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Smart Restaurant Ordering System with QR Code Integration

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***Abstract*— QR-based food ordering system aimed at enhancing efficiency, accuracy, and customer convenience in restaurants. In the existing system, orders are taken manually by staff, which can lead to delays and errors. The proposed system enables customers to scan a QR code at their table, access a digital menu, place orders, and make payments directly using their smartphones. It reduces human intervention and ensures faster service. The system includes modules for adding seating, creating menus, viewing restaurants, managing orders, scanning QR codes, and processing bills. Additionally, an in Case of Emergency feature can be integrated to store basic user details for quick assistance if required. This modern approach minimizes contact, improves order accuracy, and enhances the overall dining experience. The system is user-friendly, reliable, and beneficial for both restaurant owners and customers.**

***Keywords*— QR-based food ordering system, digital menu, contactless service, order management, mobile application, QR code scanning, online payment, customer convenience, restaurant automation, improved accuracy.**

I. INTRODUCTION

The rapid growth of digital technology has significantly transformed the way businesses operate, especially in the hospitality industry. Restaurants are increasingly adopting innovative solutions to enhance customer experience, improve operational efficiency, and reduce manual workload. One such advancement is the QR-based food ordering system, which offers a modern, contactless alternative to traditional ordering methods. This system utilizes smartphones and QR code technology to simplify ordering, making it faster and more accurate. Recent studies highlight that QR-based systems improve order efficiency and customer satisfaction levels in restaurants [2], [4].

In the existing system, customers rely on waitstaff to take orders manually, which often leads to delays, miscommunication, and errors. These issues become more significant during peak hours, affecting service quality and customer satisfaction. Traditional systems also increase staff dependency and operational complexity. Research on restaurant automation systems shows that integrating technologies such as IoT and QR codes can significantly reduce these inefficiencies [3], [5].
Moreover, contactless solutions have gained importance due to their ability to enhance safety and convenience in dining environments.

The proposed QR-based food ordering system addresses these challenges by allowing customers to scan a QR code placed on their table and access a digital menu instantly. Customers can browse items, place orders, and complete payments directly through their mobile devices. This system reduces human interaction, minimizes errors, and speeds up service delivery. Additionally, integrating secure payment gateways ensures seamless and reliable transactions [10]. The system design can be effectively developed using structured methodologies such as the waterfall model and represented using UML diagrams for better clarity and implementation [8], [9].

Furthermore, the system includes modules such as menu management, order processing, QR code scanning, and billing. Restaurant owners can

manage menus and track orders efficiently, while customers benefit from a user-friendly interface. Testing methods such as black box testing and user acceptance testing ensure system reliability and performance [11], [12], [14]. Overall, the QR-based food ordering system represents a significant step toward digital transformation in the restaurant industry. It enhances service quality, reduces operational challenges, and provides a seamless dining experience, meeting the growing demand for fast, accurate, and contactless services [13].

By integrating data analytics, the system can track customer preferences, popular menu items, and peak ordering times, enabling businesses to optimize their services and marketing strategies [4]. This helps in better inventory management and reduces food wastage, ultimately increasing profitability. Furthermore, digital ordering systems contribute to enhanced customer engagement by offering personalized recommendations and a more interactive dining experience.

The adoption of such systems is also aligned with modern business planning and development strategies, where technology plays a key role in sustaining competitive advantage [1]. Compared to older technologies like RFID-based systems, QR code solutions are more cost-effective and easier to implement [6], [7]. Additionally, ensuring proper system testing and validation improves reliability and user satisfaction, making the solution more robust and scalable in real-world applications [12].

