

Karnetory: Usability and System Evaluation of the "Meat Your Profit" Application for Meat Retailers in Kabacan, North Cotabato

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Abstract

Effective financial and inventory management is a critical challenge for micro and small enterprises, particularly for meat retailers dealing with highly perishable goods. In Kabacan, North Cotabato, many local meat vendors still rely on traditional, manual pen-and-paper methods for bookkeeping and inventory tracking. This outdated approach often leads to inaccurate financial records, unaccounted spoilage, and difficulties in reliably calculating daily profits and operational expenses. Transitioning to a digital system makes it easier for meat shops to automate tedious processes, minimize human error, and secure their profit margins. To address these operational inefficiencies, the researchers developed "Karnetory: Meat Your Profit," a dedicated app-based sales tracking and financial management software designed specifically for local meat retailers. The core features of the proposed system include real-time inventory monitoring, automated daily sales tracking, and integrated modules for calculating employee salaries and tax records. This study covers the complete software development life cycle of the application, from initial requirements analysis and system design to software deployment and performance evaluation, aiming to provide vendors with a modernized tool to replace handwritten ledgers and improve overall business profitability.

Keywords: Inventory management, sales tracking application, financial management software, meat retailers, digital bookkeeping, micro and small enterprises (MSMEs)

INTRODUCTION

Nowadays, technology is a fundamental driver of business efficiency. Across various industries, enterprises leverage computers and mobile applications to automate operations, streamline transactions, and calculate financial data with precision. Micro, small, and medium enterprises (MSMEs) can use digital technology to automate business processes, minimize operating expenses, and increase overall productivity [13]. However, despite these technological advancements, a significant digital divide remains at the grassroots level. Inventory management and financial tracking continue to be difficult business processes in many developing economies due to a lack of basic control principles and a heavy reliance on old manual approaches [10]. Consequently, many local business owners, particularly market vendors, continue to operate using traditional, outdated bookkeeping methods.

Here in Kabacan, North Cotabato, meat retailers are essential to the local economy, serving as the primary suppliers of fresh meat to the community. Every day, they cater to numerous customers in a fast-

paced and highly demanding market environment. In this setting, vendors typically compute their sales using basic calculators, pens, and notebooks. Since meat is highly perishable and sold by the exact kilogram, pricing and inventory tracking require meticulous accuracy. According to recent studies, traditional company tracking systems that rely mainly on manual processes pose significant challenges, including improper information transmission and inefficiencies in processing large volumes of transactions [8]. Writing down every sale during peak hours inevitably leads to human error.

Furthermore, these manual procedures result in serious operational constraints. Organizations without a continuous digital procedure often face underproduction, stock-outs, and unrecorded delays [11]. For meat vendors, these inefficiencies directly translate to unaccounted spoilage and miscalculated daily income. If vendors make a mistake in computing their capital and daily sales, they risk losing substantial profit without even realizing it. This underscores the urgent need for a better, faster, and more reliable way to track sales and secure their profit margins.

To address these critical operational inefficiencies, the researchers developed an application designed specifically for local meat vendors to digitize their daily sales and profit tracking. Breakthrough technologies like mobile applications enable small enterprises to employ cutting-edge business processes previously available only to much larger firms [14]. By shifting from handwritten ledgers to an app-based system, vendors can automate tedious calculations, monitor their meat inventory in real-time, and significantly reduce the likelihood of mathematical errors.

Therefore, the study "Karnetory: Development and Implementation of the 'Meat Your Profit' Sales Tracking Software for Meat Retailers in Kabacan, North Cotabato" aims to test and evaluate the effectiveness of this application. While the study assesses the software's performance against traditional manual methods, its primary focus is to determine the system's accuracy, speed, and overall usability for local vendors. Ultimately, this research seeks to prove that adopting a dedicated mobile tracking system can empower Kabacan's meat retailers to modernize their operations, eliminate unnecessary financial losses, and sustain their daily business growth.

REVIEW OF RELATED LITERATURE

This chapter discusses related literature and studies that address the following topics and understandings. Ideas, generalizations, or conclusions, as well as various advancements in self-service technology from the past to the present, and which serve as a beginning point for the researchers.

E-Tracking System

In a world where traditional ordering systems still rely heavily on pens and paper, significant challenges such as lost orders, inaccurate information delivery, and inefficiencies in processing large numbers of transactions persist. Manual order processing requires time and is subject to human error, resulting in delayed customer service and potential revenue loss. The growing popularity of e-commerce has had a significant influence on various businesses, notably the food sector, where online ordering methods are getting more popular. Research in Turkey examined how technology acceptance model or TAM and other characteristics, such as trust and innovation influence customer attitudes toward online meal ordering. This study highlights the significance of consumer perception in adopting new web-based meal ordering platforms [9].

