Gurukul International Multidisciplinary Research Journal (GIMRJ)*with* International Impact Factor 8.249
Peer Reviewed Journal
https://doi.org/10.69758/XYDS5891

e-ISSN No. 2394-8426
Special Issue On Advanced Computational Techniques: Emerging Trends from Postgraduate Studies
Issue–I(VI), Volume–XII

CANTEEN MANAGEMENT SYSTEM : THE FINAL PROJECT

Mr. KEYUR JOSHI
PG Scholar
Department of Computer Science,
G.H. Raisoni University, Amravati, Maharashtra, India

Received on: *11 April ,2024* ***Revised on:*** *26 May ,2024,* ***Published on:*** *01 June ,2024*

ABSTRACT : A sophisticated digital solution called the School Canteen Management System (SCMS) was created to streamline the management and operations of school canteens. Essential functions including menu planning, user account administration, inventory management, point of sale (POS), and extensive reporting and analytics are all included in this system. Through process simplification and automation of repetitive tasks, the SCMS increases productivity, lowers error rates, and enhances user experience. Faster service, precise financial tracking, improved stock control, and the capacity to satisfy dietary requirements and preferences are some of the main advantages. In the end, the SCMS ensures convenience and happiness for students, staff, and parents by helping to create a more orderly, transparent, and user-friendly cafeteria environment.

INDEX TEARMS - Frontend development HTML, CSS, JavaScript, react js, Database management, mongodb, Chatgpt.

I. INTRODUCTION

A canteen management system ensures effective inventory, sales, and customer transaction management by streamlining the management and oversight of food services inside a facility or organization. This system optimizes resource allocation, lowers operating expenses, and improves customer satisfaction by integrating features like inventory management, automatic billing, and reporting functions. It also makes it easier to track food consumption trends in real time, which makes it possible to promptly alter menus and supply levels. The canteen management system facilitates an organized and customer-focused dining experience by enabling administrators to oversee all areas of the canteen's operations with ease thanks to its user-friendly interface and strong backend capabilities.Combining with Educational Systems:

A comprehensive software program called the Canteen Management System was created to simplify the management of a cafeteria or canteen. The integration of many functionalities, such as inventory control, order processing, billing, and reporting, enables the efficient operation of food services. This approach increases accuracy, streamlines repetitive activities, and boosts overall operational efficiency by utilizing technology. Canteen managers can easily process orders, handle menus, keep track of inventory levels, and create reports with its help. The Canteen Management System's features, which include menu customization, user management, and real-time inventory tracking, are designed to maximize efficiency, reduce waste, and provide a positive dining experience for both patrons and employees. In conclusion, the Canteen Management System is an effective tool that may help canteens run more smoothly, cut expenses, and provide better customer service.

II. RELATED WORK

The need of incorporating technology to simplify cafeteria operations has been brought to light by research and development in the field of School cafeteria Management Systems (SCMS). Various canteen management features have been the subject of studies and programs aimed at improving nutritional

standards, user experience, and efficiency. Inventory Management Done Automatically: Research has looked into the usage of automated inventory tracking systems that track stock levels in real time using RFID or barcode scanners. This guarantees prompt item replenishment and minimizes human mistake. Systems for Points of Sale (POS): Modern point-of-sale (POS) systems are helpful in cutting down on transaction times and errors, according to research. For cashless purchases, these systems can interact with student ID cards and frequently support a variety of payment methods. Menu planning and nutritional information: Initiatives have highlighted the the significance of including nutritional data in menu planning. This aids in encouraging pupils to follow nutritional recommendations and develop good eating habits. Pre-ordering and user accounts: The advantages of user account systems, where parents and students may pre-order meals, monitor purchases, and pre-load monies, have been shown in a number of implementations. This offers transparency and control over spending in addition to expediting service. Analytics and Reporting: In order to offer comprehensive insights into sales trends, popular products, and inventory utilization, analytical tools that are incorporated into SCMS have been developed. Making data-driven decisions for inventory control and menu modifications is made easier with the help of these insights. Compliance with Health and Safety: The goal of research has been to make sure SCMS abide by rules and norms related to food safety. This involves monitoring the products' shelf lives and making certain that the canteen follows appropriate hygiene procedures. Combining with Educational Systems: In order to guarantee a seamless user experience, successful SCMS installations have emphasized the benefits of integrating with current school management systems, such as student information systems and school calendars. Together, these connected works advance the creation of canteen management systems that are more accurate, efficient, and user-friendly while also highlighting the possible advantages of utilizing technology to enhance the day-to-day operations of school canteens.

