Western Mindanao State University
College of Computing Studies
DEPARTMENT OF COMPUTER SCIENCE

THESIS CAPSULE RESEARCH PROPOSAL

Proposed Research Title:
Integrating Supply Savant POS for Advanced Inventory Control and Profit Maximization

Name of the Proponent(s):

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Research Discipline/Topic:	**Sector/Priority Areas/SDG:**
Restaurant Management Systems	Hospitality Industry

In today's dynamic and competitive business landscape, efficient management of resources is paramount for the success and sustainability of enterprises, particularly within the hospitality industry. The proposed research seeks to address the pressing issue of inventory control and cost monitoring in restaurants, leveraging modern technology to streamline operations and enhance profitability. By developing an integrated Point of Sale (POS) system, dubbed the Supply Savant, this research aims to revolutionize how restaurants manage their inventory, track costs, and optimize their menu offerings.

Traditional methods of inventory management in restaurants often involve manual record-keeping and disjointed systems, leading to inaccuracies, inefficiencies, and missed opportunities for cost optimization. Recognizing this, the research endeavors to bridge the gap between outdated inventory management practices and the technological advancements available today. By harnessing the power of digitalization and automation, the Supply Savant system aims to provide restaurant owners with real-time insights and control over their inventory, ultimately driving operational excellence and financial success.

Despite the proliferation of POS systems in the hospitality sector, existing solutions often lack comprehensive features tailored specifically to the unique needs of restaurant inventory management. While some systems offer basic inventory tracking capabilities, few provide the advanced functionality required to calculate dish-level profitability, minimize waste, and maximize yield per product. This research aims to fill this critical gap in the market by developing a cutting-edge POS system that offers end-to-end supply chain visibility, cost tracking, and profitability analysis, catering directly to the needs of restaurant owners and operators.

The proposed study will involve the design, development, and implementation of the Supply Savant POS system, incorporating features such as real-time supply, waste, and yield tracking, cost monitoring, profitability reporting, and user-friendly interface design. Through rigorous testing and validation in real-world restaurant environments, the system is expected to demonstrate significant improvements in inventory management efficiency, cost control, and overall profitability. The outputs of this research will not only benefit restaurant owners by empowering them with actionable insights and decision-making tools but also contribute to advancements in technology within the hospitality sector. By fostering innovation and efficiency, the Supply Savant system has the potential to drive economic growth, enhance competitiveness, and elevate the standards of restaurant management practices across the country.

Objectives

Implementing advance inventory control using C# Winforms with SQL Server Management Studio as the backend and ADO.NET framework for better database interaction.

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- Establish a connection between your C# WinForms system and the SQL Server database using ADO.NET framework.
- Integrate business logic for inventory management into your C# system. This may involve processes like updating inventory levels upon order placement, managing stockouts, yield per product tracking, minimizing food waste and spoilage, and setting reorder points.
- Implement error handling and data validation to ensure data integrity and prevent runtime errors. Validate user input to prevent invalid data from being entered into the system.
- Conduct comprehensive testing for the system to verify its functionality and identify any potential issues, this also includes assessing various aspects of its performance and impact on operations. Debug any encountered problems during testing and make necessary adjustments to enhance performance.

Features of the Proposed Study

- Yield per Product Tracking: This feature provides valuable insights into ingredient usage efficiency, helping to minimize waste and maximize profitability. It includes Ingredient Allocation, Automated Deductions, Yield Calculation, and Yield Reports, allowing restaurant owners to optimize their operations.

- Supply Tracking: The system maintains a digital record of all supplies and ingredients purchased for the restaurant. Each time an ingredient is used in the kitchen and recorded in the POS system, it's automatically deducted from the inventory. This prevents hoarding and ensures accurate tracking of inventory levels.

- Real-Time Cost Tracking: The system calculates the cost of each dish prepared, considering the ingredients used. It provides real-time insights into the cost of goods sold (COGS) for every dish directly within the POS interface. This feature helps restaurant owners understand their profit margins on specific menu items.

- Profitability Reports: The system generates easy-to-read reports that show the restaurant's overall financial performance, including sales, expenses, and profit margins. These reports help identify areas for improvement and ensure the restaurant is making a profit.

- User-Friendly Interface: The POS system features a user-friendly interface that allows both restaurant owners and staff to easily record inventory and track sales without technical hassle. This ensures efficient operation and reduces the need for extensive training.

Methodology

The research aims to address the challenges of inventory control and cost monitoring in the hospitality industry, particularly within restaurants. To gather comprehensive data, both qualitative and quantitative methods will be employed. Qualitative data will be collected through interviews and focus groups with restaurant owners, managers, and staff to understand their current practices and preferences. Quantitative data will be gathered through surveys administered to a diverse sample of restaurant stakeholders to capture broader industry trends and technological adoption rates.

The target population group includes restaurant owners, managers, and staff, chosen for their direct involvement in inventory management and operations within the hospitality sector. Hardware components

required for system development include computers for programming and testing purposes. The Supply Savant POS system will utilize algorithms (specifically basic algorithms like FIFO, JIT, Yield Percentage calculation, Weighted Average Cost calculation, Moving Average method, and Economic Order Quantity) for inventory management processes, such as order placement, stockout management, and yield tracking. Specific algorithms will be chosen based on their suitability for these tasks, and they will be implemented within the C# WinForms framework using appropriate programming techniques.

Tools needed for system development include C# WinForms for frontend development, SQL Server Management Studio for backend database management, and ADO.NET framework for database interaction. User testing will be conducted by deploying the Supply Savant POS system in real-world restaurant environments, involving restaurant owners, managers, and staff. Data collected from user testing will be analyzed using a combination of quantitative and qualitative methods. Quantitative data will be analyzed using descriptive and inferential statistical techniques, while qualitative data will be subjected to thematic analysis. Additionally, third-party consultants may be engaged to validate the research findings and ensure the robustness of the Supply Savant POS system. This could involve experts in hospitality management or software development to provide independent validation and insights.

Expected Output

For Places and Partnerships - Establishment of facilities and networks that enable increased outputs, fostering collaboration and knowledge exchange among researchers, industry partners, and stakeholders.

For Products - Development of a commercial product, such as the Supply Savant POS system, providing tangible value to businesses in the hospitality industry.

For People Services - Increase in the scientific workforce through training programs, internships, or employment opportunities created as part of the project.

For Policies - Adoption of science-based guidelines or recommendations by policymakers, informed by the research findings, to improve practices or regulations within relevant industries.

Target Beneficiaries

- Restaurant Owners and Managers: They will benefit from improved inventory management, cost monitoring, and profitability analysis provided by the Supply Savant POS system. This will result in optimized operations, increased profitability, and informed decision-making regarding menu offerings and pricing strategies.

- Restaurant Staff: Frontline staff members, such as chefs and servers, will experience streamlined processes and better inventory control, leading to smoother operations and reduced workload associated with manual inventory tracking.

- Customers: Enhanced efficiency and optimized menu offerings may result in improved dining experiences for customers, with better availability of menu items, consistent quality, and potentially lower prices due to cost savings.

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- Investors and Stakeholders: Investors in restaurants or hospitality businesses stand to benefit from increased profitability and operational efficiency resulting from the implementation of the Supply Savant POS system. Stakeholders, including suppliers and partners, may also experience improved relationships and more reliable business transactions.

- Industry as a Whole: The research/project outputs contribute to the advancement of best practices within the hospitality industry, fostering innovation and efficiency. This may lead to broader adoption of similar technologies and approaches, ultimately raising the standards of inventory management and cost control across the industry.