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| RESEARCH ARTICLE

CRM Extensions for Retail Fuel Industry in USA Accounting: Efficiency Gains and ROI

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| ABSTRACT

The retail fuel segment of the downstream fuel industry relies heavily on timely and accurate financial reporting, yet traditional workflows remain dependent on manual data collection, spreadsheet-based consolidation, and week-long bookkeeping cycles. This paper presents a custom-built retail in-house accounting system, developed as the companion framework to the previously published research "CRM Extensions for Wholesale Jobbers in USA Operations: Efficiency Gains and ROI". While the wholesale CRM system automated dispatch, pricing, supplier reconciliation, and invoicing, the retail accounting system addresses the equally complex challenge of integrating C-store sales data, fuel inventory, credit card settlements, cash summaries, paid-outs, and merchandising transactions into a unified platform capable of directly posting journal entries to QuickBooks Online (QBO).Built on the same web application and SQL database architecture as the wholesale CRM, the system utilizes API integrations, FTP ingestion, CSV automation scripts, and audit-tracked workflows to eliminate multi-team data collection and manual spreadsheet preparation. Core modules include monthly sales summaries, credit card settlement reconciliation, cash management, expense tracking, station-level inventory, EFT and batch summaries, and a suite of profitability dashboards. Together, these modules reduce manual workload, accelerate month-end close, improve cash visibility, and ensure complete accuracy by removing manual entry errors.The retail system further leverages data already generated in the wholesale CRM such as fuel delivery records, EFTs, and inventory data creating a seamless wholesale-to-retail integration layer where wholesale sales become automated retail purchase entries. Emerging AI applications, including sales forecasting using decision tree and random forest models, computer vision for receipt scanning, and future NLP-based incident log automation, position the system for next-generation operational intelligence. This research demonstrates how combining wholesale CRM automation with integrated retail accounting capabilities forms a unified financial backbone for fuel enterprises, enabling faster reporting, higher accuracy, and stronger data-driven decision-making across the entire rack-to-retail value chain.

| KEYWORDS

CRM automation, wholesales-to-retail integration, ROI, month-end close, accounting system, financial backbone

| ARTICLE INFORMATION

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1. Introduction

The downstream fuel industry particularly the C-store and retail fuel segment faces significant operational complexity during financial close cycles. Retail operators must consolidate data from multiple heterogeneous sources, including C-store back-office systems, fuel purchase records, credit card processors, cash management logs, paid-outs, merchandising transactions, and inventory adjustments. Traditionally, this information is gathered manually across various teams, compiled into spreadsheets, and eventually submitted to accounting departments for review. These workflows introduce delays, produce inconsistent data quality, and extend the month-end financial reporting timeline, ultimately affecting owners' visibility into profitability and cash flow.

This paper builds upon the prior research "CRM Extensions for Wholesale Jobbers in USA Operations: Efficiency Gains and ROI," which presented a unified CRM system to streamline dispatch, pricing, invoicing, and supplier reconciliation for wholesale fuel distributors. In retail operations often owned by the same enterprise wholesale fuel sales become retail fuel purchases. The wholesale CRM therefore contains data that serves as foundational input for retail accounting, including fuel receipts, EFTs, and inventory details. Leveraging a shared web application and SQL database, the retail system described herein extends the same architectural principles to automate the C-store and retail accounting workflow.

The proposed retail accounting system integrates directly with C-store back offices, credit card settlement providers, cash management tools, and merchandise systems through APIs, FTP ingestion, and CSV imports, while posting journal entries automatically into QuickBooks Online (QBO). By removing manual spreadsheet preparation and data entry, the system significantly reduces processing time, improves accuracy, enhances cash visibility, and enables faster financial reporting. Furthermore, the system provides a foundation for deploying advanced analytics and machine learning models such as sales forecasting, anomaly detection, and computer vision assisted document processing to deliver future intelligence across retail operations.

This paper examines the architecture, functional modules, integration design, efficiency gains, and ROI potential of a fully automated retail accounting platform, while demonstrating how unified wholesale-to-retail systems create a continuous digital thread across the rack-to-retail value chain.