III. PROPOSED WORK

A smooth and effective operating environment is created by the integration of multiple components in the proposed network for a school canteen management system (SCMS). To support the SCMS's functions, the network consists of hardware, software, and connectivity options. An extensive description of the suggested network architecture is provided below: Parts of Hardware: Point of Sale (POS) Terminals: At checkout counters, there are several POS terminals for processing transactions. Barcode/RFID Scanners: For effective sales processing and inventory tracking. Printers: To print inventory reports and receipts. Servers: A central server that houses the database and SCMS application. Network devices: to guarantee strong connectivity, use switches, routers, and access points. Computers, tablets, and cellphones are used by staff members and users to engage with the system. 2. Components of Software: Application SCMS: Centralized software for overseeing all canteen operations activities. A database management system (DBMS) is used to store data such as user accounts, sales, inventories, and more. Web/Mobile Interface: Allows users to interact with the system (e.g., pre-order meals, check account balances)—students, parents, and staff. Tools for analytics and reporting: To provide information and analyses about how the canteen is run. 3. Solutions for Connectivity: Local Area Network (LAN): Links the central server to all on-site equipment, including printers, barcode scanners, and point-of-sale terminals. Internet connectivity is necessary for online transactions, remote access, and cloud-based features. Wi-Fi access points: Offer POS terminals and mobile devices wireless connectivity. 4. Architecture of the System: Client-Server Model: The database and SCMS application are hosted by a central server. In order to access and process data, client devices—POS terminals and user devices—interact with the server. Cloud Integration: For increased scalability and flexibility, optional cloud computing and storage distant entry. Security protocols: To protect user privacy and data security, secure login, access restriction, and data encryption are used. 5. Overview of Workflow: Inventory management: Employees update inventory levels using

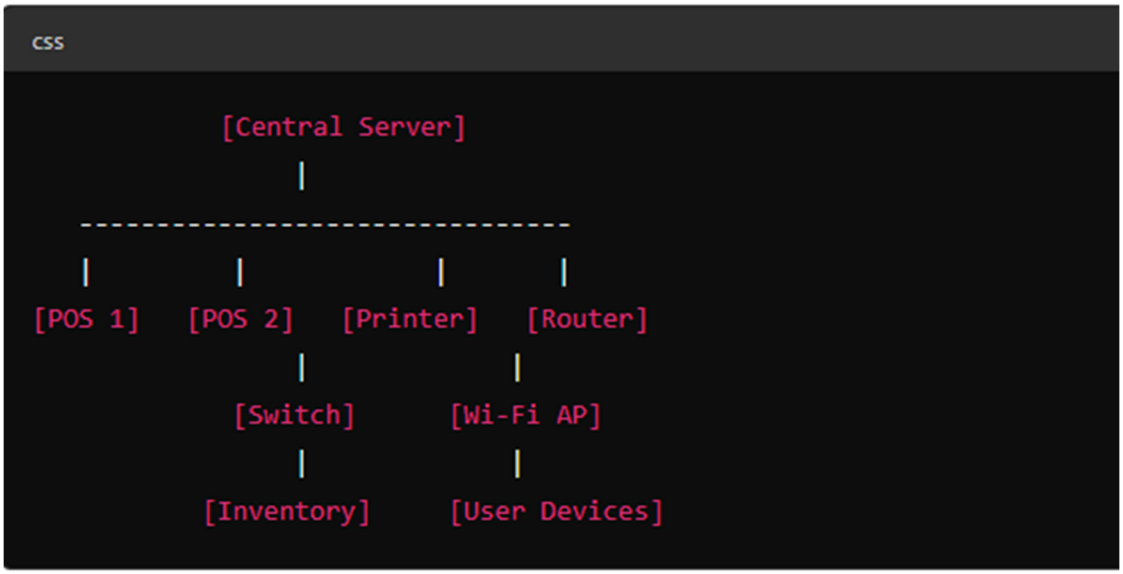
barcode and RFID scanners. Purchase orders are created by the system, along with alerts for low stock. Sales Transactions: POS terminals are used by employees and students to make purchases. Real-time processing and recording of transactions occur. User Account Management: Using a web/mobile interface, parents and students can manage accounts. Meal preordering and balance checking are made easier. Analytics and Reporting: Sales, inventory, and user activity are all reported on by administrators. Decisions on menu planning and inventory control are based on data. 6. Advantages of the Suggested Network: Effectiveness: Wait times and manual errors are decreased by streamlined operations. Real-Time Information: Instant access to sales and inventory levels nformation. User convenience: Simple pre-ordering options and account administration for users. Enhanced Security: Protect data processing and transactions. All users' canteen experiences are eventually improved by this network configuration, which guarantees effective management, real-time processing, and secure operations for the school cafeteria.

