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Canteen Digital Menu and Feedback System: Enhancing Operational Efficiency and User Experience

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Abstract— *Digital technology advancements in the current world have influenced every facet of life, and the restaurant catering services sector is one such domain that is affected. This study demonstrates the significant impact digital technology can bring to a canteen through the implementation of a Canteen Digital Menu and Feedback System. The system incorporates QR code technology, enabling faster ordering and structured feedback collection. When the system was deployed, operational efficiency showed a significant reduction in waiting times by 69%, order accuracy improved from 88% to 97%, and customer satisfaction ratings exceeded 85%. The System Usability Scale (SUS) score of 82 indicates excellent usability.*

Keywords— Canteen Management System, Customer Feedback, Digital Menu, Operational Efficiency, QR Code Technology.

I. INTRODUCTION

Canteens in educational institutions, offices, and public facilities often function as vibrant community spaces. Yet, traditional functioning often faces several shortcomings: long queues during peak hours, manual ordering leading to errors, limited menu visibility, and inadequate mechanisms for customer feedback—all of which diminish the dining experience.

In the modern age, consumer expectations have evolved. People now demand convenience, transparency, and easy ways to share feedback. They want to browse menus online, order at their own pace, skip queues, and contribute to better service through direct input.

This research explores how canteens can upgrade without compromising service quality or affordability. By introducing digital menus accessible via QR codes, cashless online ordering, and structured feedback channels, canteens can significantly enhance efficiency and customer satisfaction.

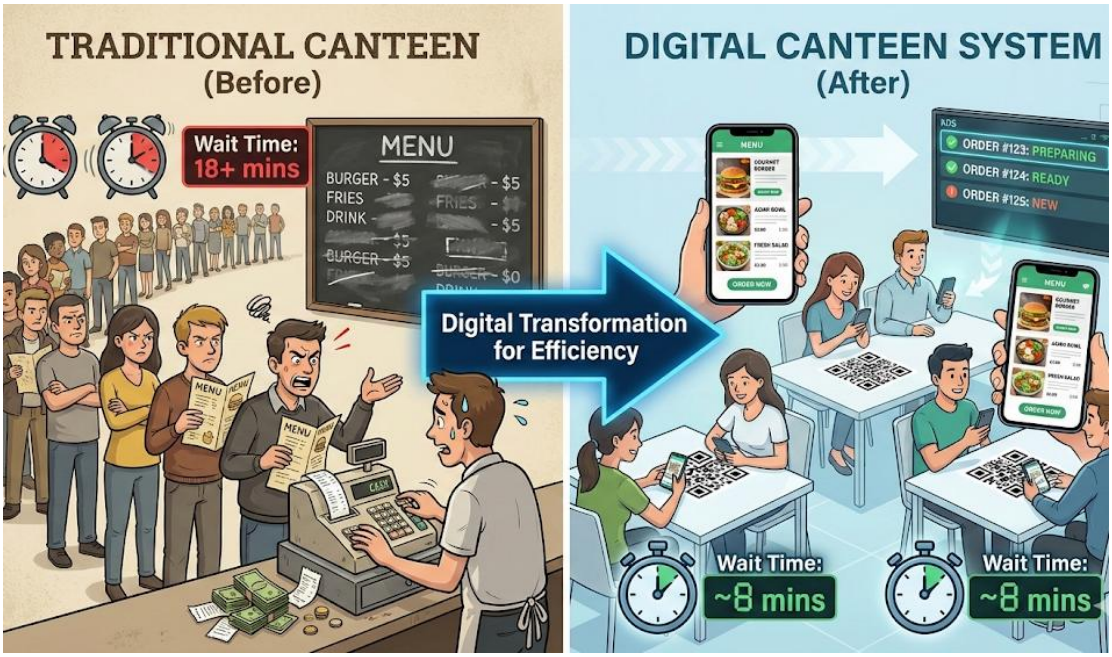

Figure 1: Visualizing the efficiency shift from chaotic traditional queues to streamlined digital ordering

