Data-Driven Point-of-Sale and Inventory System or Pastil Sa Tabi: Integrating Sales Forecasting Algorithms and Predictive Analytics

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ABSTRACT

Developing a web-based system to automate sales and inventory management procedures for small food enterprises is the main goal of "Data-Driven Point-of-Sale and Inventory System for Pastil sa Tabi: Integrating Sales Forecasting Algorithms with Predictive Analytics." The system, developed using PHP, MySQL, HTML, CSS, and JavaScript under the Waterfall SDLC approach, integrates transaction processing, inventory management, and sales forecasting to address inefficiencies caused by manual processes. It predicts product demand using forecasting algorithms, helping the business minimize waste, prevent shortages, and improve ingredient procurement.

Fifty (50) respondents, including thirty (30) users and twenty (20) technical experts, evaluated the system using ISO/IEC 25010 software quality standards. They rated it highly for functionality and usability and suggested improvements in performance and reliability. The system improved operational speed, accuracy, and decision-making while providing real-time analytics on inventory and sales trends.

Results show that both technical and user respondents agreed the system achieved its objectives by enhancing customer service, updating inventory reliably, and automating business processes efficiently. The system's ability to record transactions and generate reports precisely improved accuracy and user satisfaction. Although reliability and performance efficiency were slightly lower, they remained favorable, highlighting the need for further optimization during high-traffic operations.

The study concludes that incorporating automation and forecasting technologies in small food businesses like "Pastil sa Tabi" enhances decision-making and sustainability. Regular system updates, better multi-user optimization, and future features such as offline and mobile access are recommended. Expanding scalability for multi-branch use and adopting machine learning-based forecasting can further improve performance. Overall, the system demonstrates how digital transformation guided by quality standards enables small businesses to operate efficiently in a data-driven economy.

Keywords: Data Analytics, Predictive Algorithm, Point-of-Sale System, Inventory Management, Sales Forecasting, ISO 25010, Web-Based Application, SDLC Waterfall Model, MySQL, PHP

INTRODUCTION

Systems for inventory management and point-of-sale (POS) are essential for effective small business operations. While an inventory system monitors stock levels, usage, and sends out notifications when supplies run low, a point-of-sale (POS) system keeps track of sales transactions, computes totals, and prints receipts in real time. Tasks can be streamlined and errors can be decreased by integrating these systems. According to Ananda et al. (2024), for instance, integrating POS data with analytics and inventory management enables retailers to see their stock levels and forecast when to place new orders. Many companies in the restaurant sector are pursuing these integrated solutions in an effort to increase productivity and automate repetitive tasks.

"Pastil", a Filipino rice dish with spiced beef, is the specialty of "Pastil sa Tabi", a tiny restaurant close to Arellano University. It serves local residents and students looking for a quick and reasonably priced dinner. For everyday operations, "Pastil sa Tabi" still uses manual methods (handwritten sales logs and simple spreadsheets), despite its popularity. These handwritten records are laborious and prone to errors. As a result, employees might not be aware of the best-selling items or when stock is running low. In the absence of automated systems, the proprietors frequently run out of ingredients during peak hours or wind up purchasing too many slow-selling things. As the company expands, this makes inventory planning and decision-making challenging.

Small eateries and food stalls frequently rely on manual or independent systems for inventory and sales, which can reduce operational efficiency. According to research, a lot of small firms still maintain inventory by hand even after implementing digital point-of-sale systems. Businesses only see true benefits when their point-of-sale (POS) systems are completely connected with inventory and analytics functions, according to Ananda et al. (2024). If not, companies lose out on the benefits of having connected data that aids in inventory control and restocking requirements prediction.

Projecting future demand is another crucial component. Businesses can minimize waste and prevent shortages by purchasing the precise quantity of ingredients with the aid of accurate sales projections. Mason et al. (2023), for instance, demonstrated how a family restaurant planned ingredient purchases using forecasting models such as Facebook Prophet and ARIMA. Compared to their previous ordering procedures, they are able to reduce their monthly protein expenses by almost 34%. This demonstrates how small organizations may enhance inventory planning and save money by utilizing even basic prediction tools.

How employees and business owners comprehend and utilize such systems depends in part on their cognitive capacities. Cognitive talents, according to Ferrara (2011), are mental capabilities that support reasoning, planning, problem-solving, abstract thought, and experience-based learning. These abilities enable users to use data-driven insights to decision-making and swiftly grasp new systems. Employees and owners must understand reports, sales trends, and inventory forecasts in the context of "Pastil sa Tabi". A well-designed system should be straightforward to use and simple to understand, taking into account their cognitive capacities.