II. RELATED WORK

L. Soelaiman and C. Liusca, “Preparing a Business Plan as a Step to Developing a Coffee Shop Business” 2022. This paper focuses on the importance of preparing a well-structured business plan for developing a coffee shop. The authors explain that a business plan serves as a roadmap for entrepreneurs, helping them define their goals, target customers, financial strategies, and operational processes. It highlights how proper planning reduces risks and improves decision-making in competitive markets. The study emphasizes analysing market trends, customer preferences, and resource management to ensure long-term sustainability. It also discusses how adopting modern technologies can enhance business efficiency and customer satisfaction. For food service businesses, integrating digital tools such as online ordering systems can support growth and improve service quality. Overall, the paper underlines that a strong business foundation combined with innovative solutions is essential for success in the hospitality industry [1]

F. Alberlianasari, S. Nabilah and S. D. Rahmawati, “Implementation of QR Code on Ichiban Sushi Restaurant's Dish Menu on Order Time Efficiency and Customer Satisfaction Level” 2022. This study examines the use of QR codes in restaurant menus and its impact on order efficiency and customer satisfaction. The authors conducted research in a restaurant environment and found that QR-based ordering significantly reduces waiting time compared to traditional methods. Customers can easily scan the code, view the menu, and place orders without relying on staff, making the process faster and more convenient. The study also highlights that digital menus improve accuracy, as customers directly select their items, reducing miscommunication. Additionally, the contactless nature of QR systems enhances safety and hygiene, which is especially important in modern dining environments. The findings conclude that QR code implementation not only improves operational efficiency but also increases customer satisfaction by providing a smooth and user-friendly ordering experience [2]

M. Nandre, K. Patil and D. Patil, “IoT Based Restaurant Automation System” 2019. This paper presents an IoT-based restaurant automation system designed to improve overall restaurant operations. The system connects different components such as ordering, kitchen management, and billing through a centralized digital platform. By using IoT technology, orders placed by customers are instantly transmitted to the kitchen, reducing delays and improving coordination between staff.

The study highlights how automation minimizes human errors, enhances service speed, and optimizes resource utilization. It also discusses the benefits of reducing manual workload, allowing staff to focus more on customer service. The system can be further integrated with smart devices for real-time monitoring and control. Overall, the paper demonstrates that IoT-based solutions can transform traditional restaurants into smart environments, improving efficiency, accuracy, and customer satisfaction [3].

C. Chun Wong, L. Ying Chong, S. Chin Chong and C. Yee Law, “QR Food Ordering System with Data Analytics” 2023. This research introduces a QR-based food ordering system integrated with data analytics to improve restaurant performance. The system not only allows customers to place orders using QR codes but also collects valuable data related to customer behaviour, preferences, and ordering patterns. The authors explain that this data can be analysed to identify popular menu items,

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peak hours, and sales trends. Such insights help restaurant owners make informed decisions regarding menu design, pricing, and inventory management. The study also highlights that combining QR technology with analytics enhances both operational efficiency and strategic planning. Customers benefit from a faster and more personalized experience, while businesses gain better control over their operations. Overall, the paper shows how data-driven approaches can significantly improve restaurant management and profitability [4]

R. Singh, R. Sonje, S. Salkar and A. Jadhav, "Smart Qr-Based Restaurant Dine-In System with Sales Analysis" 2022. [5] This paper discusses a smart QR-based dine-in system that includes sales analysis features for restaurants. The proposed system allows customers to scan QR codes, access menus, and place orders digitally, reducing dependency on manual processes. In addition to ordering, the system records transaction data, which is used for analysing sales performance and customer trends. The authors emphasize that such analysis helps restaurant owners understand demand patterns and make better business decisions. The system also improves order accuracy and reduces waiting time, leading to enhanced customer satisfaction. Furthermore, it supports efficient billing and payment processes, making the entire dining experience smoother. The study concludes that integrating QR technology with sales analysis provides both operational and managerial benefits, making it a valuable solution for modern restaurants.

IV. PROPOSED METHODOLOGY

The proposed QR-based food ordering system follows a structured and user-centric methodology to ensure efficient restaurant operations and enhanced customer experience. The system is designed using a modular approach, where both restaurant owners and customers interact through a mobile-based platform. Initially, restaurant owners register and log in to the system to set up their profiles, manage seating arrangements by adding chairs or tables, and create or update digital menus with item details, prices, and availability. Each table in the restaurant is assigned a unique QR code. When customers arrive, they scan the QR code using their smartphones, which redirects them to the digital menu interface. Customers can browse the menu, select items, and place orders directly without waiting for staff. The order is then instantly transmitted to the kitchen or management system for preparation. This real-time communication reduces delays and eliminates manual errors.

