DEVELOPMENT OF A SOFTWARE TOOL FOR ORDER AND INVENTORY MANAGEMENT FOR SMALL BUSINESSES

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Анотація. У роботі розглянуто проблему ведення обліку замовлень і складських залишків у малому бізнесі, де часто застосовуються електронні таблиці та ручне внесення даних. Це підвищує ризик помилок користувача, ускладнює контроль постачань і актуальних залишків, а також уповільнює обробку замовлень. Метою дослідження є проєктування та реалізація інформаційної системи, що автоматизує облік замовлень, постачань і руху товарів на складі. Запропоновано підхід на основі централізованої бази даних та бізнес-правил для забезпечення цілісності операцій зі складом. Реалізовано основні функції: керування номенклатурою, формування замовлень, опрацювання постачань, контроль залишків, звітність та аудит дій. Результати тестування підтверджують коректність обліку руху товарів і зменшення частки ручних операцій при типових сценаріях роботи.

Abstract. Small businesses frequently manage orders and stock using spreadsheets and manual workflows, increasing the likelihood of user errors and weakening operational control. This paper presents the design and implementation of an information system to automate order processing, supply registration, and real-time inventory tracking. The proposed solution relies on a centralised database and explicit business rules to ensure consistent accounting of stock movements and document states. The software supports product catalogue management, customer orders, inbound deliveries, warehouse balances, reporting, and user activity auditing. Role-based access control is applied to separate responsibilities between management and warehouse staff. Functional and scenario-based testing demonstrates correct handling of typical inventory operations and a reduction in routine manual actions.

Keywords: small business automation; order management; inventory control; warehouse accounting; information system; database-backed applications; role-based access control.

1. Introduction

Automation of operational processes is a practical requirement for small businesses handling tangible goods and maintaining accurate warehouse balances. In many organisations, order processing and inventory tracking remain semi-formal: data are distributed across spreadsheets, paper notes, or messenger threads. Such practices lead to duplicated entries, delayed updates, inconsistent stock figures, and avoidable losses due to stock-outs or overstocking. A dedicated information system can replace fragmented tools with a single source of truth and deterministic business logic.

2. Aim and objectives

The aim of the work is to design and implement an information system that automates order accounting, supply tracking, and product balance management in a warehouse, reduces manual operations, and minimises user-induced errors. The objectives include workflow analysis, requirements definition, data model and business rule design, implementation of core modules (catalogue, orders, supplies, reporting), and verification through representative operational scenarios.

3. System design and methods

The system is designed as an application with a persistent data layer and a set of services implementing business logic. The approach emphasises centralised data storage to avoid inconsistencies between files and devices, transactional processing for warehouse operations to maintain balance integrity, document-based accounting with explicit states and traceable changes, and access control to restrict sensitive operations and reduce accidental modifications.

A relational database model represents products, warehouse balances, business partners, documents (orders and deliveries), and line items. Constraints and validation rules are enforced at both the data and application levels, including identifier uniqueness, mandatory document attributes, and preventing invalid stock transitions.

4. Implementation features

The software tool supports product catalogue management, customer orders with a controlled lifecycle, inbound delivery registration with automatic stock updates, inventory balance monitoring (including shortage-prevention policies), and operational reporting with user-activity auditing. To reduce user mistakes, the interface enforces input validation, catalogue-based selections, and clear feedback on document states, prioritising fast data entry and predictable workflows.

5. Testing and results

Verification was performed using functional tests and scenario-based checks that reflect typical small business processes: creating orders, registering deliveries, updating stock balances, and generating reports. Boundary cases included duplicate entries, partial deliveries, and attempts to complete an operation with insufficient stock. The tests confirm that balances are updated consistently after validated operations and remain coherent across repeated scenarios, reducing routine manual actions compared to spreadsheet-based accounting.

6. Conclusions and future work

The developed system integrates centralised storage, explicit business rules, document lifecycle management, and access control to automate order and warehouse accounting for small businesses and minimise user errors. Future work may include integration with accounting software, barcode and QR code support, replenishment-planning analytics, and a mobile client for warehouse staff.