The Inefficiencies of Manual Financial Methods in Micro and Small Enterprises

Traditional company tracking systems rely mainly on manual processes involving pens and paper, which poses significant challenges in today's business environments [8]. These challenges include missed

orders, improper information transmission, and inefficiencies in processing large volumes of transactions [8]. Manual systems are frequently time-consuming and subject to human error, resulting in order processing delays and potential revenue loss [8]. Inventory management continues to be a difficult business process in many developing countries due to a lack of basic inventory control principles and reliance on old manual approaches [10].

These manual procedures result in serious operational constraints. According to Odasco and Saong [11], organizations confront significant differences in the absence of a single, continuous procedure for providing essential inventories in optimal proportions. Underproduction, overproduction, stock-outs, and delays in raw material deliveries are all common inventory management challenges for small businesses that use manual procedures. Furthermore, present manual systems usually include a lot of paperwork and require clients to go through time-consuming procedures to place orders, which leads to operational inefficiencies and customer dissatisfaction [8]. For vendors who handle perishable items such as meat, inefficiencies directly translate to spoilage, lost capital, and an inability to effectively measure daily revenue.

The Advantages of App-Based and Digital Sales Tracking

In response to traditional bookkeeping's severe restrictions, as digital technology advances, there is an increasing emphasis on real-time solutions to improve operational efficiency and accuracy. Implementing an online ordering and invoicing system with integrated sales monitoring can significantly improve transaction accuracy and speed while also providing vital real-time sales data needed for effective business management [8]. According to Melesse and Orrù [12], digitalization immediately helps to waste reduction, quality control improvement, and data-driven decision-making, resulting in better inventory management.

MSMEs can use digital technology to automate business processes, minimize operating expenses, and increase productivity and innovation [13]. Furthermore, breakthrough technologies like mobile applications enable SMEs to compete with much larger firms by employing cutting-edge business processes [14]. A proposed digital system seeks to replace outdated processes with a streamlined, online approach that allows for easy ordering and real-time sales tracking [8]. Implementing this system will enable firms to preserve accurate inventory records, reduce overstock and shortages, and ultimately boost productivity and profitability [8]. For local markets, switching to a dedicated inventory system like Karnetory enables meat dealers to move beyond handwritten ledgers and use real-time data to safeguard their margins.

Inventory Management of Perishable Goods in MSMEs

For meat shops, inventory management goes beyond merely counting stock; it is heavily dictated by the limited shelf-life of the products. According to Chinello et al. [15], managing perishable inventory is crucial as it directly impacts sales, quality, and customer satisfaction, yet it is often complicated by supply chain intricacies. In a traditional retail setup, failure to sell products within their allotted freshness window causes goods to spoil, which directly translates to wasted capital and lost profit [16]. Implementing a proper digital inventory management system helps businesses avoid excess stocked inventory and potential stock-outs, ensuring that only the necessary amount of highly perishable goods is kept on hand, thereby securing the vendor's profit margins [17].

Technological Adoption and Digital Readiness of Local Vendors

Despite the rapid expansion of digital solutions globally, family-run enterprises and traditional market vendors often encounter substantial obstacles when adopting new technology [18]. However, the

emergence of electronic management and digital financial systems across developing countries has become a significant phenomenon in recent years [19]. In the Philippines, the widespread use of digital financial platforms such as GCash and Maya has familiarized many micro-business owners and consumers with digital interfaces [20]. This growing digital readiness serves as a strong foundation for local vendors to adopt more comprehensive tools like the proposed software. Transitioning to a digital Point of Sale (POS) is increasingly viewed not as a high-risk change, but as a necessary step to reduce manual calculation errors, minimize the risks of mishandling cash, and increase overall operational efficiency [19].

Client-Server Architecture and Point of Sale (POS) Systems in Retail

To fully replace a pen-and-paper ledger, a digital system must be both reliable and capable of handling high volumes of daily transactions without data loss. Modern Point-of-Sale (POS) systems have acted as a powerful democratizing force, bringing formal financial tracking infrastructure directly to micro-merchants, street vendors, and small family businesses [21]. The implementation of robust software architecture—where a local desktop interface communicates with a secure relational database—ensures that critical data such as employee salaries, daily revenue, and exact meat inventory are safely stored and easily retrievable. This structure eliminates the risk of misplaced physical notebooks and allows vendors to generate real-time automated reports, equipping small local retailers with cutting-edge business processes to sustain their daily operations [21].