Small firms like "Pastil sa Tabi" can benefit from a POS and inventory system that incorporates forecasting and analytics in light of these factors. The company can reduce overstocking, better track what sells, and get ready for peak periods by automating data gathering and analysis. The background demonstrates how incorporating technology into small food enterprises may increase productivity and profitability.

The suggested system combines analytics, inventory tracking, and sales processing into a single platform to address these issues. It has a forecasting system that uses historical sales data to estimate future demand and recommend replenishment levels. In order to facilitate data-driven decision-making, the system also produces visual summaries of peak hours, best-selling products, and consumer spending trends. With the title "Data-Driven Point-of-Sale and Inventory System for Pastil sa Tabi: Integrating Sales Forecasting Algorithms and Predictive Analytics", the project seeks to improve the operational efficiency of small food enterprises such as "Pastil sa Tabi". The restaurant may increase service speed, cut down on food waste, and optimize resource use by utilizing basic digital tools.

A number of obstacles prevent "Pastil sa Tabi" from operating effectively and efficiently. The restaurant currently keeps track of sales and inventory by hand or using simple spreadsheets, which causes computation errors, erroneous stock counts, and delays in determining daily earnings. Due to the lack of automated tracking, the company frequently runs out of essential materials during peak hours and occasionally orders too many things that do not sell right away, resulting in waste when they expire. The owner finds it challenging to determine the best-selling products and forecast demand because the present system does not offer any analysis of sales trends or consumer preferences. These issues result in time wastage, repetitive manual labor, and lost chances to enhance service and better manage resources. When taken as a whole, these problems show how "Pastil sa Tabi" needs a digital system that can offer real-time data and insights to assist it overcome its operating difficulties.

The study aims to design and develop a web-based Point-of-Sale and Inventory Management System for "Pastil sa Tabi" that enhances its operations through efficient transaction processing, accurate inventory control, sales forecasting, and data-driven insights. The following are the specific objectives:

- To develop a user-friendly interface that enables staff to record sales and track inventory easily (including a digital Kitchen Display System to route orders to the kitchen).
- To create a real-time transaction processing module that records dine-in and take-out sales and updates inventory.
- To build an inventory tracker that monitors ingredient usage, alerts users when stock is low, and keeps stock levels up to date with supplier deliveries.
- To implement a sales forecasting tool that uses historical sales data (and relevant external factors) to predict future demand and suggest restocking needs.
- To provide a visual analytics dashboard showing sales trends, peak business hours, top-selling items, and resource usage to support management decisions.
- To implement role-based access control to assign permissions to managers, cashiers, and staff for secure operation.
- To collect customer feedback and profiles to support loyalty programs and service improvements.
- To use ISO 25010 quality standards to evaluate the system's functionality, usability, reliability, maintainability, and performance efficiency.

Scope

The project's scope outlines the general coverage of "Pastil sa Tabi"'s data-driven point-of-sale and inventory management system. The scope guarantees that the system stays focused on improving accuracy, productivity, and data-driven decision-making in the context of small food businesses by clearly defining its bounds. The scope of the system are:

- The system is a web-based Point-of-Sale and Inventory Management platform. It focuses on streamlining daily operations in a small food business.
- It handles real-time processing of dine-in and take-out orders through a POS interface.
- A Kitchen Display System (KDS) is included to route orders digitally to kitchen stations for faster service. Historical sales data (and selected external factors) are used to forecast demand and suggest purchase orders.
- A dashboard displays sales trends, inventory levels, resource usage, and profit insights.
- Visual reports highlight peak hours, fast-moving items, and customer patterns.
- Role-based access control allows different permissions for admins, cashiers, and staff.
- The system collects customer feedback and profile information to support potential loyalty and marketing programs.
- As a web application, it is accessible on multiple devices through a browser, provided there is an internet connection.

LIMITATION

The project's limitation outlines the restrictions and limitations that could have an impact on the functionality, usability, or deployment of "Pastil sa Tabi"'s data-driven point-of-sale and inventory management system. By outlining these restrictions, the researchers hope to provide a clear picture of the areas that might need more improvement or growth in the future while also setting reasonable expectations for the system's potential. These are:

- The system requires an active internet connection and cannot operate offline.
- Sales forecasts may be less accurate if only limited historical data is available.
- Online payments is not supported.
- Supplier data integration is manual; the system does not automatically sync with third-party supplier systems.

- The study did not include cost–benefit analysis and return on investment (ROI) evaluation, which could provide deeper insights into the financial performance and economic impact of system adoption.

Theoretical Framework

The following collection of ideas, theories, concepts, and presumption aids in comprehending the study question.