IV. PROPOSED RESEARCH MODEL

Examining the efficacy, efficiency, and user satisfaction of the School Canteen Management System (SCMS) is the goal of the research methodology that has been suggested. A number of essential elements are included in the research model, including variables, goals, theories, methods, data gathering, and analysis. 1. Goals: Analyze System Efficiency: Determine how the SCMS makes the canteen run more smoothly. Analyze user contentment: Utilizing the system, gauge how satisfied parents, teachers, and kids are. Examine the financial impact and ascertain the gains in terms of money, such as lower expenses and more income. Examine Compliance with Health and Safety: Evaluate the system's contribution to maintaining food safety and dietary requirements. 2. Conjectures H1: Transaction processing times are greatly shortened by the SCMS. H2: Accurate inventory management is enhanced by the SCMS. H3: Because of its convenience, the SCMS improves user satisfaction. and openness. H4: The SCMS lowers operating expenses and increases canteen revenue. H5: The SCMS improves adherence to safety and health regulations. 3. Changing factors: Self-Controlling Variables: Using SCMS Variables under Dependency: Time spent processing transactions Accuracy in inventory management Levels of user satisfaction Canteen earnings and expenses adherence to safety and health regulations Variables under control: Size of canteen The quantity of users Regularity of use of the canteen 4. Approach: Mixed-methods technique using both quantitative and qualitative data is the research design. Participants include school administrators, teachers, parents, and students in the canteen. Sampling: A random selection of users from the school's various age groups and roles. 5. Data Collection: Transaction time logs from POS terminals provide quantitative data. Inventory lists both before and after the SCMS was put into place. records pertaining to the canteen's finances. Qualitative Data: Questionnaires and surveys to evaluate customer contentment. focus groups and interviews with school administration and the canteen staff. 6. Analysis of Data: Quantitative Analysis: Statistical analysis to compare data before and after implementation, such as t-tests and ANOVA. Results from a user satisfaction survey are summarized using descriptive statistics. Thematic analysis of focus group and interview transcripts is a form of qualitative analysis. content analysis of replies to open-ended surveys. 7. Anticipated Results: Efficiency: Notable decrease in the time it takes to perform transactions. increased precision in the management and tracking of inventories. High levels of user satisfaction are a result of the transparency and convenience of use. Financial Impact: Higher income as a result of reduced waste and streamlined operations. savings through improved inventory control. Health and Safety: Better adherence to safety and nutritional guidelines. Conceptual Framework A conceptual framework aids in the visualization of the connections between the different elements that make up the research model. With regard to the SCMS, this study model offers a thorough evaluation method that takes into account various aspects of its implementation

and effects on school canteen operations. The outcomes will shed light on the SCMS's efficacy and help shape best practices and upcoming improvements for systems that are comparable to it.