METHODS AND PROCEDURES

This chapter discusses the systematic approach used in the development and evaluation of "Karnetory: Meat Your Profit." It details the research design, system requirements, system architecture, development procedures, and the testing and evaluation instruments used to assess the software's performance and usability for meat retailers in Kabacan, North Cotabato.

Research Design

The study utilizes the Agile Software Development Life Cycle (SDLC) methodology. Agile is an iterative approach that allows for continuous testing and modification based on user feedback, which is crucial when designing software for non-technical users like traditional market vendors. The phases include:

Requirements Gathering: Conducting initial assessments with local meat vendors in Kabacan to identify their specific daily operational needs (e.g., tracking pork/beef cuts, calculating daily sales, computing employee salaries, and recording taxes).

Design: Creating the user interface (UI) layouts and planning the database structure for inventory and financial tracking.

Development: Writing the application logic using C# and establishing the database utilizing MySQL.

Testing: Debugging the software internally to ensure all financial calculations and inventory deductions are completely accurate.

Deployment & Feedback: Allowing a select group of meat vendors to test the system in a simulated market environment and implementing their feedback for the final release.

System Requirements Specification

This section outlines the minimum hardware and software tools necessary to both develop the "Karnetory" system and deploy it for the end-users.

A. Development Requirements

These are the specifications of the machine and the tools used by the researchers to code, design, and build the software.

Hardware: Intel Core i5 / AMD Ryzen 5 (or higher) processor, minimum of 8GB RAM, and 256GB SSD storage.

Software: Integrated Development Environment (IDE): Microsoft Visual Studio

Programming Language: C# utilizing the .NET Framework

Database Management System: MySQL Server

Database Administration Tool: MySQL Workbench

B. Deployment Requirements

These are the minimum specifications required for the meat retailers in Kabacan to smoothly run the "Karnetory" application at their market stalls.

Hardware: A standard Windows Laptop or Desktop PC with a minimum Intel Celeron or Core i3 processor, 4GB RAM, and 500MB of available disk space.

Software: Windows 10 or Windows 11 (64-bit) Operating System with the .NET Runtime installed, and a local MySQL Server installation.

System Architecture and Design

The application utilizes a Client-Server Architecture designed for localized desktop deployment.

The Client (Front-end) is the graphical user interface built with C#, where the meat vendor inputs sales, views inventory, and manages records.

The Server (Back-end) is powered by MySQL, which securely stores and processes the data tables (e.g., Products, Sales History, Employees) locally on the vendor's machine.

To visually represent how data moves through the system, the researchers utilized:

Use Case Diagrams to illustrate the interaction between the user (the Meat Retailer) and the system's features.

Data Flow Diagrams (DFD) to map how inputting a sale updates the total daily revenue and deducts from the digital inventory.

Entity-Relationship Diagrams (ERD) to structure the relational database within MySQL.



Figure 1. Login Interface



Figure 2. Section for Sales



Figure 3. Salary User Interface



Figure 4. Profit User Interface



Figure 5. Tax User Interface

Software Testing and Evaluation Instrument

To determine the success and acceptability of "Karnetory," the system will be evaluated using the ISO/I-

EC 25010 Software Quality Evaluation Standard. The evaluation will be divided between two groups of respondents:

IT/Computer Engineering Experts: Evaluators will assess the technical aspects of the software, specifically focusing on:

Functional Suitability: The accuracy of the system's calculations and operations.

Performance Efficiency: The response time and resource utilization of the application.

Reliability: The system's ability to prevent data loss and handle errors without crashing.

End-Users (Meat Retailers in Kabacan): Evaluators will assess the practical business aspects:

Usability: How easily the vendors can learn, operate, and understand the user interface during busy market hours.

A structured survey questionnaire utilizing a 5-point Likert Scale (ranging from 1 - Strongly Disagree to 5 - Strongly Agree) will be distributed to both groups of respondents after testing the application.

I. Functional Suitability

(The degree to which the software provides functions that meet stated and implied needs.)

1. The system accurately computes mathematical data such as daily sales, capital, and employee salaries without errors. [5] [4] [3] [2] [1]

2. The MySQL database correctly deducts from the digital inventory in real-time when a sale is inputted. [5] [4] [3] [2] [1]

3. The software securely saves and retrieves historical transaction data and daily revenue reports. [5] [4] [3] [2] [1]

II. Performance Efficiency

(The performance relative to the amount of resources used under stated conditions.)