2. Literature Review

2.1 Accounting automation in retail operations

Automation in financial accounting has gained increasing attention as businesses move from spreadsheet-driven workflows to integrated data pipelines. Scholars such as Valker, Clarence A. (1967) highlight that automation not only reduces human error but also enhances transparency and auditability in small business accounting environments. Their findings suggest that integrating retail transaction systems directly with financial platforms like QuickBooks or Xero can reduce reporting latency and strengthen financial governance. [1]

2.2 API-driven financial systems in small and mid-sized enterprises

The fuel retail and oil & gas (O&G) industry is recognizing the importance of loyalty & CRM analytics. A case by Accenture/BP describes that by implementing a new CRM model powered by analytics, BP deepened its understanding of customer behavior and improved its competitive edge in its fuels and convenience retail business.[5]

Similarly, Salesforce offers CRM solutions tailored to the energy and utilities sector that unify data and automate processes to improve stakeholder engagement and field operations. [6]

Although these are mostly vantage-point or marketing statements, they do indicate the market's recognition that CRM is relevant in fuel operations.

2.3 Digital transformation in fuel and C-store retailing

A recent study, *Leveraging Business Analytics to Optimize Fuel and Retail Sales in Gas Station C-Stores* (Warren et al., 2025), explores how analytics applied to fuel and in-store retail sales (via POS systems, loyalty programs, inventory systems) can optimize pricing, inventory, demand forecasting, and targeted marketing campaigns.[2]

Another relevant domain is operational efficiency via data analytics in retail supply chains: for example, a 2025 paper shows how historical demand, machine learning models, and inventory optimization can reduce costs and improve service levels.[3]

In the fuel domain, McKinsey's article *Unlocking value with AI in the rack-to-retail fuel market* argues that granular micro-market trends (at rack hubs) and AI can improve margins, logistics decisions, and supply planning.[4]

These works indirectly support the notion that domain-specific CRM + analytics synergy can deliver real business value.

2.4 Role of integrated wholesale–retail data pipelines

Integrated wholesale - retail data pipelines are essential for ensuring accurate financial reporting and operational alignment across fuel distribution and C-store operations. Research shows that fragmented CRM, POS, and accounting systems create delays, reconciliation errors, and inconsistent margin calculations (Meyer & Kolbe, 2005). By synchronizing wholesale dispatch data, BOLs, EFTs, and fuel purchase records directly into retail accounting workflows, organizations significantly reduce manual workloads and shorten month-end close cycles benefits strongly supported by accounting automation studies (Corbett, 2024; Journal of Accountancy, 2025).[8] [9]

This unified data flow also improves auditability, enhances inventory and COGS accuracy, and enables advanced analytics capabilities such as AI-driven forecasting and anomaly detection (Bedford, 2025; Kholod et al., 2024). Thus, integrating wholesale and retail systems establishes a real-time, end-to-end financial backbone that supports faster decisions and strengthens overall operational control [10] [11].

2.5 Research Gap and Contribution

Although there is increasing interest in modernizing fuel and C-store operations, the existing research remains limited in several important ways. Most publications focus on broad themes such as CRM adoption, accounting automation, or analytics within retail environments. These works acknowledge that digital tools can reduce errors and improve decision-making, but they do not explain how wholesale operational data can be directly integrated with retail accounting workflows. In current practice, wholesale dispatch information, BOLs, supplier EFTs, and fuel purchase details are usually handled separately from C-store sales, POS reports, cash logs, and merchandising transactions. As a result, companies continue to depend on spreadsheets, manual reconciliation, and multi-team handoffs during the month-end closing process.

The literature also lacks discussion on how a shared database or unified architecture could streamline both wholesale and retail functions within the same organization. Most fuel operators treat these as independent systems, which creates delays, data inconsistencies, and difficulty maintaining accurate COGS and margin calculations. Existing studies on analytics, forecasting, or AI tend to examine these technologies as stand-alone solutions rather than components of an integrated financial system. There is very little guidance on how machine learning, computer vision, or automated data ingestion can be applied to a complete fuel sales and accounting pipeline.

This paper addresses these gaps by presenting a retail accounting system designed to operate on the same web application and SQL database as an established wholesale CRM platform. The research contributes the following:

A. A practical wholesale-to-retail data pipeline that automatically converts wholesale deliveries into retail purchases, enabling consistent and reliable fuel cost and inventory records.

B. A retail accounting framework that combines API connections, FTP imports, CSV automation, and audit logging to replace spreadsheet-based workflows.

C. Evidence that these integrations reduce manual effort, shorten the month-end closing cycle, improve cash visibility, and eliminate common data-entry errors when posting to QuickBooks Online.

D. A description of how machine learning models, computer vision, and future NLP capabilities can enhance both retail and wholesale processes within the same system.

