# An Agile Approach to the Sales and Inventory System for Company A

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**ABSTRACT**

Company A faces several challenges when it comes to recording all sales, managing their inventory which results in damaged shoes, inaccurate stock counts, and difficulty in locating their products from the warehouse. The goal of the study, therefore, is to develop a web-based Sales and Inventory System to manage sales and stock inventory data. The system provides an overview of the stock availability in the physical store and will track sales data that is accomplished through generated sales and inventory reports. In this study, the researchers used the Agile Method as their approach for their research design to allow and increase flexibility in the development of the system and reduce potential risks of changing requirements. The systems validity was evaluated based on ISO 25010 standard survey. The results from the survey were mostly positive on a scale of 1-5 with 5 being the highest: functional stability 5.0, reliability 4.0, and usability 4.83. The feedback from the client indicated that the system is able to provide and meet their requirements. With the use of a time and motion study, the researchers managed to cut down the existing business process from 10 minutes to 15 seconds with 4 minutes being the longest it took. The researchers provided the test case results wherein the clients were satisfied with the system. Based on this result, we can conclude that we were able to create a sales and inventory system and validate that it meets the requirements of Company A.

# 1      INTRODUCTION

Company A is a business that has been supplying footwear for army personnel, security guards, ROTC students, and both men and women for all occasions. They started their business making shoes by hand and now they sell their authentic outdoor footwear through their social media platforms like Facebook, Instagram, and Shopee. The researchers discovered that Company A had problems locating their products from storage, they also had a difficult time monitoring which batches their products come from, and they are unable to provide accurate stock counts in their warehouse.

Company A begins its business transaction by having customers order through their physical store or online social media platforms such as Shopee, Facebook, and Instagram. For online sales, the customer pays for the product/s then the transaction is recorded afterward by the manager into an Excel spreadsheet file. As for the physical store, there is no process for recording sales and inventory, the only data being tracked is the amount of sales made for the day.

The researchers concluded that the automation of business processes such as encoding, adding, and managing data will help expedite their current business process and provide accurate data. There are certain benefits that come from being able to see an overview of their sales and inventory data. This is so that the company can understand the behavior in the market so that they can make the necessary changes to adapt such as selling more of the trending products and phasing out products that are not selling well to the market. The researchers observed that other businesses in the industry adopt similar systems to adapt to current and emerging business needs and to remain in the competitive market.

# 2      REVIEW OF RELATED LITERATURE

Inventory is part of much of the working capital of small-scale enterprises, and the relationship between inventory management practices and business performance. Inventory management plays an important role in how efficient a business enterprise is and how competitive it is with other businesses, therefore a company needs to implement inventory management practices to improve its competitiveness. Part of the findings of this study concludes that there exists a relationship between the level of effectiveness in inventory management and business performance in small-scale enterprises, with effective inventory budgeting having the largest effect on business performance, followed by shelf-space management and then inventory levels management (Nyabwanga and Ojera, 2017). Inventory management helps companies identify which and how much stock to order at what time. It also helps track inventory from purchase to the sale of goods. The practice identifies and responds to trends to ensure there is always enough stock to fulfill customer orders and proper warning of a shortage (Jenkins, 2020).

A proper recording of sales lets the business owner know when inventory stock is running low, whether this should be reordered, if so, how much to purchase, and so on. Accurately recording a sale every time fundamentally eases this planning process with the aid of a sound inventory management system. It can help identify issues such as understocking and overstocking of items that can directly affect cash flow. In turn, this helps the business owner keep track of the profitability of a business and make decisions about the future of the business (Chan, 2019). Despite the fact that inventory control is one of the most ignored management areas in small businesses, it accounts for a significant portion of the entire budget. Due to poor inventory management or an inability to handle inventory properly, many small businesses have an excessive amount of cash locked up in an accumulation of goods that has been sitting for a long time. Cash flow of a company is directly impacted by poor inventory management since inventory is retained to fulfill needs meaning multiple techniques of inventory management should be used to align inventory supply with demand, depending on whether demand is dependent or independent (Chan, 2019).

Adopting a sales and inventory system is generally acknowledged as a progressive way to have a functional, efficient, and reliable business operation. This was demonstrated through the study by Peralta (2016) where a web-based system that incorporated the sales and inventory aspect was able to make things like ordering and recording transactions easier and more productive leading to an increase in business operation efficiency (Peralta, 2016). The proposed framework would help the business in a way it will be able to automate and file documents faster and more efficiently.

