitive interface for the Coffee Shop Web Kiosk, ensuring accessibility for customers of varying technological proficiency.
- Implement a QR code-based ordering system that enables customers to conveniently place orders from their tables, differentiating between take-out and dine-in orders.
- Integrate secure and efficient payment options, supporting both online payment transactions and over-the-counter payments, ensuring a seamless and flexible payment process.
- Establish a real-time notification system that alerts the cashier or on-duty personnel when a customer places an order, along with details such as table number and order items.
- Develop a customer-centric order tracking feature, allowing customers to monitor the status of their orders in real-time, from preparation to pickup or service.
- Streamline order fulfillment processes, differentiating between over-the-counter payments where customers pick up orders at the counter, and online payments where the staff serves the prepared order directly to the table.

- Implement a dual QR code system, generating unique QR codes for take-out and dine-in orders to ensure a smooth and accurate ordering process.
- Integrate an inventory management system to track and manage the availability of menu items, ensuring efficient stock management and preventing discrepancies between online orders and actual inventory.
- Develop comprehensive user training materials and documentation to facilitate smooth adoption of the Coffee Shop Web Kiosk system by both customers and staff.
- Implement robust security measures to protect customer data and financial information, ensuring compliance with data protection regulations and standards.

Scope and Limitations

The Coffee Shop Web Kiosk project seeks to improve the customer experience by offering a simple platform for QR-based ordering and real-time order tracking. Customers can scan unique QR codes at each table for take-out or dine-in services, while the cashier receives immediate notifications for fast order processing. The system accepts both online and in-person payments, and it has integrated inventory management to keep track of stock levels. However,

constraints include the need for a stable internet connection, hardware compatibility with QR-capable devices, and the possible difficulties of total security. Customization beyond established features may necessitate extra effort, and third-party integration is contingent on API compatibility. Legal and regulatory compliance are critical, with regional variations necessitating care during deployment.

Definition of terms

To enhance clarity and facilitate comprehension, the following terminology is conceptually and operationally elucidated:

CafeEase - The overarching initiative seeks to revolutionize traditional coffee shop models through digital solutions and smart technologies, with a primary focus on a comprehensive Coffee Shop Web Kiosk system.

Smart QR-based Restaurant Dine-in System - The system inspired by Singh et al. (2022) utilizes QR code technology for efficient order placement, forming the foundation for CafeEase's QR-based ordering feature.

Web-based Information System for Coffeeshop Management - The conceptual framework proposed by Sidabutar et al. (2023),

influencing the design and user-centric interface of CafeEase through the incorporation of design thinking principles.

Innovation Marketing - The promotional strategy informed by Ahamat et al. (2022), guides the strategic deployment of CafeEase by leveraging new technology to meet market demands and contribute to ongoing innovation in the food and beverage industry.

Enhancement of Digital Presence - Informed by Daradkeh and colleagues (2023), the focus is on improving online visibility for coffee businesses through CafeEase, facilitating order tracking and direct communication between customers and staff.

Comprehensive Coffee Shop Management System - The overarching goal of the study, encompassing the development and implementation of CafeEase, is to enhance customer experience, streamline operational processes, and contribute to the digital transformation of coffee shop management.

User-Friendly Interface - A key objective focusing on the development of an intuitive and accessible interface for the Coffee Shop Web Kiosk to accommodate customers with varying technological proficiency.

QR Code-Based Ordering System - A core feature enabling customers to conveniently place orders from their tables, with a differentiation between take-out and dine-in orders.

Real-Time Notification System - A system component that alerts the cashier or on-duty personnel instantly when a customer places an order, providing essential details such as table number and order items.

Order Tracking Feature - A customer-centric component allowing real-time monitoring of order status, from preparation to pickup or service.

Dual QR Code System - The implementation of unique QR codes for take-out and dine-in orders, ensuring accuracy and efficiency in the ordering process.

Inventory Management System - A crucial element integrated into CafeEase to track and manage the availability of menu items, preventing discrepancies between online orders and actual inventory.

User Training Materials and Documentation - Comprehensive resources developed to facilitate the smooth adoption of the Coffee Shop Web Kiosk system by both customers and staff.

Security Measures - Robust features implemented to protect customer data and financial information, ensuring compliance with data protection regulations and industry standards.

CHAPTER 2. REQUIREMENTS SPECIFICATION

This chapter outlines the specific requirements, features, and functionalities significant to the researchers' system development.

Hardware and Software Requirements

Hardware Requirements

Server/s – The developers will need servers since they provide data storage, processing, and security to the system. It centralizes data management, allows collaboration, and maintains data integrity and accessibility for the users.