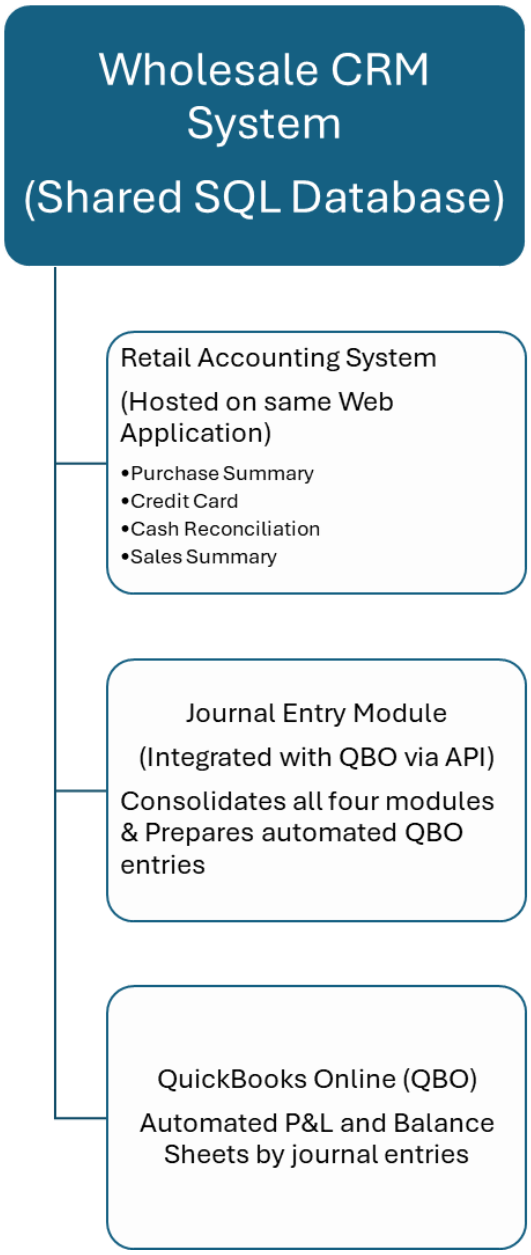
E. A unified financial and operational model that links dispatch, pricing, supplier reconciliation, C-store sales, cash management, and accounting into one consistent platform.

3. System Architecture & Core Functions

Table 3.1 - Below is a proposed architecture of how CRM should be extended and integrated in retail fuel accounting, with mapping of modules, data flows, and value levers.

Extension Module	Function / Use Case	Inputs & Data Sources	Key Outcome
Purchase summary	Utilizes wholesale CRM data to automatically generate the retail purchase records. Wholesale fuel sold to the retail division is treated as retail inventory purchased for the month.	Shared CRM database containing wholesale sales data, BOLs, and delivery records.	Eliminates manual entry of fuel purchases, improves accuracy, and provides timely purchase reconciliation across both systems.
Sales Summary	Computes monthly fuel and merchandise sales using automated imports from C-store back-office systems or uploaded CSV files.	API integrations with systems such as Petrosoft or Petromo, or CSV uploads when API is unavailable.	Reduces reliance on store managers, increases accuracy of reported sales, and accelerates month-end reporting.
Credit Card Fees	Processes credit-card settlement files by extracting fee information from PDF emails (Fuelman/Fleetcor) or CSV reports (Valero).	PDF attachments received through email, CSV settlement reports, mailbox integration for automated parsing.	Provides immediate fee calculations for each retail site, removes manual data entry, and ensures timely fee reconciliation.
Cash Reconcilation	Automates retrieval of ATM cash data, safe drops, and paid-out transactions from C-store systems.	Back-office systems such as Petromo or Petrosoft through API connections.	Reduces manual gathering of cash-related data, improves accuracy in cash flow tracking, and increases operational efficiency.
Journal Entry Module	Consolidates data from purchases, sales, credit-card fees, and cash activity to prepare automated journal entries for posting into QuickBooks Online.	Aggregated data from all modules; accommodates any exceptional manual entries when needed.	Directly posts structured journal entries to QBO, enabling automated P&L and balance-sheet generation with significantly reduced processing time.
Audit trail	Maintains a detailed record of all system updates, user actions, and data modifications with role-based access control.	Internal system database tracking user activity and time-stamped changes.	Enhances accountability, supports compliance needs, and ensures traceability of all edits throughout the accounting process.++

Figure 1 (conceptual): Retail CRM workflow diagram



3.1 Data ingestion components and efficiency gains

From the above modules, the key efficiency gains derive from:

1. **Wholesale CRM Data Ingestion**

   The first ingestion path uses the existing wholesale CRM database as a trusted source of truth for fuel movement. Sales from the wholesale system to company-operated retail locations are ingested as purchase records for the retail accounting system. This includes data such as BOL details, delivered quantities, prices, and EFT-related payment information. Because both systems share the same SQL database, no external file transfer is required, and the retail purchase module can query the required data directly with controlled views.