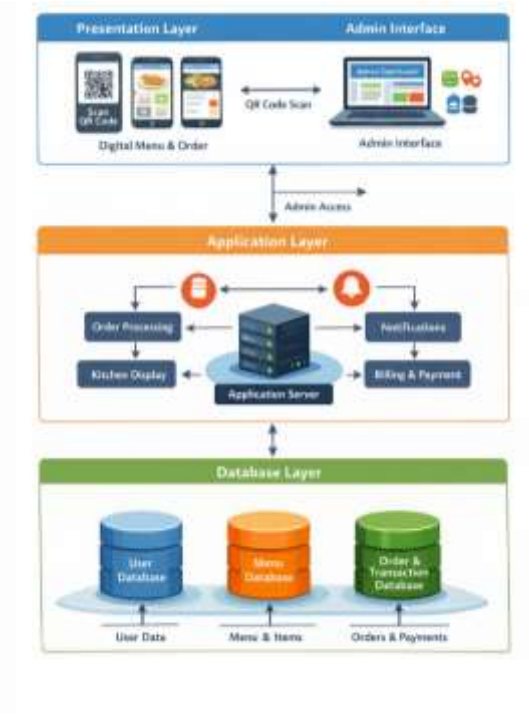

Figure [1]: System Architecture

The system also includes order management and billing modules. Customers can view their orders, modify selections if needed, and proceed to secure online payment. Restaurant owners can monitor all incoming orders and manage them efficiently. The system is developed using standard software engineering practices, ensuring reliability, scalability, and ease of use.

Overall, this methodology improves accuracy, reduces human effort, and provides a seamless and contactless dining experience.

Figure [1] The system architecture of the QR-based food ordering system is designed using a three-layer model to ensure smooth and efficient operation. The presentation layer acts as the user interface where customers and restaurant owners interact with the system. Customers scan the QR code placed on their table using their smartphones, which opens a digital menu. They can browse items, place orders, and make payments. Restaurant owners use an admin dashboard to manage menus, tables, and orders. The application layer serves as the core processing unit of the system. It handles all business logic, including order processing, validation, notifications, and payment handling. Once a customer places an order, the application

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server processes it and sends it to the kitchen display system for preparation. It also manages real-time updates and communication between users and the system. The database layer stores all essential information such as user details, menu items, orders, and transaction records. This layered architecture ensures scalability, reliability, and fast data access, providing a seamless and efficient experience for both customers and restaurant management.

V.RESULT AND DISCUSSION

The implementation of the QR-based food ordering system demonstrates significant improvements in restaurant operations and customer experience. The system successfully reduces order processing time by allowing customers to directly place orders through their smartphones without waiting for staff assistance. This leads to faster service, especially during peak hours. Additionally, the accuracy of orders is greatly improved, as customers select items themselves, minimizing miscommunication and human errors. The digital menu feature enables easy updates and better presentation of food items, enhancing customer interaction. The integration of online payment methods ensures secure and convenient transactions, reducing the need for cash handling. Restaurant owners can monitor orders in real time, track sales, and manage menu updates efficiently. The system also provides better organization in the kitchen by sending orders directly to the kitchen display. Overall, the results indicate that the system improves operational efficiency, enhances customer satisfaction, and reduces workload on staff. It proves to be a reliable and scalable solution for modern restaurants seeking to adopt digital transformation contactless services.

Figure [2] : User Login

Figure [2] QR-based food ordering system login page displaying navigation menu, QR code image, and user authentication fields for accessing restaurant services.

Figure [3] : Add chairs

Figure [3] Restaurant owners can log in and add the chairs as per availability.

Figure [4] : Create menu

Figure[4] Restaurant owners can create menu

Figure [5] : Food order

Figure[5] Customers can login and order food by using restaurant qr code

Figure [6] : Download Qr code

Figure [6] Customer can download Qr codes

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Figure [7] : Scan Qr code

Figure [7] Customer will scan Qr code

Figure [8] : Food Ordered using Qr code

Figure [8] Customer can Order food using Qr code

DISCUSSION

The results obtained from the QR-Based Food Ordering System highlight its effectiveness in automating restaurant operations and enhancing the customer dining experience. One of the key observations is the significant reduction in manual workload for restaurant staff. By eliminating the need for physical menus and waiter-based order taking, the system minimizes communication errors and improves order accuracy. Customers can directly interact with the digital menu, ensuring that their selections are correctly recorded and transmitted to the backend system.