1. Transaction Processing System (TPS - A Transaction Processing System refers to software that records, stores, and manages daily business transactions quickly and accurately. In this study, TPS is applied to handle sales transactions at "Pastil sa Tabi". It ensures that every order is captured, receipts are generated, and inventory is automatically updated after each sale, reducing manual errors and delays.

2. Inventory Control Theory - Inventory Control Theory focuses on maintaining the right quantity of products and supplies needed to meet demand while avoiding overstocking or shortages. In this project, it guides how the system tracks ingredient usage, sends alerts when stocks are low, and updates inventory levels in real time. This helps management plan purchases wisely and reduce waste.

3. Decision Support System (DSS) - Decision Support Systems are tools that analyze data to help users make better choices. For "Pastil sa Tabi", the system uses sales data and customer behavior to identify trends, such as best-selling products and peak hours. These insights help the owner decide how much to stock, when to schedule staff, and which items to promote.

4. Forecasting Algorithms - The study uses forecasting algorithms like ARIMA (AutoRegressive Integrated Moving Average). These models analyze past sales data to predict future demand. By forecasting how much of each ingredient is likely needed, the system helps "Pastil sa Tabi" avoid running out of popular items and prevents over-purchasing slow-moving goods.

5. Role-Based Access Control (RBAC) - Role-Based Access Control is a security concept where users are given permissions based on their roles, like Admin, Cashier, or Staff. In this study, RBAC ensures that only authorized users can access certain features of the system, protecting sensitive business data and simplifying tasks for each user group.

Conceptual Framework

Figure 1: The IPO Model
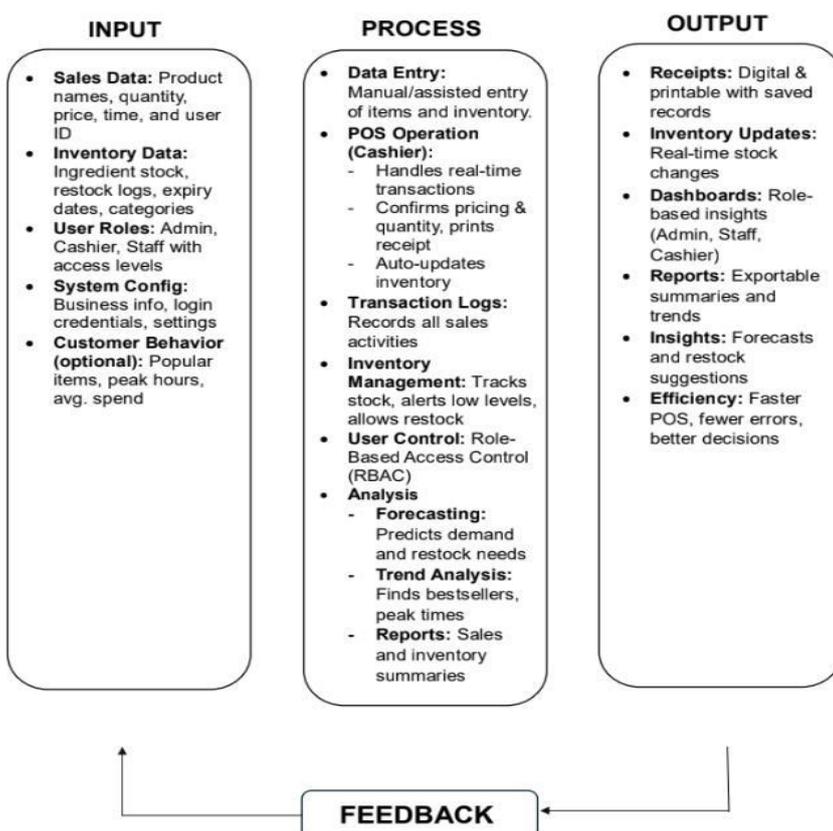
The Input–Process–Output (IPO) Model depicts the system's logical progression from data collection to outcome generation and served as the foundation for the conceptual framework of the "Pastil sa Tabi" system.

- INPUT

  1. The input step entails gathering the essential data and materials required for system design and implementation.

- PROCESS

  2. The process stage concentrates on the actions and procedures that convert the gathered inputs into useful system components.

- OUTPUT

  3. The output is a representation of the finished system and its desired advantages.

Significance of the Study

A number of stakeholders involved in the business can profit practically from the proposed project. These stakeholders are:

- Business Owners: The system supports better decision-making by providing accurate data on inventory levels and sales trends. It helps control costs, minimize waste, and improve profit management through timely and data-driven insights.
- Staff and Cashiers: It simplifies daily operations by speeding up transaction processing and maintaining accurate records. This reduces manual errors and allows staff to focus more on customer service.
- Customers: Improved inventory accuracy ensures product availability and faster service, leading to a more consistent and reliable dining experience.
- IT Experts and System Designers: The project demonstrates the integration of analytics, forecasting algorithms, and user-focused design in a real business setting. It serves as a model for developing systems that balance usability with technical performance.
- Researchers and Developers: The study provides a framework for combining automation, forecasting, and data analytics in micro and small enterprises. It highlights the potential of affordable digital tools to enhance operational efficiency and business sustainability.