2. **C-store Back-Office and POS Integration**

   Retail fuel and in-store sales data are ingested primarily through integrations with C-store back-office systems such as Petrosoft or Petromo. Where available, REST APIs are used to pull summarized daily or monthly reports covering fuel sales,

merchandise sales, lottery, and other categories. In cases where APIs are not yet supported or only partially available, the system provides a structured CSV upload mechanism with validation rules. This ingestion path feeds the Sales Summary, Station Inventory, and Expense modules**.**

3. Email and File-Based Settlement Ingestion

Credit card fees and settlement information are obtained from providers such as Fuelman, Fleetcor, and Valero. The system connects to designated mailboxes to retrieve PDF statements, applies parsing logic to extract fee and volume details, and also supports direct CSV file imports for settlement data. This component feeds the Credit Card Fees module and ensures that transaction fees per site are captured without manual keying.

4. Integration with QuickBooks Online

Cash-related data, including ATM withdrawals, safe drops, and paid-outs, are ingested through API connections to the C-store back-office where such endpoints are available. The integration normalizes these records into a common schema so that the Cash Reconciliation module can compute net cash positions for each station and period.

5. Consolidation for Journal Entry Preparation

All ingestion components write into structured tables within the shared database. The Journal Entry module then reads from these tables, applies mapping rules and account codes, and prepares balanced entries for direct posting into QuickBooks Online using QBO's API. This approach ensures that every journal entry can be traced back to its original source, supporting both auditability and error investigation.

5. ROI Framework & Quantitative Impact

This section evaluates the measurable gains achieved through the implementation of the retail accounting system. The analysis considers process efficiency, error reduction, labor savings, and operational cost avoidance. The ROI framework compares pre-implementation conditions with post-implementation outcomes to quantify the system's financial and operational impact across retail sites.

Table 5.1 - ROI model (estimation)

Category	**Before System**	**After System**	**Annual Hours Saved**	**Cost Value (USD)**
Data Collection (per site)	8 hrs/month	1 hr/month	7 hrs × 10 sites × 12 months = 840 hrs	$23,520
Reconciliation (per site)	10 hrs/month	3 hrs/month	7 hrs × 10 sites × 12 months = 840 hrs	$37,800
QBO Journal Entries (per site)	6 hrs/month	1 hr/month	5 hrs × 10 sites × 12 months = 600 hrs	$27,000

Error Reduction & Cost Avoidance	High discrepancies	Significantly reduced	—	$60,000
Total Annual Savings	—	—	2,280 hrs/year	$148,320

Table 5.2 - Implementation Cost and ROI (estimation)

Component	**Amount (USD)**	**Notes**
System Development Cost	$42,500	Internal development (500 hrs × $85/hr)
Deployment, Testing, Hosting	$7,500	Infrastructure and enhancements
Total Implementation Cost	$50,000	—
Total Annual Savings	$148,320	From automated workflows
ROI (%)	196.64%	Based on annual savings vs. cost
Payback Period	4.04 months	$50,000 / $12,360 monthly savings

6. AI and Automation Opportunities

The architecture of the retail accounting system creates several opportunities for applying artificial intelligence and advanced automation. Because the system centralizes wholesale and retail financial data in a single environment, it provides a strong foundation for predictive modeling, automated document processing, anomaly detection, and future NLP-based analysis. These capabilities can further enhance accuracy, reduce labor effort, and support more informed decision-making across both operational and accounting workflows.

6.1 ML forecasting for C-store sales (Decision Trees, Random Forests)

The availability of structured, month-over-month sales data enables the application of supervised machine learning models such as Decision Trees and Random Forests. These models can forecast store-level fuel and merchandise sales by incorporating historical trends, seasonal behavior, weather variations, pricing patterns, and local demand signals. Predictive forecasts can support procurement planning, inventory control, labor scheduling, and margin optimization.

6.2 Computer vision for receipt scanning and document understanding

Retail operations depend heavily on paper-based or PDF documents, including vendor receipts, paid-out slips, settlement reports, and store-level expense proofs. Computer vision models can automate document intake by identifying key fields such as dates, amounts, categories, and store identifiers. By integrating OCR with deep learning classifiers, the system can reduce manual data entry and ensure accurate categorization of expenses for journal entry preparation.