The role-based access mechanism allows restaurant owners and customers to interact with the system according to their specific needs. Restaurant owners benefit from features such as menu management, order tracking, and real-time visibility of customer orders. Customers, on the other hand, experience faster service, transparent billing, and a convenient, contactless ordering process. The QR code acts as an efficient bridge between physical dining spaces and digital services.

Another important aspect discussed is hygiene and safety. The contactless nature of QR-based ordering significantly reduces physical interaction, which is particularly beneficial in health-sensitive environments. Additionally, the system supports scalability, as multiple restaurants, menus, and customers can be added without affecting performance. However, the system's effectiveness depends on reliable internet connectivity and basic smartphone availability for customers. Overall, the discussion confirms that QR-based food ordering systems align well with modern restaurant requirements. While there are minor limitations such as dependency on digital devices, the advantages in efficiency, accuracy, and customer satisfaction strongly outweigh these challenges.

VI. CONCLUSION

The QR-Based Food Ordering System presents a practical and efficient solution for modernizing restaurant services. This system successfully replaces traditional menu cards and manual order-taking processes with a digital, contactless approach that benefits both customers and restaurant owners. By enabling customers to scan QR codes and place orders through their smartphones, the system enhances convenience, reduces waiting time, and minimizes ordering errors. From the restaurant owner's perspective, the system offers streamlined management of restaurant details, menus, orders, and billing. The ability to update menus dynamically and monitor customer orders in real time improves operational control and decision-making. Additionally, the automated order and billing process reduces dependency on staff and lowers operational costs. The centralized database ensures secure storage and efficient retrieval of data related to users, menus, and transactions. The system also addresses important concerns related to hygiene and safety by promoting contactless interaction. In the post-pandemic era, such solutions have become essential for maintaining customer trust and ensuring safe dining experiences. Furthermore, the system's scalable architecture allows it to support multiple restaurants and users, making it suitable for small, medium, and large-scale food establishments.
Despite its advantages, the system requires internet access and basic smartphone usage, which may limit accessibility in certain environments. However, with increasing digital adoption, these limitations are expected to diminish over time. In conclusion, the QR-Based Food Ordering System is an effective, reliable, and future-ready solution that enhances service quality, improves customer satisfaction, and supports efficient restaurant management through automation and digital transformation.

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REFERENCES

[1]. L. Soelaiman and C. Liusca, "Preparing a Business Plan as a Step to Developing a Coffee Shop Business (Penyusunan Rencana Bisnis sebagai Langkah Pengembangan Usaha Coffee Shop)," Madani: Journal of Community Service, vol. 8, no. 2, pp. 45–55, 2022.

[2]. F. Alberlianasari, S. Nabilah and S. D. Rahmawati, "Implementation of QR Code on Ichiban Sushi Restaurant's Dish Menu on Order Time Efficiency and Customer Satisfaction Level," Journal Current Advanced Research on Sharia Finance and Economic Worldwide, vol. 1, no. 4, pp. 13–20, 2022.

[3]. M. Nandre, K. Patil and D. Patil, "IoT Based Restaurant Automation System," International Journal for Research Trends and Innovation, vol. 4, no. 6, pp. 10–17, 2019.

[4]. C. Chun Wong, L. Ying Chong, S. Chin Chong and C. Yee Law, "QR Food Ordering System with Data Analytics," Journal of Informatics and Web Engineering, vol. 2, no. 2, pp. 249–272, 2023.

[5]. R. Singh, R. Sonje, S. Salkar and A. Jadhav, "Smart Qr-Based Restaurant Dine-In System with Sales Analysis," in International Conference on Automation, Computing and Communication 2022, Mumbai, 2022.

[6]. J. Harpanahalli, K. Bhingradia, P. Jain and J. Koti, "Smart Restaurant System using RFID Technology," in The Fourth International Conference on Computing Methodologies and Communication (ICCMC 2020), Erode India, 2020.