REVIEW OF RELATED LITERATURE

According to Zhang et al. (2021), intelligent point-of-sale (POS) systems greatly improve small food businesses' operational efficiency. These technologies facilitate improved inventory management and sales forecasting by automating transaction procedures and enabling data analytics. This is closely related to the project's objective of using automation and predictive intelligence to reduce food waste and missed sales.

Lopez et al. (2020) investigated the advantages of inventory optimization for small food businesses using forecasting models such as exponential smoothing and ARIMA. Their findings reinforces the goal of this research, which is to forecast demand using historical sales data, by supporting the inclusion of predictive modules in POS systems.

In Malaysia, Rahman et al. (2020) created a smart point-of-sale system for food stalls that allowed for automated stock deduction and real-time monitoring. Similar to the technique suggested for Pastil sa Tabi, their study demonstrated the efficacy of automated systems in lowering inventory errors.

Using historical data, Wijaya et al. (2019) in Indonesia created a technique for predicting restaurant sales. The forecasting objectives of this project are closely aligned with the effective use of time-series analysis to forecast client demand.

A cloud-based point-of-sale system with dashboards and remote access was put into place in Egypt by Hassan et al. in 2021. Similar to the analytics and reporting features in this study, their technology assisted business owners in monitoring sales trends and performance indicators.

In Metro Manila, Santos et al. (2021) investigated inventory and point-of-sale systems for carinderias. Similar to the objectives of this system, their results shown that digital systems increased inventory accuracy and avoided shortages.

Reyes et al. (2019) investigated analytics-based point-of-sale for a Laguna bakery. Similar to the project's reporting tools, the bakery was able to modify production in response to demand thanks to graphic reports from its system.

Synthesis

There is broad agreement among the studied literature and studies—both domestic and international—about the advantages of small food businesses combining data analytics, inventory control, and transaction processing into a single digital system. Each component has been shown to be successful in both academic research and real-world applications, ranging from inventory management and demand prediction to enhancing customer service and security through RBAC. The "Pastil sa Tabi" system's design, using RBAC, can become a navigable platform. The system is not only inventive but also evidence-based because its forecasting, reporting, and behavioral analytics capabilities are directly derived from verified models and practical applications. The project intends to modernize micro-food business operations through this synthesis of concepts and technology by utilizing data-driven tools that improve profitability, efficiency, and decision-making.

METHODOLOGY OF THE STUDY

In order to direct the development, improvement, and assessment of a data-driven Point-of-Sale (POS) and Inventory System for "Pastil sa Tabi", a small food business close to Arellano University, this project uses a developmental research design. Because this project focuses on creating and refining a technical solution that tackles practical operational issues, specifically in inventory management, consumer behavior research, and sales tracking, the developing process is suitable.

The study adheres to a methodical but adaptable procedure that comprises assessing the current business workflow, creating a customized system solution, developing the system with the use of suitable tools and technologies, putting it into practice in a real-world business setting, and assessing its effectiveness. Iterative and user-centered development allows for constant improvement based on input from system users and stakeholders.

To make sure that the system's development and assessment reflect the actual requirements and experiences of its target users, the study employs structured data collection methods, including surveys, questionnaires, and interviews. Both main and secondary data are gathered during the procedure.

Two stages are used to collect primary data. To understand present procedures, difficulties, and service gaps, pre-development interviews are carried out in Phase 1 with key players involved in "Pastil sa Tabi"'s day-to-day operations, such as the company owner, employees, and regular clients. Phase 2 involves post-development surveys that use a 4-point Likert scale based on ISO 25010 software quality standards to assess the system's overall satisfaction, usability, and performance. Additionally, open-ended questions gathered qualitative input for system enhancement.

Conversely, secondary data are gathered through a review of previous research and associated literature. The research framework are strengthened and pertinent design approaches are identified with the help of these resources.

In order to provide a quantifiable foundation for evaluating the system's efficacy, quality, and user approval, all gathered data are examined using fundamental statistical methods like averages and percentage ratings.