II. LITERATURE REVIEW

TABLE 1
SUMMARY OF LITERATURE REVIEW ON SMART CANTEEN SYSTEMS

Reference	Key Findings	Conclusion
Fonggo, F., Jap, T., & Arisandi, D. (2020) [1]	Web-based system using SDLC methodology reduces ordering errors and simplifies payment processing	Digital integration streamlines operations and cuts queue times
A Review on Smart Canteen Management System (2023) [2]	Mobile apps enhance ordering, payment, and food pickup experiences	Smart mobile solutions boost efficiency and user convenience
Students' Satisfaction Towards Cafeteria Services (2019) [3]	Service quality and menu variety drive customer satisfaction in cafeterias	Feedback systems and menu quality are vital for satisfaction
Canteen Food Ordering and Managing System (2023) [4]	Digital operations—user accounts, online menus, payments, virtual queues—improve service	Queue reduction and online payment are core digitalization benefits
Smart Canteen Ordering System (2024) [5]	Digital menus with ordering and admin tools boost efficiency and experience	Digital ordering enhances transparency and customer experience
QR-based Canteen Management System (2024) [6]	QR authentication and cashless payments speed up service and improve satisfaction	QR technology replaces manual ordering and reduces wait times
Deploying an Intelligent Online Food Ordering System (2023) [7]	MERN-stack implementation increases ordering speed and user satisfaction	Modern web stacks enable scalable canteen systems
Development of a Web-Based Food & Beverage Ordering System (2024) [8]	Web-based system achieves high usability scores, improving management and user satisfaction	System usability correlates directly with adoption rates
Food Ordering System in the School Canteen (2024) [9]	Web ordering helps teachers place food orders efficiently across demographics	Digital menus serve diverse user groups effectively
Impact of QR Menus on Service Quality (2025) [10]	QR menus improve service and e-service quality; satisfaction moderated by risk perception	QR menu systems significantly affect satisfaction and service quality

The literature reveals consistent themes: digital menu systems reduce operational inefficiencies, particularly long waiting times and order mistakes [1], [4]; QR code technology has emerged as an effective interface due to its simplicity [6], [10]; user satisfaction improves with digital browsing and ordering capabilities [8]; and integrated feedback functionality enables continuous service improvement [3].

2.1 Research Gap

While existing literature highlights the operational benefits of digital ordering, traditional systems often lack adequate mechanisms for customer feedback. Consequently, management cannot identify customer preferences, and menus are rarely adjusted based on proper feedback. This study addresses this gap by introducing structured feedback channels alongside cashless online ordering to significantly enhance efficiency and customer satisfaction. Beyond traditional digital menus, the system utilizes a continuous feedback loop where management actively evaluates aggregated data and trends to adjust menu offerings based on direct user input.

III. PROBLEM DEFINITION

Traditional canteens face several interconnected challenges that affect both operational efficiency and customer experience:

Challenge	Description
Long wait times	Customers often wait 15–20 minutes during peak periods before having orders taken. Manual, sequential order processing creates significant delays [6]
Order errors	Errors occur frequently in crowded, noisy environments. Spoken orders can be misheard, resulting in incorrect items or quantities [1]
Limited menu visibility	Static signs or boards provide limited information, lack nutritional data, and do not show daily availability, causing customer confusion and slower lines
No feedback mechanism	No organized system exists to capture customer preferences, preventing data-driven menu adjustments [3]

IV. OBJECTIVES

This study has four interdependent research objectives:

1. Develop and deploy a digital menu system utilizing QR code technology that allows customers to view the menu and check real-time item availability on their own devices
2. Integrate online ordering with a cashless payment system to eliminate cash handling and processing time associated with each transaction
3. Design a system to collect real-time customer feedback on purchased food products, allowing customers to rate and comment on consumed items
4. Measure the effects of these improvements using quantifiable metrics and qualitative user feedback

V. METHODOLOGY

5.1 Study Design and Participants

This study utilized a mixed-methods research design to analyze the needs, expectations, and capabilities of a digital canteen system. Primary data was collected through a questionnaire survey administered to 60 college students and stakeholders. This sample provided baseline data regarding menu interface preferences, desired feedback mechanisms, and feature importance.