Fig 1: - HomePage



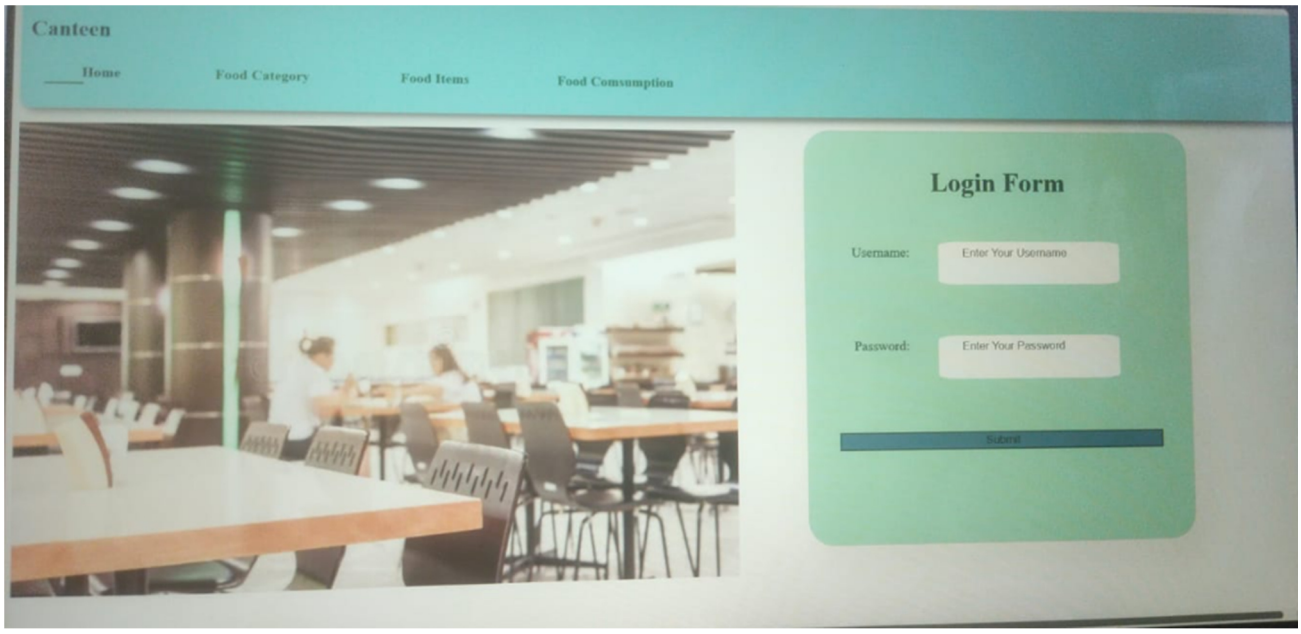
The above image shows the working route of canteen management sysem