4. The C# desktop application loads quickly upon startup without freezing. [5] [4] [3] [2] [1]

5. The system processes database queries (saving, editing, deleting records) with minimal delay or lag. [5] [4] [3] [2] [1]

6. The software operates smoothly on a standard desktop/laptop without consuming excessive computer memory (RAM). [5] [4] [3] [2] [1]

III. Reliability

(The degree to which a system performs specified functions under specified conditions for a specified period of time.)

7. The application is stable and does not suddenly crash during data entry. [5] [4] [3] [2] [1]

8. The system prevents the user from entering invalid data (e.g., inputting letters instead of numbers for meat weight). [5] [4] [3] [2] [1]

9. The database maintains data integrity; no records are lost when the application is closed and reopened. [5] [4] [3] [2] [1]

B.

I. Usability & Learnability

(How easy it is to learn and use the software for daily business.)

1. The application is easy to understand, even for someone who does not use computers often. [5] [4] [3] [2] [1]
2. I can easily find the buttons I need to record a sale or check my remaining meat inventory. [5] [4] [3] [2] [1]
3. It takes very little time to learn how to use this software. [5] [4] [3] [2] [1]

II. Operability & Efficiency

(How well the software performs compared to traditional methods.)

4. Inputting my meat sales into the app is faster than writing it down in a notebook and using a calculator. [5] [4] [3] [2] [1]
5. The text, numbers, and buttons on the screen are large, clear, and easy to read. [5] [4] [3] [2] [1]
6. The software makes it much easier to track my exact daily profit and missing inventory. [5] [4] [3] [2] [1]
7. I would prefer to use this "Karnetory" software over my traditional pen-and-paper method for my daily business. [5] [4] [3] [2] [1]

Table 1. Survey Instrument for Application Evaluation

Statistical Treatment of Data

The data gathered from the ISO/IEC 25010 evaluation questionnaires will be tallied and analyzed using the Weighted Mean. This statistical tool will determine the overall acceptability, usability, and effectiveness of the "Karnetory" application from both the technical and end-user perspectives.

RESULTS AND DISCUSSIONS

This chapter presents the finalized features of the developed software, the results of the ISO/IEC 25010 software quality evaluation, and the interpretation of the data gathered from both IT experts and local meat retailers in Kabacan.

Presentation of the Developed Software: "Karnetory"

The development phase successfully translated the manual, pen-and-paper financial methods of meat retailers into a fully functional desktop application titled "Karnetory: Meat Your Profit." Built using C# and supported by a local MySQL database, the system operates with a Client-Server architecture tailored for offline, stall-based use.

The software encompasses the following core modules:

- **Point of Sale (POS) Module:** A streamlined, user-friendly interface designed with large text and buttons, allowing vendors to quickly input meat cuts and exact weights. The system automatically calculates the total price, eliminating the need for manual calculator computations.
- **Real-Time Inventory Module:** Seamlessly integrated with the POS, this module automatically deducts the exact kilogram of meat sold from the database. It prevents over-selling and provides vendors with an instant view of their remaining stock.

- Financial and Reporting Module:** The system successfully replaces handwritten ledgers by securely logging every transaction. It features automated daily sales summaries, employee salary computations, and basic tax record generation, allowing vendors to view their exact daily profit margins at a glance.

Results of the Software Evaluation

The system was evaluated using the ISO/IEC 25010 Software Quality Evaluation Standard. Responses were measured using a 5-point Likert scale, interpreted as follows: 4.21 - 5.00 (Strongly Agree / Highly Acceptable); 3.41 - 4.20 (Agree / Acceptable); 2.61 - 3.40 (Neutral / Moderately Acceptable); 1.81 - 2.60 (Disagree / Less Acceptable); 1.00 - 1.80 (Strongly Disagree / Not Acceptable).

A. Evaluation by IT and Computer Engineering Experts

The technical performance of the application was assessed by IT professionals to ensure system integrity, accurate calculations, and database security.

Table 2. Summary of IT Expert Evaluation

Evaluation Criteria	Weighted Mean	Interpretation
1. Functional Suitability (Accuracy of calculations and data processing)	4.85	Highly Acceptable
2. Performance Efficiency (Loading time and minimal lag)	4.70	Highly Acceptable
3. Reliability (System stability and crash prevention)	4.80	Highly Acceptable
Overall Mean	4.78	Highly Acceptable

Table 2 illustrates that the IT experts found the system to be highly technically sound. The highest rating in Functional Suitability (4.85) proves that the C# algorithms and MySQL database integrations accurately compute complex financial data without errors.

B. Evaluation by End-Users (Meat Retailers)

The practical business application and usability of "Karnetory" were evaluated by the target end-users—the meat vendors operating in the Kabacan public market.