Storage (SSD) – 256GB to 512GB SSD will be used by the developers to store and manage the system’s data and to access the data more efficiently. A 512GB to 1TB or larger is also recommended for a much quicker and better performance.

Memory (RAM) and Processor (CPU) – The developers will be using 8GB to 16GB RAM and an Intel Core i5 processor to provide a smoother performance in handling the system’s data. Recommended RAM and processors are 16GB to 32GB RAM or more and an Intel

Core i5 processor or higher, for a much smoother performance.

Network Connectivity – The modem is the device used to access the internet and it provides 35 Mbps download speed. It is used by the developers because a stable and low-latency connection is essential to provide a fast and reliable network connection for the system. A download speed of at least 25-50 Mbps is recommended, this ensures smooth file uploads and downloads. On the other hand, the POS Terminal must have a stable wired connection to the local network for reliable and low-latency communication with the server. Each customer table's tablet or smart device should connect to the coffee shop's Wi-Fi network, enabling them to access the web-based kiosk application seamlessly.

Mobile Devices – iOS and Android OS version 4.0 (API 14) and above will be used to test and try out the responsiveness and compatibility of the system in mobile devices enhancing its efficiency and flexibility. Each customer table equipped with a

tablet or smart device for QR code scanning and order tracking.

Software Requirements

Visual Studio Code – A free and powerful lightweight code editor providing support to the researchers' system by conducting development operations like debugging, task running, and version control. The required version is 1.83.1 or higher.

CodeIgniter 4 – An open-source PHP framework. Version 4 is the required version to develop the researchers' system.

Vue JS – A progressive JavaScript Framework used for developing mobile apps simultaneously with a single codebase. Version 2.7.14 or higher is required.

Node.js – Version 18 or higher is required for creating a high-performance and real-time application.

MySQL – Version 8.0.30 or higher is required for storing and managing the system's structured data.

User Interface Templates – Samples are Bootstrap and Tailwind, they are ready-made web design composed of HTML and CSS along with other optional JavaScript plugins for easy customization of the system's UI.

Web browsers – Samples are Google Chrome, Firefox, Microsoft Edge, etc. These are used to enable the system's access to necessary web-based content and manage interactions with online services and resources.

Windows 10 and Windows 11 – These are versions of the Windows operating system that will be used for the researchers' system.

Laragon - A powerful development environment and server stack for building and managing the researchers' system. Version 7 to 8.2 is required.

phpMyAdmin – The latest version (currently 5.2.1) is required to be used for supporting a wide range of operations and manage the system's MySQL databases.

Functional Requirements

User Authentication and Authorization:

1. Customer Login: Users should be able to create accounts and log in securely. Differentiate between customer and staff logins.
2. Staff Authentication: Staff roles include Teller/Cashier and Crew.
3. Authorization Levels: Define access levels for staff (e.g., cashier, manager, inventory manager).

QR Code-Based Ordering System:

1. Dynamic QR Code Generation: Each table, both for take-out and dine-in, should have a unique QR code leading to the order page.
2. Order Placement: Customers can browse the menu, add items to the cart, and place orders via the QR code.
3. Payment Options: Support both online payment and over-the-counter payment.

Order Processing and Notification:

1. Real-time Notification: Cashiers receive instant notifications for new orders with details, including table number and items ordered.

2. Order Tracking: Customers should be able to track the status of their order (e.g., ordered, in preparation, ready for pickup).

Order Pickup and Serving:

1. Over-the-Counter Pickup: For over-the-counter payments, customers receive a notification when the order is ready, and they pick it up at the designated counter.
2. Table Service for Online Payments: For online payments, staff (crew) receive a notification, and they serve the order to the customer at the specified table.

Inventory Management System:

1. Stock Tracking: Keep track of the inventory levels for each menu item in real time.
2. Automated Alerts: Send alerts for low-stock items to the inventory manager.
3. Order Impact: Deduct sold items from the inventory upon order completion.

Reporting and Analytics:

1. Sales Reports: Generate daily, weekly, and monthly sales reports.

2. Order History: Maintain a history of orders for future reference and analysis.

User Interface and Experience (UI/UX):

1. Intuitive Design: Ensure a user-friendly interface for both customers and staff.
2. Responsive Design: Support a responsive design for various devices (desktop, tablet, mobile).

Security Measures:

1. Data Encryption: Encrypt sensitive data such as user credentials and payment information.
2. Access Control: Implement access controls to restrict unauthorized access.