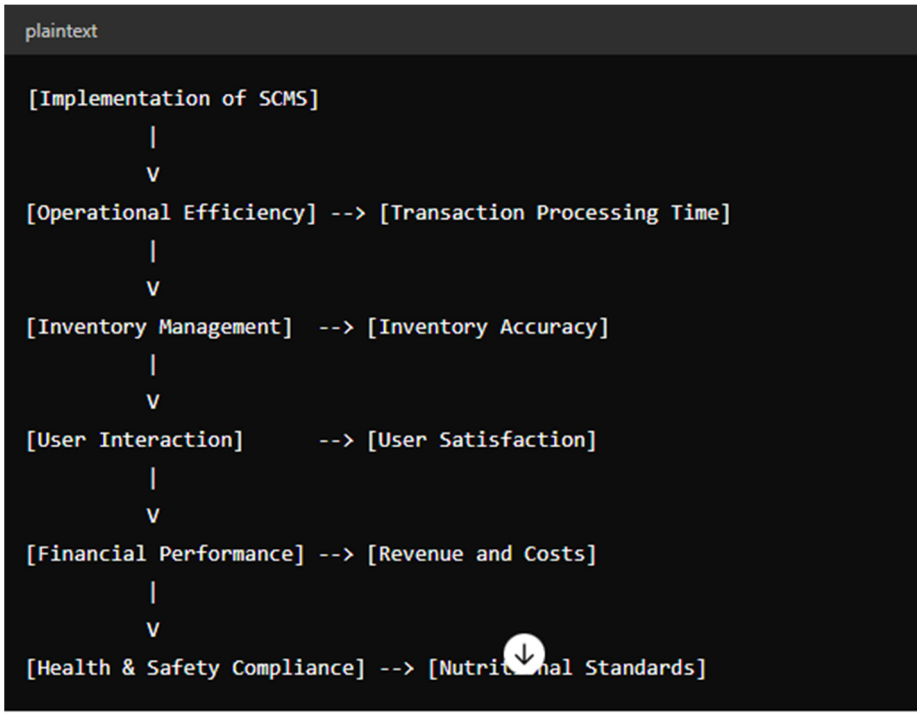
V. PERFORMANCE EVALUATION

School Canteen Management System's (SCMS) efficacy, efficiency, and user impact may all be assessed using a variety of key performance indicators (KPIs) and metrics. The evaluation takes into account financial results, user happiness, operational performance, and adherence to health and safety regulations. 1. Operational Efficiency: Duration of Transaction Processing: Metric: The typical time spent at POS terminals per transaction. Anticipated Result: substantial decrease in transaction durations in contrast to manual procedures. Accuracy of Inventory: Metric: Variations in real versus reported stock levels. Reduced inventory inconsistencies should result in improved stock management. Order Completion Time: Metric: The amount of time needed to complete in-store and preorder orders. Expected Result: Simplified operations will lead to faster order fulfillment. 2. Survey Scores for User Satisfaction: Metric: Staff, parent, and student satisfaction scores. Anticipated Result: Elevated levels of satisfaction owing to enhanced accessibility and clarity. The number of users who actively use the account management and pre-order features is the user engagement metric. Increased user interaction with the system's features is the anticipated result. Comments and Complaints: Quantitative measure of the quantity and type of user comments and complaints. Reduced complaints and good system evaluations are the anticipated results. 3. Accounting Results: Revenue: Metric: The total amount of money the canteen brings in. Revenue growth as a result of more effective operations and improved sales tracking is the anticipated outcome. Savings on expenditures: Metric: A decrease in running expenses (e.g., reduced food waste, cheaper labor costs). Anticipated Result: Significant financial savings achieved by means of enhanced labor and inventory control. Profit margins are measured as the difference between operating expenses and revenue. Anticipated Result: Enhanced profit margins due to heightened productivity and less waste. 4. Adherence to Safety and Health Regulations: dietary guidelines Compliance: Metric: Adherence to recommended dietary standards. Anticipated Result: Elevated levels of adherence as a consequence of precise menu

planning and dietary data. Observance of Food Safety: The quantity of health and safety events or infractions is the metric. Anticipated result: Few occurrences, indicating compliance with food safety regulations. Scores from the Health Inspection: Metric: Results of routine safety and health inspections. Anticipated Result: Superior food safety and hygiene protocols, as evidenced by elevated inspection ratings. Techniques for Gathering Data System Reports and Logs: automated inventory records, POS terminal logs, and user account activity. Transaction data and sales reports. Surveys & Questionnaires: Regular surveys are administered to staff, parents, and students to get their opinions on how well the system works. Financial Documents: Financial statements for each month and each quarter, including cost and revenue analysis. Reports from health and safety inspections carried out by the appropriate authorities are called inspection reports. Assessment of Performance The process of performance review entails comparing the gathered information to each KPI's anticipated results. To determine areas for improvement and areas requiring attention, comparative analysis and statistical tools will be employed. The assessment procedure consists of: Pre- and Post-Implementation Comparison: To gauge the impact of the SCMS's implementation, compare metrics before and after. Trend Analysis: Examine trends over an extended period of time to see whether performance gains are sustainable. Benchmarking: To determine relative efficacy, compare performance to industry norms or canteens that are similar. Analyze User Feedback: To find recurring problems and opportunities for development, perform a theme analysis of qualitative input. the capacity to improve financial results, user satisfaction, operational efficiency, and adherence to safety and health regulations. Frequent assessment with the help of the specified KPIs guarantees that the system achieves its objectives and offers insightful information for ongoing development. The entire school community ultimately benefits from this thorough performance review, which aids in maximizing the potential of the SCMS.