Figure 2: SDLC Waterfall Model
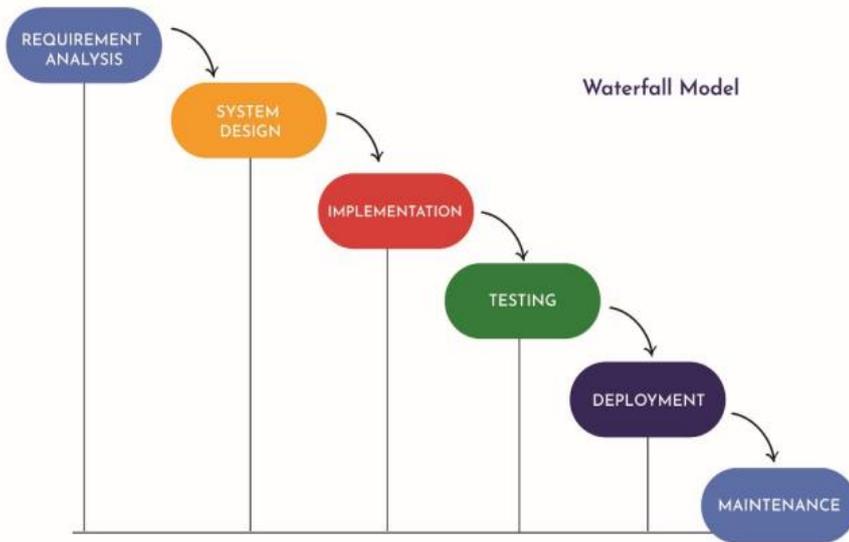
The Waterfall Model, a conventional Software Development Life Cycle (SDLC) methodology renowned for its linear and structured phase sequence, is used in the creation of the Data-Driven Point-of-Sale and Inventory System for "Pastil sa Tabi". This model is chosen because of its well-defined structure, which enabled the researchers to go methodically through every phase, from gathering requirements and designing the system to developing, testing, and deploying the system.

The overall architecture of the system is created based on the requirements analysis. In order to guarantee data integrity and user role separation, security concerns and access controls are also planned during this phase.

Performance and scalability are also considered, with plans in place to manage potential increases in the number of users and volume of data. Additionally, the architecture placed a strong emphasis on maintainability and modularity, which facilitates the integration of new features and upgrades as the system develops.

In future development, the researchers also recognize the value of adopting Agile principles to complement the Waterfall approach. Iterative sprints, frequent user feedback, and rapid prototyping can improve responsiveness to stakeholder needs and speed up revisions. Combining Waterfall's structured process with Agile's flexibility enables continuous improvement while maintaining systematic documentation and testing standards.

Figure 3: Context Diagram
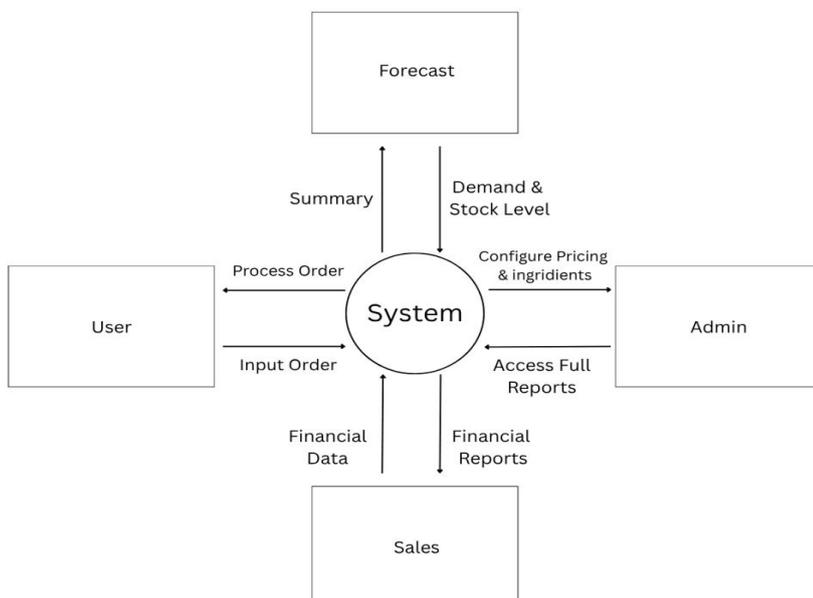
The way different things interact with a central system is depicted in figure 3. While the administrator sets up ingredients, prices, and reports, the user enters and completes orders. Forecast gives information on demand and stock levels, while Sales keeps track of sales statistics. The system serves as the center for all communications, managing financial data and reports and providing the administrative and sales teams with a summary of important insights.

Respondents of the Study

The study's participants are carefully selected to offer insightful and pertinent comments on the functionality, usability, and general efficacy of "Pastil sa Tabi"'s data-driven point-of-sale and inventory system. The researchers used purposive sampling, a kind of non-probability sampling technique, to choose participants who had technical knowledge or intimate familiarity with the system's operational context in order to guarantee accuracy and relevance.