[7]. R. J.-A. R. Espinosa and A. L. T. Lumibao, "Design of Cashless Payment System with RFID to Improve Services of School Canteen: A Case Study," in 11th Annual International Conference on Industrial Engineering and Operations Management, Singapore, 2021.

[8]. Tjahjanto, A. Arista and Ermatita, "Application of the Waterfall Method in Information System for State-Owned Inventories Management Development," Journal and Research Infomatics (Sinkron:Jurnal dan Penelitian Teknik Informatika), vol. 7, no. 4, pp. 2182–2192, 2022.

[9]. Sypsas and D. Kalles, "Using UML Activity Diagram for Adapting Experiments under a Virtual Laboratory Environment," in Panhellenic Conference on Informatics (PCI), Greece, 2020.

[10]. S. Supriyati and E. Nurfiqo, "Effectiveness of Payment Gateway in E-Commerce," in 1st International Conference on Informatics, Engineering, Science and Technology, Bandung, 2019.

[11]. M. Sholeh, I. Gisfas Cahiman and M. A. Fauz, "Black Box Testing on ukmbantul.com Page with Boundary Value Analysis and Equivalence Partitioning Methods," in International Conference on Applied Science and Education, Yogyakarta, 2021.

[12]. R. T. Y. Tong, Y. K. Yuan, N. W. Dong and R. K. Ramasamy, "A Review: Methods of Acceptance Testing," in International Conference on Technology and Innovation Management (ICTIM2022), Cyberjaya Malaysia, 2022.

[13]. N. A. A. Hamid, N. H. Abdullah and N. S. Chian, "The User Experience (UX) Analysis of Self-Service Kiosk (SSK) in Waiting Time at Fast Food Restaurant Using User Experience (UX) Model," 2021.

[14]. Nuraini, Mohd and F. Shahbodin, "Personalized Learning Environment: Alpha Testing, Beta Testing & User Acceptance Test," Procedia Social and Behavioral Sciences, vol. 195, pp. 838–843, 2015.

[15]. Babburi, S. Privacy-Preserving Collaborative Framework with Auditable Federated Learning.

[16]. Gaddam, S. Integrating Analytics into the Development Process: Bridging the Gap between Data Insights and Design Execution.

[17]. Immadi, S. K. (2025). Optimizing ERP for Human Capital Management. Applied Research for Growth, Innovation and Sustainable Impact, 377–384. https://doi.org/10.1201/9781003684657-63

[18]. Reddy, S. K. R. Developing a Modular AI Framework to Enhance Scalability and Personalization in Next-Generation Reward Platforms.

[19]. Poojari, R. INTELLIGENT SYSTEMS+B108 AND APPLICATIONS IN ENGINEERING.

[20]. Mahimalur, R. K., Vasgam, M., & Manoharan, D. Devops Lifecycle Management And Cloud Migration Assessments: A Security-Driven CICD Perspective.

[21]. Viswanathan, V. (2023). AI-Augmented Decision Intelligence for Enterprise Systems: Integrating Cognitive Analytics for Resource and Talent Optimization.

[22]. Agrawal, A. M., Gajula, S., Shinde, R. P., Shah, H., & Ghosh, H. (2025, July). Machine Translation for Long Sequences with Enhanced Attention Mechanisms. In 2025 5th International Conference on Electrical, Computer and Energy Technologies (ICECET) (pp. 1-6). IEEE.

[23]. Maturi, S. Y. (2024). Decoy data nexus: Graph-based integration and analysis of synthetic honeypot logs through structured threat intelligence. International Journal of Computational and Experimental Science and Engineering (IJCESEN), 10(4), 4255–4261. https://doi.org/10.22399/ijcesen.5010.

[24]. Kumar Adabala, P. (2021). Optimizing ERP Modernization: A Smart Data Migration Framework Approach. International Journal of Enhanced Research in Science, Technology &Amp; Engineering, 10(07), 61–72. https://doi.org/10.55948/ijerste.2021.0708

[25]. Kavuri, S. (2026). An Explainable Machine Learning Framework for Predicting Software Defects in Large-Scale Software Systems. 2026 IEEE 5th International Conference on AI in Cybersecurity (ICAIC), 1–6. https://doi.org/10.1109/icaic67076.2026.11395777

[26]. Venkata Pavan Kumar Gummadi. (2025). MuleSoft's Role in Advancing Sustainable Digital Infrastructure: An Enterprise Integration Perspective. Journal of Information Systems Engineering and Management, 10(62s), 1313–1321. https://doi.org/10.52783/jisem.v10i62s.13783

[27]. Shashank, A. (2025). Self-Healing Data Pipelines for Enhanced Reliability: A Paradigm Shift in Enterprise Data Management. Journal of Computer Science and Technology Studies, 7(8), 1097-1104.