6.3 Anomaly detection in financial and POS data

The unified dataset of purchases, sales, cash logs, credit card settlements, and inventory provides a rich source for anomaly detection. Statistical and machine learning techniques can flag unusual variances such as sudden drops in inventory, unexpected cash shortages, abnormal credit card fee ratios, or discrepancies between wholesale deliveries and retail sales. Early detection of these irregularities can reduce losses, strengthen internal controls, and support audit readiness.

6.4 Unified AI platform across wholesale + retail systems

Since both the wholesale CRM and the retail accounting system operate on the same database and web application, they form a consistent environment for deploying cross-functional AI solutions. A unified AI platform can leverage data from dispatch, pricing, inventory, deliveries, sales, cash activity, and financial results. This integration enables broader use cases such as end-to-end margin prediction, supply-chain optimization, pricing recommendations, and fully automated month-end close scenarios. The shared architecture ensures that models trained on one part of the operation can easily be extended to the other.

7. Challenges & Implementation Considerations

Although the retail accounting system delivers significant efficiency gains, several practical challenges must be considered during implementation. These challenges relate to data variability, operational adoption, and the complexity of integrating multiple systems across retail networks. Understanding these factors is essential for ensuring stable performance, reliable outputs, and long-term scalability.

7.1 diverse back-office providers

Retail fuel operations often rely on multiple back-office and POS systems, each with different data formats, reporting structures, and API capabilities. Some providers support full API access, while others only offer CSV exports or partial integration. These differences require flexible ingestion pipelines, customized mapping layers, and standardized validation rules to ensure that sales, inventory, and cash data can be processed consistently across all sites. Managing these variations is a key consideration when deploying the system across locations with differing technologies.

7.2 Ensuring data accuracy across multi-source imports

The system collects data from wholesale dispatch records, C-store systems, settlement files, and cash logs. Each source may update at different intervals or use different formatting conventions, which can create inconsistencies if not properly managed. To ensure accuracy, the system requires reconciliation checks, timestamp validation, duplicate detection, and clear handling of missing or late data. Maintaining data integrity across all ingestion points is essential for producing reliable journal entries and accurate financial statements.

7.3 User adoption for retail store managers

Store managers and bookkeepers are accustomed to manual workflows and spreadsheet driven reporting. Transitioning to an automated system may require training, operational adjustments, and clear communication of the system's benefits. Adoption can be influenced by factors such as comfort with technology, perceived changes in responsibility, and trust in automated outputs. Providing training sessions, user guides, and responsive support can help ease the transition and encourage consistent usage across all sites.

7.4 Scalability forIntegrating multi-store operators

As operators expand to additional retail sites, the system must scale to handle higher data volumes, increased transaction complexity, and varying operational practices across locations. Scalability considerations include database performance, ingestion throughput, error-handling capacity, and the ability to support different vendor configurations. The architecture must remain flexible enough to onboard new locations with minimal customization, ensuring that the benefits of automation extend smoothly across both current and future store networks.

8. Conclusion

This study examined the design and implementation of an integrated retail accounting system built on the same architecture as an existing wholesale CRM platform. The findings show that unifying wholesale and retail financial data creates a more reliable, efficient, and timely accounting workflow for fuel and C-store operators. By automating data ingestion from wholesale deliveries, C-store back-office systems, settlement providers, and cash logs, the system removes the manual steps that traditionally slowed month-end closing and increased the risk of calculation errors.

The retail accounting system enhances operational accuracy through structured imports, validation rules, and centralized reconciliation. Its direct connection to QuickBooks Online supports automated journal posting and consistent financial reporting across all retail sites. The ROI analysis demonstrates that the system produces substantial recurring value, with significant labor savings, reduced discrepancies, and a short payback period for multi-store operators.

Beyond efficiency, the shared database and unified workflow create a foundation for future AI applications, including forecasting models, computer vision for document processing, anomaly detection, and eventual NLP-based interpretation of shift notes. These capabilities position the system not only as an accounting tool but as an evolving intelligence layer for both wholesale and retail operations.

Overall, the research highlights the practical benefits of integrating wholesale CRM and retail accounting functions within a single platform. The resulting financial backbone strengthens data integrity, improves managerial visibility, and supports scalable growth for fuel enterprises seeking to modernize their operational and financial processes.

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