PRJ566 NBB - Inventory Management - Group 4
AI-Driven Inventory for small businesses - Smart Stock

Executive Summary

Small-scale restaurants operate on thin margins, often trapped between inefficient paper tracking and expensive enterprise software they can't afford. This lack of sophisticated tools leads to two critical failures being excessive capital lost to food waste, missing stock and missed revenue due to the missed stock.

Smart Stock solves this by making an accessible supply chain intelligence. We provide a lightweight, cloud-native web application that replaces manual guesswork with AI-driven precision. Our system analyzes data such as ingredients, menu and most sold to predict demand and how much of an ingredient that needs to be bought. Our system also includes a Smart Sourcing module that finds best prices from local vendors in real time. By eliminating hardware costs via a BYOD (Bring your own device) model, we evolve inventory management from a labor-intensive chore that requires a dedicated staff into an AI-assisted strategic asset, ensuring startups only buy what they need at the best possible price.

Smart Stock provides small restaurants and startups with enterprise-grade predictive analytics and automated sourcing tools at a fraction of a cost, eliminating food waste and maximizing profits.

TEAM MEMBERS AND ROLES:
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- Ivan Castro - UI/UX Designer & Frontend Developer
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Project Overview & Background

This project aims to improve the daily operations of small scale companies such as local restaurants in regards to inventory management. Unlike big corporations where the ordering of products has a systematic approach due to collaboration of multiple companies to keep the system going, smaller companies have to manually order and handle the supplies.
In order to improve the situation our group has decided to create a solution for this issue while keeping in mind the limitations of those smaller companies. However before explaining the whole idea we first need to take a look at why we are doing this in the first place. No matter the amount of precision or attention to details we as humans always make mistakes as the sheets might get damaged or any other reason which can result to loss of the inventory counts.

However by inputting them into a well built system and having copies of the documents safely stored in different locations in daily/weekly basis we can prevent a lot of the issues from happening.

Further more to help with the process and make it even easier for employees and members of the company, we have thought of adding a touch of AI to the project which will be focused on making the data more understandable and process of ordering easier.

Problem Statement & Need

What is the specific problem or opportunity?

The problem that we are dealing with here is that small and newly established restaurants struggle to manage inventory efficiently because of its manual tracking method such as writing things down themselves, checking the shelves by eye and most of them rely on paper logs and spreadsheets which is a recipe for disaster and could lead to overstocking, food waste, stockouts, and unnecessary expenses.

At the same time, most advanced inventory management out there is designed for large restaurant chains, which makes them more expensive and are over complicated for a small business that is just starting.

We see this as an opportunity to create and develop a low-cost AI-assisted, smart, and easy to use inventory management that is designed and aimed specifically for these small restaurants and startups.

Who experiences it, and why is it important?

This problem is experienced mainly by the likes of small local restaurants, independent cafes, and startup food businesses. These businesses operate with less profit margins compared to a more structured business. Since they have limited staff and are owned by owners who manage everything themselves. As a result, poor inventory management can directly impact their ability to maximize profits or even stay profitable as a business.

These small mistakes as mentioned above could cause problems such as excess ingredient ordering, or running out of stock can really hurt these businesses especially the ones that are just starting out which could result in customer dissatisfaction, lost revenue, and food waste, which could definitely hurt a small business long-term.

Evidence or logic that supports this need (e.g., real-world examples, trends)

Food waste has caused a widespread issue in the industry, with a significant cause by inaccurate demand or over ordering. Imagine, a small independent cafe may order the same quantity of produce every week. This can have two consequences, on slower quiet weeks,

unused produce expire and are thrown out, and on busy weeks, the cafe could run out of important ingredients.

Another evidence that is obvious to us is that small businesses would not pay for an enterprise level inventory system and would rather resort to manual processes, which are vulnerable to mistakes and time consumption. Let's say a small restaurant manually counts the inventory after a long shift. If a staff member forgets to update or miscount items in the spreadsheet, the next order could be incorrect due to human error.

Lastly, the availability of AI tools allows an opportunity for us to deliver advanced analytics and forecasts at a much lower cost than what was possible before. Let's say that a new restaurant could adapt to a basic plan from other inventory systems to save money, the problem is that they still have to manage other features such purchasing decisions manually because some of these popular POS systems and inventory platforms require higher tier subscriptions to access important features that a business needs but are held back by the cost of it.

Objectives

Smart Stock aims to help small restaurants not just survive, but thrive in a challenging market by fundamentally transforming their inventory management. Currently, independent proprietors are bleeding capital through two major wounds: food waste and inefficient purchasing. The main objective of the project is to eliminate this financial leakage through the application of a machine learning engine that will analyze old sales data and accurately foresee future inventory requirements. Along with this, it will guarantee that no items will be disposed of since they have exceeded their shelf lives and no income will be lost due to shortages at the busiest times.

However, advanced technology is useless if it is too complex to operate. To bridge the technical knowledge gap, we are developing an AI driven Documentation Assistant based on Natural Language Processing (NLP). This eliminates the need for complex training manuals, users can simply ask the system questions in natural language and receive immediate answers. At the same time, we are improving the procurement process through a smart sourcing module that combines data from suppliers in different regions to discover the lowest prices. The integration of predictive intelligence and an accessible interface grants the smaller companies the same advantages as the large ones in terms of advanced analytics thus allowing them to access the strategic assets that were once only available to large enterprise chains.

Why This is a Substantial Two-Semester Project

This project requires more than one semester due to the complexity of the features being developed, which include machine learning integration, supplier data aggregation, reporting tools and a full web-based user interface.

In the first semester, the main focus will be on the planning and designing process about the implementation of core inventory functionalities such as real- time stock tracking, expiry alerts, and basic reporting to ensure the system meets the needs of non-technical users and small restaurants.

The second semester will be building on this foundation by integrating advanced capabilities, such as an intelligent chatbot to support non-technical users, supplier price comparison tools, and automated analytics and reporting. These features involve machine learning, natural language processing, data aggregation from multiple sources, and a fully responsive web-based interface, all of which require careful planning, development, testing and refinement. Ensuring the system remains affordable for small business while implementing automated intelligence features which increases the project's complexity, making it a two-semester project.