[28]. Susarla, R. S., Boyapati, P. K., & Kandula, S. T. R. (2025, July). Cloud-Based Secure Data Storage in Smart Cities Using Central-Smoothing Hypergraph Neural Networks. In 2025 IEEE 4th World Conference on Applied Intelligence and Computing (AIC) (pp. 279-284). IEEE.

[29]. Boyapati, P. K. Building a centralized data operations hub for healthcare enterprise integration. IJSAT-Int. J. Sci. Technol. 16 (2). https://doi.org/10.71097/IJSAT.v16.i2.3219

[30]. Babburi, S. Privacy-Preserving Collaborative Framework with Auditable Federated Learning.

[31]. Gaddam, S. Integrating Analytics into the Development Process: Bridging the Gap between Data Insights and Design Execution.

[32]. Immadi, S. K. (2025). Optimizing ERP for Human Capital Management. Applied Research for Growth, Innovation and Sustainable Impact, 377–384. https://doi.org/10.1201/9781003684657-63

[33]. Reddy, S. K. R. Developing a Modular AI Framework to Enhance Scalability and Personalization in Next-Generation Reward Platforms.

[34]. Poojari, R. INTELLIGENT SYSTEMS+B108 AND APPLICATIONS IN ENGINEERING.

[35]. Mahimalur, R. K., Vasgam, M., & Manoharan, D. Devops Lifecycle Management And Cloud Migration Assessments: A Security-Driven CICD Perspective.

[36]. Viswanathan, V. (2023). AI-Augmented Decision Intelligence for Enterprise Systems: Integrating Cognitive Analytics for Resource and Talent Optimization.

[37]. Agrawal, A. M., Gajula, S., Shinde, R. P., Shah, H., & Ghosh, H. (2025, July). Machine Translation for Long Sequences with Enhanced Attention Mechanisms. In 2025 5th International Conference on Electrical, Computer and Energy Technologies (ICECET) (pp. 1-6). IEEE.

[38]. Maturi, S. Y. (2021). Blockbond hardening: Securing pooled-hash protocols against traffic tampering, MITM hash-rate hijacking, and template coercion. International Journal of Communication Networks and Information Security, 13(3), 718–728.

[39]. Adabala, P. K. (2024). Utilizing predictive analytics to improve efficiency and decision-making in ERP-connected supply chains. International Journal of Intelligent Systems and Applications in Engineering, 12(22s), 2465

[40]. Kavuri, S. (2026). An Explainable Machine Learning Framework for Predicting Software Defects in Large-Scale Software Systems. 2026 IEEE 5th International Conference on AI in Cybersecurity (ICAIC), 1–6. https://doi.org/10.1109/icaic67076.2026.11395777

[41]. Venkata Pavan Kumar Gummadi. (2023). MuleSoft Batch Processing: High-Volume Streaming Architecture. Computer Fraud and Security, 50–57. https://doi.org/10.52710/cfs.886

[42]. Shashank, A. (2025). Self-Healing Data Pipelines for Enhanced Reliability: A Paradigm Shift in Enterprise Data Management. Journal of Computer Science and Technology Studies, 7(8), 1097-1104.

[43]. Susarla, R. S., Boyapati, P. K., & Kandula, S. T. R. (2025, July). Cloud-Based Secure Data Storage in Smart Cities Using Central-Smoothing Hypergraph Neural Networks. In 2025 IEEE 4th World Conference on Applied Intelligence and Computing (AIC) (pp. 279-284). IEEE.

[44]. Boyapati, P. K. Building a centralized data operations hub for healthcare enterprise integration. IJSAT-Int. J. Sci. Technol. 16 (2). https://doi.org/10.71097/IJSAT.v16.i2.3219