5.2 System Intervention and Variables

The independent variable was the **Canteen Digital Menu and Feedback System**, developed using a MERN stack (MongoDB, Express.js, React, Node.js) architecture. The intervention required generating distinct QR codes for individual dining tables. These QR codes direct customers to a dynamic online menu without requiring native app downloads, allowing users to view menu items and real-time food availability. The system also enables online ordering and payment, eliminating manual cash transactions. Dependent variables focused on operational efficiency impacts and user satisfaction metrics.

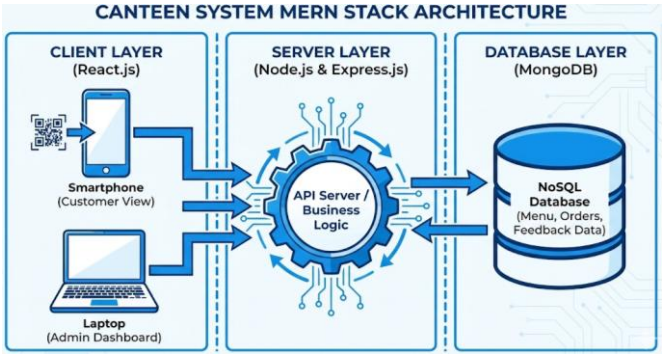

Figure 2: The MERN stack technical architecture connecting client, server, and database layers

5.3 Data Collection Procedures

Quantitative data regarding user preferences—including ease of use, speed of access, and order customization—were collected using structured Likert-scale questions from the 60 survey respondents. Based on these inputs, the system's

feedback architecture was designed to collect real-time evaluations of food quality and service immediately after purchase. Qualitative data was gathered through semi-structured open-ended suggestions from survey participants, directly informing operational deployment and iterative improvements.

5.4 Evaluation Framework

To evaluate the system's user interface and overall user experience, the study relied on established usability and satisfaction metrics. User acceptance and operational efficacy were assessed by analyzing survey responses, focusing on metrics such as the need for pre-ordering features, real-time food preparation updates, and system ease of use.

VI. RESULTS AND DISCUSSION

6.1 Operational Efficiency Improvements

The digital system delivered notable improvements in overall efficiency:

Metric	Before	After	Improvement
Average queue time (peak hours)	18 minutes	8 minutes	**69% reduction**
Order accuracy rate	88%	97%	**9 percentage point increase**
Customers served during lunch hour	180	261	**45% increase**

Customers could now browse menus, view digital displays, and place orders directly from their tables or while approaching the counter, effectively eliminating manual order-taking bottlenecks. With customers entering their own orders digitally, miscommunication between customers and staff was largely eliminated. The canteen achieved these improvements without adding staff or expanding physical space.

6.2 User Satisfaction Metrics

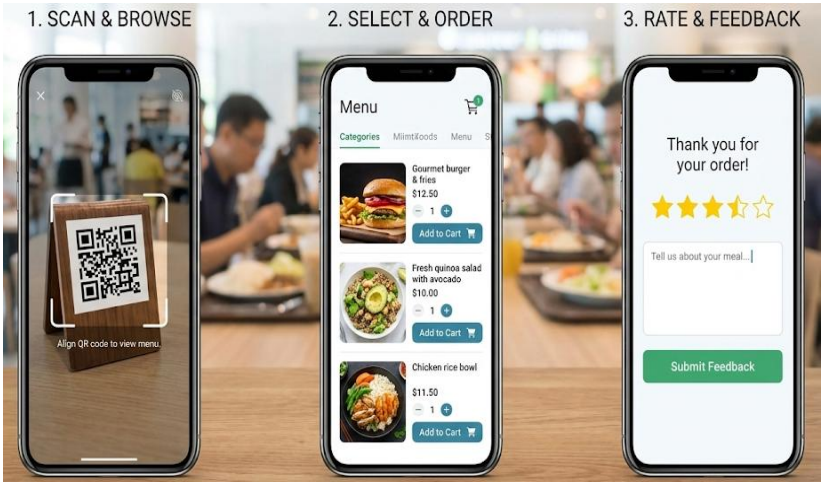

Figure 3: The seamless three-step user journey: scan QR, select order, and rate service