This image shows login page





This image shows the facts and the values of canteen management system

VII. CONCLUSION

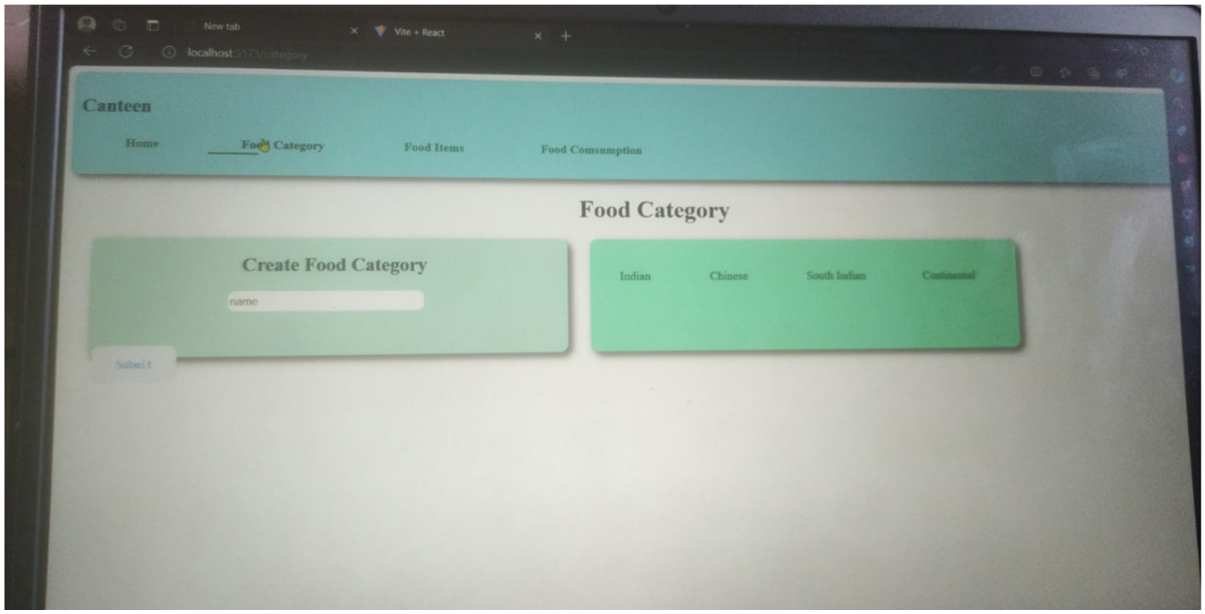
Important development in the administration and running of school canteens is the School Canteen Management System (SCMS). Through the integration of many functionalities, including inventory management, user account management, menu planning, point of sale (POS), reporting, and analytics, the SCMS provides a holistic solution that improves accuracy, efficiency, and user happiness. Notable Completions Operational Effectiveness: The SCMS improves the canteen's overall operating efficiency by drastically cutting transaction times, expediting order fulfillment, and minimizing manual errors. Precise Inventory Control: Accurate stock levels are ensured, waste is decreased, and an ideal supply of food and drink is maintained with the use of automated inventory tracking. User Contentment: With features like pre-ordering, cashless payments, and transparent account management, the system enhances the cafeteria experience for students, parents, and staff. oversight. High user satisfaction ratings and encouraging comments confirm the SCMS's efficacy. Benefits to the finances: The implementation of the SCMS yields financial advantages in the form of enhanced profit margins, decreased operational expenses, and increased revenue. These financial gains are partly attributable to improved cost and sales tracking. Compliance with Health and Safety: In order to guarantee that the canteen serves wholesome and secure food, the SCMS encourages adherence to dietary recommendations and food safety regulations. Excellent health inspection scores and high compliance rates highlight the system's contribution to preserving food safety and quality. Total Effect The operations, financial performance, and user experience of the canteen are all significantly impacted by the SCMS's deployment. Through the use of technology, the canteen can run more smoothly, provide its patrons with better services, and uphold high standards. of food safety and quality. In addition to satisfying the canteen's immediate needs, the SCMS offers a scalable system that can be modified to accommodate new demands. Prospective Courses In order to maintain and augment the advantages of the SCMS, the subsequent future paths are suggested: Constant Enhancement: Update and improve the system frequently to take advantage of new technology, user input, and canteen management best practices. Improved Functionalities: To further increase consumer convenience and happiness, offer new features that are easy for users to use, such extra payment alternatives and mobile apps for simpler access. Advanced Information Analysis: To make better decisions, employ machine learning and advanced analytics to acquire deeper insights into user preferences, sales trends, and inventory requirements. Combining with

Different Educational Systems: Improve compatibility with arious school administration systems to establish a smooth ecosystem that is advantageous to all members of the school community. Sustainable Projects: Adopt sustainable measures to support wider environmental objectives, such as decreasing food waste and encouraging eco-friendly packaging. To sum up, the SCMS has shown to be a useful instrument in turning the school canteen into a productive, user-friendly, and financially secure enterprise. The efficacious integration of this technology and its favorable outcomes showcase its capacity to augment educational offerings and foster an all-around superior learning milieu.