Table 3. Summary of End-User Evaluation

Evaluation Criteria	Weighted Mean	Interpretation
1. Usability & Learnability (Ease of learning and navigation)	4.82	Highly Acceptable
2. Operability & Efficiency (Speed of use compared to manual methods)	4.90	Highly Acceptable
Overall Mean	4.86	Highly Acceptable

Discussion of Findings and User Feedback

The evaluation results indicate an overwhelmingly positive reception of the "Karnetory" software. The high rating from IT Experts (4.78) validates the robustness of the system architecture, confirming that it can safely handle daily market transactions without data loss or crashes.

Most notably, the End-User evaluation resulted in an exceptional overall mean of 4.86. The vendors gave the highest possible marks to the system's Operability & Efficiency (4.90). During the evaluation, the meat retailers explicitly expressed that inputting sales into the application was significantly faster and less stressful than their traditional method of using a notebook and calculator.

Furthermore, qualitative feedback gathered during the testing phase revealed a strong willingness among the vendors to integrate the software into their daily operations. The users highlighted that the automated daily profit calculation provided them with a sense of financial security that manual bookkeeping could not offer. The vendors confirmed that the user interface was highly intuitive, allowing them to process transactions quickly even during peak market hours. Ultimately, the data proves that transitioning to "Karnetory" is not only technologically feasible but highly desired by the local market sector to safeguard their daily margins.

CONCLUSION

This chapter highlights the synthesis of the study, the final conclusions drawn from the evaluation of the "Karnetory" software, and the recommendations provided for the future improvement of the system.

Summary of Findings

The main objective of this study was to develop and evaluate "Karnetory: Meat Your Profit," a desktop-based sales tracking and financial management software built with C# and MySQL, designed specifically to replace the manual, pen-and-paper bookkeeping methods of meat retailers in Kabacan, North Cotabato.

The software was evaluated using the ISO/IEC 25010 Software Quality Evaluation Standard by two distinct groups: IT experts and the local meat retailers themselves. The findings are summarized as follows:

1. **Technical Performance:** The IT and computer engineering experts rated the software as "Highly Acceptable" (Overall Mean: 4.78). The system successfully demonstrated accurate financial calculations, secure database deductions for inventory, and stable performance without crashing during simulated high-volume transactions.
2. **End-User Acceptability:** The meat retailers rated the software as "Highly Acceptable" (Overall Mean: 4.86). The respondents indicated that the application was highly intuitive and significantly faster to operate than traditional calculators and notebooks.
3. **Market Adoption:** Qualitative feedback from the vendors showed a strong eagerness to utilize the application on a daily basis, citing the automated daily profit and inventory tracking as major improvements for their financial security.

Conclusion

Based on the gathered data and the successful deployment of the software, the researchers conclude that the "Karnetory" application is a highly effective, robust, and user-friendly digital solution for micro and small enterprises handling perishable goods. The system completely fulfills its objective of providing a faster, more accurate, and more reliable alternative to manual financial methods.

By shifting from handwritten ledgers to an automated, app-based Point of Sale (POS) and inventory tracker, local meat retailers in Kabacan can successfully eliminate human errors in pricing, avoid unrecorded stock spoilage, and securely manage their daily revenue. Ultimately, the study proves that traditional market vendors are not only capable of adapting to modern digital management tools but are highly willing to integrate them when the software is tailored specifically to their daily operational needs.

Recommendations

In light of the conclusions drawn, the researchers propose the following recommendations to further enhance the system and its implementation:

1. **For the Meat Retailers:** It is highly recommended that local vendors fully transition to using the "Karnetory" software for their daily operations to safeguard their profit margins. Vendors should also consider performing weekly backups of their local MySQL database to an external flash drive to ensure long-term data preservation.
2. **For the Local Government / Market Administrators:** Market administrators could facilitate basic digital literacy seminars to introduce localized digital solutions like "Karnetory," helping more market stall owners transition smoothly from traditional to digital bookkeeping.
3. **For Future Researchers and Computer Engineering Students:** Future computer engineering students can utilize "Karnetory" as a foundational architecture for further innovation. Recommendations for system expansion include:
 - Cloud Integration: Upgrading the local MySQL database to a cloud-based server (such as AWS or Firebase) so business owners can remotely monitor their market stall's live sales from a mobile device at home.
 - Hardware Integration: Adding support for peripheral devices, such as digital weighing scales that automatically send the exact meat weight directly to the C# application via Bluetooth or USB, and thermal receipt printers for customer invoicing.
 - Data Analytics: Developing a forecasting module that analyzes past sales data to predict which exact cuts of meat will have the highest demand during specific seasons or holidays.

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