Thirty (30) users who actively participate in the day-to-day operations of the business and twenty (20) technical respondents who are IT experts with experiences in system's development and evaluation made up the fifty (50) respondents that took part in the evaluation.

Development and Evaluation Procedure

A set of dependable and extensively used development tools are used to create the system, guaranteeing effective coding, seamless database interface, and focus management during the whole process. Every tool is essential to the development and upkeep of the system's structure and functionality.

- MySQL's performance, simplicity of integration, and support for structured queries make it a popular choice for relational data management.
- Back-end logic to communicate with the MySQL database is handled by PHP or Node.js.
- During development, database schemas and query testing can be done with phpMyAdmin or MySQL Workbench.

Two important evaluation techniques are used in the study to gauge the overall efficacy and quality of the system. The first approach concentrated on how easy it is for users to interact with the system and how satisfied they are. This aided in assessing the system's usability and accessibility from the viewpoint of the users. The second approach assessed the system's practical utility and technical performance in assisting "Pastil sa Tabi"'s activities.

Only one standardized evaluation form is utilized, despite the fact that these two features focused on distinct evaluation areas. This form is meticulously created in accordance with the ISO 25010 software quality standard, enabling a systematic and trustworthy evaluation of system functionality and user experiences.

An internationally accepted standard for evaluating software product quality, ISO/IEC 25010 Software Quality Model, served as the basis for the assessment.

Data Analysis Plan

In order to evaluate and validate the system's performance and user satisfaction levels, the researchers used proper statistical methods to examine the data collected from respondents' assessments.

- Weighted Mean: A statistical technique for determining the degree of agreement or disagreement among different questionnaire questions or assertions is the weighted mean, sometimes referred to as the average mean. Each item's weighted mean is determined by multiplying its weighted points by the associated sample sizes, then adding the results. The overall population size is then split by this sum.
- Percentage: This statistical technique determines the respondents' distribution by grade level. A percentage of the results are shown.

A popular instrument for gathering quantitative data for studies and assessments is the Likert Scale. It gauges people's attitudes, perceptions, and opinions. Because each response is given a numerical value, statistical analysis may be performed on it. A 4-point Likert scale, with values ranging from 4 ("Strongly Agree") to 1 ("Strongly Disagree"), is used in this study.