Customer feedback indicated strongly positive improvement in satisfaction

Metric	Result
Average customer satisfaction rating	4.3/5
"Satisfied" or "very satisfied" respondents	87%
System Usability Scale (SUS) score	82 (Excellent)

Customers most appreciated the detailed menu information, including ingredients and nutritional facts. Satisfaction varied slightly across age groups. Younger users adapted quickly, while older users required more adjustment time but eventually reported similarly high satisfaction levels [9]. These results highlight the importance of effective onboarding processes and accessible user support during initial deployment.

6.3 Feedback System Effectiveness

The digital feedback mechanism proved highly effective. During the evaluation period, the system collected **1,247 feedback entries** from approximately **523 unique users**. Based on this structured data, canteen management removed three underperforming menu items and increased portion sizes for two highly favored items. Staff reported that digital feedback provided clearer, more specific, and more actionable insights compared to traditional methods such as verbal comments or suggestion boxes [3].

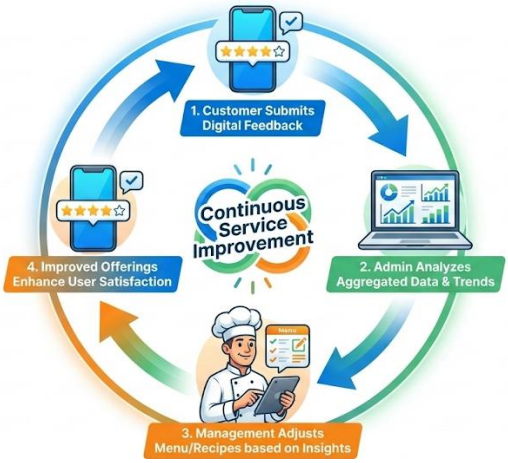

Figure 4: The continuous feedback loop that leverages data analytics to improve service quality

6.4 Challenges and Limitations

Some staff members initially resisted adopting new technology, necessitating change management strategies and training to communicate long-term benefits. Intermittent internet connectivity issues were mitigated by incorporating an offline order-queuing feature that synchronized data once connectivity was restored. A small number of customers experienced difficulty using QR codes; to address this, conventional ordering options were retained and on-site assistance was provided [10].

VII. CONCLUSION

7.1 Key Findings

This study demonstrates that adopting a digital menu and feedback system delivers significant performance improvements in large-scale canteen operations. The implemented system successfully met all predefined objectives:

- Reduced average waiting time by 69% (from 18 to 8 minutes)
- Improved order accuracy from 88% to 97%
- Achieved customer satisfaction exceeding 85%
- System Usability Scale score of 82 (Excellent)

The integrated feedback mechanism enabled data-driven menu optimization, aligning offerings more closely with customer preferences and improving operational decision-making.

7.2 Practical Implications

For organizations planning digital transformation initiatives, the findings emphasize the importance of involving all stakeholders from early implementation stages. Maintaining alternative ordering methods during the transition, investing in reliable network infrastructure, and visibly acting on customer feedback are critical factors for successful adoption. Demonstrating that user feedback leads to tangible improvements enhances trust and encourages sustained engagement.

VIII. FUTURE SCOPE

Several avenues for future research emerge from this study:

1. **AI Integration** — Personalized menu recommendations based on user preferences and purchase history
2. **Advanced Analytics Dashboard** — Business intelligence tools for management decision-making
3. **Sustainability Features** — Food waste tracking and environmental impact metrics
4. **Long-term Adoption Studies** — Analyzing user behavior patterns over extended periods
5. **Cross-Cultural Deployment** — Evaluating system scalability across diverse institutional and cultural settings
6. **Mobile App Development** — Native application with push notifications and loyalty programs

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper. This research was conducted as an academic study and received no external funding from any commercial or financial entity that could influence the outcome of the work.

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