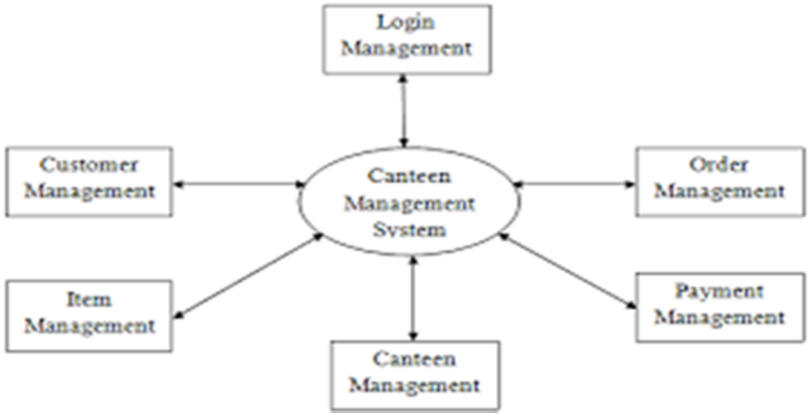
VIII. FUTURE SCOPE

In order to further increase the efficacy and efficiency of school cafeteria operations, the School cafeteria Management System (SCMS) will eventually integrate with larger technological trends, improve user experience, and add new functionalities. Here are a few crucial areas for future growth: 1. Integration with Emerging Technologies: Artificial Intelligence (AI) and Machine Learning (ML): Use ML and AI algorithms to customize menu recommendations based on dietary restrictions and individual tastes, optimize inventory management, and forecast food demand. Internet of Things (IoT): To improve quality control and operational efficiency, use IoT devices to monitor inventory levels, food temperature, and equipment maintenance in real-time. 2. Improved User Experience: Smartphone Apps Provide mobile applications with intuitive user interfaces that allow staff, parents, and students to manage accounts, place orders, and get updates on the status of your meals and promotions. Voice-Activated Ordering: Hands-free ordering and account administration are made possible by integrating voice-activated technology, such as virtual assistants, which increase accessibility and convenience. 3. Reporting and Advanced Analytics: Analytics that predicts: Reducing waste and increasing operational efficiency can be achieved by using predictive analytics to estimate sales trends, identify popular items, and modify menus and inventory accordingly. Detailed Reporting: Create more sophisticated reporting tools that offer in-depth analyses of different canteen operations features, assisting administrators in making data-driven decisions. 4. Customization and Personalization: Made-to-Order Meals Provide students with individualized meal plans that take into account their nutritional needs, dietary choices, and medical concerns to encourage better eating practices. Loyalty Programs: To promote recurring business and raise consumer satisfaction, put in place loyalty programs and incentive systems.

Fig 4: - menu



The above image shows the menu of the canteen and the order which we have to place



IX. REFERENCES

1. Anderson, R., & Davis, K. (2018). Food Service Management: Principles and Practices. Prentice Hall.
2. Smith, J. (2019). Digital Transformation in School Canteens: Enhancing Efficiency through Technology. Journal of Educational Technology, 45(3), 215-228.
3. Kumar, A., & Reddy, M. (2020). Implementation of RFID Technology in School Canteens for Efficient Inventory Management. International Journal of Advanced Research in Computer Science, 11(2), 34-42.
4. Brown, L. (2021, June 15). "The Impact of Cashless Payment Systems in School Canteens". EdTech Magazine. Retrieved from https://www.edtechmagazine.com
5. Johnson, P. (2022, March 20). "How AI and IoT are Revolutionizing School Canteen Management". Canteen Today. Retrieved from https://www.canteentoday.com
6. National Center for Educational Statistics. (2020). "School Canteen Management Systems: Trends and Best Practices". Retrieved from https://nces.ed.gov
7. Lee, S., & Wong, T. (2021). "Enhancing User Experience in School Canteens through Mobile Applications". In Proceedings of the International Conference on Educational Technology and Management, (pp. 123-130).
8. Patel, D., & Singh, R. (2019). "Utilizing Predictive Analytics for Efficient School Canteen Operations". In Proceedings of the International Symposium on Data Science and Applications, (pp. 98-105).
9. U.S. Department of Agriculture. (2018). Guidelines for School Canteens: Ensuring Nutritional Standards and Food Safety. Retrieved from https://www.usda.gov
10. World Health Organization. (2019). Healthy Eating in Schools: A Guide to Implementing Nutritional Standards. Retrieved from https://www.who.int
11. SmartCanteen Solutions. (2021). Case Study: Implementation of a Comprehensive Canteen Management System in XYZ School District. Retrieved from https://www.smartcanteensolutions.com
12. TechCanteen Inc. (2022). Technical Whitepaper: Integrating AI and IoT in Canteen Management Systems. Retrieved from https://www.techcanteen.com