The System

By combining transaction processing, inventory management, and sales forecasting into a single platform, the system aims to automate routine business tasks. It tackles the drawbacks of manual recording techniques, which frequently result in mistakes, inefficiencies, and inadequate inventory management.
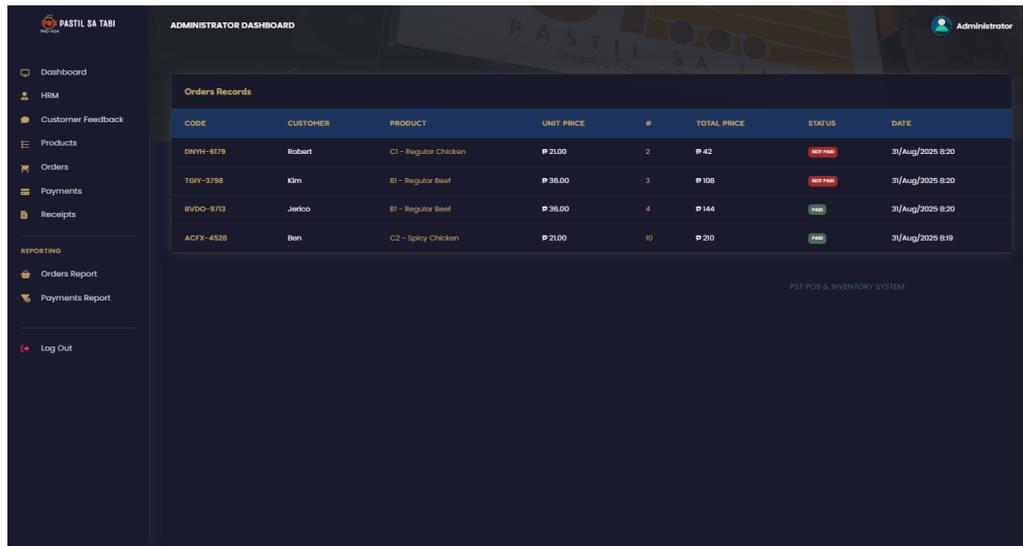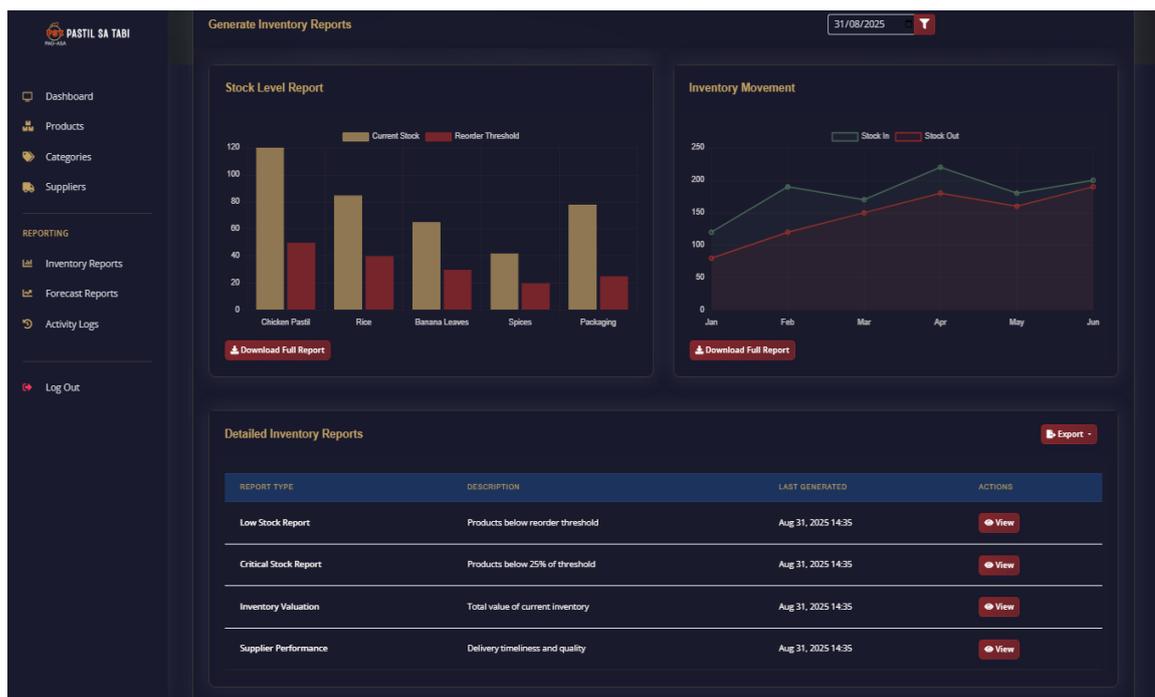
Figure 4: Orders Report Dashboard

Figure 4 displays the PASTIL SA TABI system's "Orders Records" screen as seen from the viewpoint of a cashier.

Figure 5: Forecast Report Page

The Forecast Reports tab, which offers a visual forecast of future inventory requirements, is displayed in the above image.

Assessment: Summary Of Respondents on the System

Two viewpoints are used to evaluate the project: (a) technical experts and (b) users. Based on their actual experiences, the users' feedback mostly focused on how user-friendly and acceptable the system is. However, from a more technical perspective, the technical group evaluated the system's overall quality, performance, and functionality. To guarantee a systematic and trustworthy review, both groups based their assessments on the ISO 25010 standards.

The demographic breakdown of the respondents is displayed in the accompanying table, emphasizing their classification as either technical evaluators or users. A clearer picture of the representation in the evaluation is provided by including the number of participants in each category and their corresponding percentage.

Table 1. Distribution of Respondents

Respondents (groupings)	Size (n)	Percentage
Users	30	60%
Technical	20	40%
Total (n)	50	100.0%

Table 1 presents the overall count and percentage of respondents who took part in the evaluation. Out of the total, there are 30 User respondents, which accounts for 60%, while 20 individuals are technical respondents, representing 40% of the participants. This distribution highlights that the majority of the feedback came from the end-users, with a significant portion still contributed by the technical group.

Table 2. Summary and Comparison of Respondents' Assessment Based on ISO 25010 Standards

Criteria (ISO25010)	Respondents (60)			
	Users (30)		Technical (20)	
	WM	VI	WM	VI
1. Functionality	3.80	SA	3.58	SA
2. Reliability	3.67	SA	3.94	SA
3. Usability	3.25	SA	3.17	SA
4. Effectiveness	3.09	SA	3.58	SA
5. Security	3.53	SA	3.70	SA
Overall Average Mean	3.57	SA	3.63	SA

A summary and comparison of respondents' assessments across the five ISO25010 criteria are shown in Table 2. The system is continuously evaluated as "Strongly Agree" by both technical and user respondents, with an overall average mean of 3.63 for technical respondents and 3.57 for users suggesting generally positive feedback. The findings imply that the system carries out its intended tasks efficiently, offers an intuitive user interface, sustains dependable operations, provides satisfactory performance efficiency, and meets user needs.