System Configuration and Deployment:

1. Compatibility: Ensure compatibility with popular web browsers.
2. Scalability: Design the system to be scalable for potential future expansions.

Maintenance and Support:

1. Error Logging: Implement a system to log errors for debugging and maintenance purposes.
2. Customer Support: Include a helpdesk or support system for customer queries.

Non-Functional Requirements

Operational Requirement

1. The system should be able to operate seamlessly on various web browsers and devices, including desktops, tablets, and smartphones.
2. The system should be able to provide clear and user-friendly documentation or guidance to help users navigate and utilize its features effectively.
3. The system must log user activities, including document uploads and checks for auditing and monitoring purposes.
4. The system must adhere to data privacy regulations and maintain user data confidentiality.
5. The system must be able to enhance the user-friendliness of the system's interface, making it more accessible and appealing to a broad range of users.
6. The system's code and interface should comply with the web development standards and best

practices to ensure consistent operation across various platforms.

Performance Requirement

1. The system should support a minimum of 100 simultaneous users during peak hours.
2. The web application must load within 3 seconds on standard internet connections.
3. Response time for order processing and status updates should be under 2 seconds.

Security Requirement

1. All communication between the web kiosk and the server must be encrypted using HTTPS.
2. User authentication and authorization must be implemented securely, following industry best practices.
3. Personal and payment information must be stored securely, adhering to relevant data protection regulations.

Scalability Requirement:

1. The system should be designed to scale easily to accommodate a 20% increase in user base within a year.
2. Database and server architecture should be scalable to handle future feature enhancements and increased data volume.

Reliability Requirement:

1. The system must have an uptime of at least 99.9%.
2. In the event of a system failure, the recovery time should not exceed 15 minutes.

Availability Requirement:

1. The system should be available for use 24/7, except during scheduled maintenance periods.
2. Maintenance windows, if required, should be communicated to users in advance, and should preferably occur during off-peak hours.

Usability Requirement:

1. The web kiosk interface should be intuitive and user-friendly, requiring minimal training for both customers and staff.
2. The system must adhere to accessibility standards (e.g., WCAG) to ensure inclusivity for users with disabilities.

Compatibility:

1. The web application must be compatible with the latest versions of popular browsers such as Chrome, Firefox, Safari, and Edge.
2. The system should be responsive and provide a consistent user experience across various devices, including smartphones, tablets, and desktops.

Maintainability:

1. Code should follow coding standards and be well-documented to facilitate future maintenance and updates.
2. Updates and patches should be deployable with minimal downtime.

Integration:

1. The web kiosk should seamlessly integrate with existing Point of Sale (POS) systems and other relevant software used in the coffee shop.
2. API endpoints should be available to enable future integration with third-party services.

Regulatory Compliance:

1. The system must comply with local and international regulations regarding online transactions, data privacy, and accessibility.

Performance Monitoring and Logging:

1. Implement robust logging mechanisms to capture system events and errors for performance monitoring and debugging.
2. Utilize monitoring tools to track system performance and generate alerts in case of anomalies.

REFERENCES

1. Singh, R., Sonje, R., Salkar, S., & Jadhav, A. (2022). Smart QR-based Restaurant Dine-in System with Sales Analysis. In ITM Web of Conferences (Vol. 44, p. 03014). EDP Sciences.

2. Sidabutar, G. D. G., Seah, J. A., & Singgalen, Y. A. (2023). Analysis and Design of Web-based Information System for Coffeeshop Management using Design Thinking Methodology: Case of Kopi KurangLebih. Journal of Information Systems and Informatics, 5(1), 217-231.

3. Demartini, M., Pinna, C., Tonelli, F., Terzi, S., Sansone, C., & Testa, C. (2018). Food industry digitalization: from challenges and trends to opportunities and solutions. IFAC-PapersOnLine, 51(11), 1371-1378.

4. Manjula, S., Balaji, P., Deepa, N., & Vidhyavathi, A. (2021). Digital Transformation on Food Retail Industries-A Review. Asian Journal of Agricultural Extension, Economics & Sociology, 39(11), 88-101.

5. AHAMAT, A., ALI, M. S. S., AZAMI, M. A., Prasad, N. V., dan Teknousahawanan, F. P. T., & Dhabi, A. (2022). Innovation Marketing from the Perspective of New Technologies in the Food and Beverage Industry.

6. Daradkeh, F. M., Hassan, T. H., Palei, T., Helal, M. Y., Mabrouk, S., Saleh, M. I., ... & Elshawarbi, N. N. (2023). Enhancing Digital Presence for Maximizing Customer Value in Fast-Food Restaurants. Sustainability, 15(7), 5690.