Overall, the assessment shows that the system adheres to the ISO 25010 standards.

Data Interpretation

The results from the evaluation indicate a generally positive reception toward the developed system. Based on Table 1, the majority of respondents were end-users (60%), while technical respondents comprised 40% of the total participants. This distribution shows that the evaluation gathered balanced perspectives, emphasizing both usability from the users' side and functionality from the technical side.

As shown in Table 2, both groups rated the system highly across the five ISO 25010 quality criteria, with average mean scores of 3.63 for technical respondents and 3.57 for user respondents—both interpreted as "Strongly Agree." These findings suggest that the system performs effectively in terms of functionality, performance efficiency, usability, reliability, and user satisfaction. The positive outcome also reflects the successful

application of the theoretical frameworks used in the study. The Transaction Processing System (TPS) contributed to the system's ability to process sales accurately and update inventory automatically after each transaction. The Inventory Control Theory ensured proper stock management through real-time updates and low-stock alerts, while the Decision Support System (DSS) guided the system in providing meaningful insights from sales data to support managerial decisions. Additionally, the use of Forecasting Algorithms such as ARIMA and Facebook Prophet enhanced the system's predictive capabilities for future inventory needs, and the Role-Based Access Control (RBAC) framework strengthened data security by limiting access based on user roles.

Overall, the results reveal that the system operates efficiently, remains reliable during use, and delivers an accessible and user-friendly interface consistent with the ISO 25010 software quality standards. This indicates that both users and technical evaluators view the system as effective, well-structured, and capable of fulfilling its intended functions while demonstrating how the integration of the theoretical frameworks contributed to its strong performance and overall system quality.

Security and Data Privacy

The system implements security measures to protect business and customer data. Role-Based Access Control (RBAC) restricts access based on user roles such as admin, cashier, and inventory staff. User credentials are protected through password hashing before storage to prevent unauthorized disclosure. Audit logs record all account activities for transparency and accountability.

To further strengthen security, future updates will include data encryption for stored and transmitted information, automatic session timeouts, and compliance with data privacy regulations. These measures ensure the system remains secure, reliable, and suitable for commercial use.

Ethical Considerations

The study guarantees the confidentiality and integrity of the data obtained from participants. Information provided by respondents is secure, and no personally identifiable information is shared without permission. Respondents are allowed to leave the study at any moment without facing any repercussions, in accordance with the principles of voluntary participation. Strict adherence to data security protocols guards against misuse and illegal access to information. Lastly, in order to preserve the study's integrity, all results are presented truthfully and accurately, free from prejudice or manipulation.

Summary

To solve problems with manual sales and inventory management, the research created a web-based "Data-Driven Point-of-Sale and Inventory System for Pastil sa Tabi." The system, guided by the SDLC Waterfall model, combined forecasting, analytics, real-time inventory tracking, transaction processing, and customer feedback.

Based on ISO 25010 standards, the system met expectations for functionality, usability, dependability, performance efficiency, and overall user satisfaction. The results showed significant improvements in speed, accuracy, and operational consistency compared to manual methods.

Overall, the technology successfully optimized processes, decreased errors, and assisted small food enterprises in making data-driven decisions.

CONCLUSION

The study demonstrates the effectiveness of integrating point-of-sale, inventory management, and sales forecasting into a single web-based platform. The results confirm that the system improved productivity, accuracy, and decision-making for small-scale food enterprises.

By automating daily operations and applying data analytics, the business achieved faster transactions, fewer manual errors, and more efficient resource management. The positive feedback from users and technical

evaluators supports the system's success in meeting its objectives and maintaining ISO 25010 software quality standards.

The study concludes that adopting similar data-driven systems can help small food enterprises improve operational efficiency and sustainability through automation and predictive insights.

RECOMMENDATION

This part presents actionable and fact-based suggestions meant to resolve the difficulties found and improve future results, all based on the study's main findings and conclusions. These are the recommendations:

- For The Business Owner: Continue using the system to maintain accurate records, manage stocks, and improve service efficiency.
- For Future Developers: Improve server performance, cross-device compatibility, and error handling. Add real-time alerts for low stock and sales changes. Strengthen data encryption and privacy compliance.
- For Small Business Operators: Operators: Use similar POS and inventory systems to reduce waste, prevent shortages, and make data-driven decisions.
- For Future Researchers: Conduct cost–benefit and ROI analyses to assess the financial viability and economic impact of the system on small enterprises. Explore machine learning for predictive analytics, assess multi-branch scalability, and evaluate long-term sustainability outcomes.

These recommendations are meant to aid in the system's ongoing development, application, and assessment by different stakeholders.

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