A web-based service management system that included inventory and sales was developed to operate correctly and properly manage business transactions and processes like monitoring inventory and earnings. This was crucial in the future development of the company as they were looking to expand outside of the existing branches. The researchers found this relevant as they also used web applications and development tools such as Apache to create the system (Selda, 2016). A web-based that has incorporated the sales and inventory aspect is acknowledged as a progressive way to have a functional, efficient, and reliable business operation. According to the respondents, customers, and owners of the chosen company, it was able to make things like ordering and recording transactions easier and more productive leading to an increase in business operation efficiency (Peralta, 2016).

A mobile Inventory Management System, businesses ranging from small to medium sizes are playing a crucial role in the development of the Philippines' economy. Their study focuses on a small business and the impact of an Inventory System to their company when implemented. This small business procures ingredients from various suppliers and is a beverage business based in the Philippines. They experience loss of sales because of overstocking and stockout. Eventually, with the overstocking problem, this small business made inaccurate business decisions and

inventory & sales reports. When introduced to the system, they were able to keep track and make the convenience of the system thereby increasing efficiency in their business operations (Margate, 2020). Computerized sales and inventory systems help firms save time by speeding up transactions while improving accuracy. This increases employee trust in accounting by making it simple to verify how many payments were made and when it occurred. A small pharmacy run solely by the owners uses a manual system, which might result in document duplication and work redundancy. This means they rely only on their manual product listings and data inputs, which could lead to errors. The owners are unable to check their correct records of sales or income at any given point of the year, and they also lack adequate product listings, which is why missing things are simply overlooked by the owner. Because it is a hassle-free and easy-access system, creating this system can help them save time and handle their inventory more efficiently (Santiago, 2018).

It is evident that a sales and inventory system is important and through the different literature and studies explained what a sales and management system is and how they function. One of the pieces of literature reviewed said the proposed framework would help the business in a way it will be able to automate and file documents faster and more efficiently. Another study discussed how new systems would be introduced to help organizations keep track and make smarter decisions in operating their business. These are important because third-world countries such as the Philippines are often behind in technology and it is good to know which technological advancements are at the top of the market, making changes so that local businesses can take advantage of when these advancements make it into the local market.

It is more important in larger enterprises since certain methods such as spreadsheets or normal input systems would not be efficient because of the large mass of transactions and inventory large-scale businesses require. In these businesses, it would be necessary to have automated and efficient systems that can process if not most of the business processes so that it would just be checked and confirmed by the employees assigned to them. Time becomes an important factor for these systems because, with the large amount of data they gather, they should be able to yield positive results quickly so that it allows the organization to maintain an orderly flow.

**3 RESEARCH OBJECTIVES**

The objective of this study is to provide a Sales and Inventory System for Company A to perform tasks such as storing data, specifically sales and stock inventory data in the form of a web-based system. This provides the business a visual representation of the number of stocks they have available in the physical store and also stores the sales generated so that they may be shown on reports for future business decisions.

Specifically, it attempts to satisfy the following objectives:
- To **design** a sales and inventory system that would collect, store, and manage the number of sales and inventory stock that will be used to generate reports to aid in the evaluation of the sales of the business and inventory performance.
- To **digitalize** the inventory and sales tracking to reduce the manual effort of tallying inventory and recording sales.
- To **construct** a web-based system that allows the business to manage the sales generated and inventories in their warehouse at any time.
- To **verify** that the system is able to deduct inventory based on recorded sales.
- To **verify** that the system is able to notify the business of the inventory that needs restocking.
- To **verify** that the system is able to generate a sales report that shows the sales performance of the business products.
- To **verify** that the business is able to track the batch date and batch label to monitor the aging stocks and avoid the piling up of damaged goods.
- To **test** the running time execution performance of the software product.
- To **conduct** a time and motion study to compare the execution time of the system from the existing business process
- To **validate** the system using the ISO 25010 standard survey.

**4 RESEARCH METHODOLOGY**

**4.1 Research Design**

The case study method used for this study follows the agile methods framework, which begins with planning, designing, programming, testing, deploying, and reviewing. This method examines the present workflow of the client to comprehend, assess, and evaluate issues and potential solutions (Laoyan, 2022).

In response to the feedback of their client, revisions were produced over the course of several sprints. A sprint would continue for 28 days, and at the completion of each sprint, the researchers would show the client the system and conduct a survey asking for input on that particular sprint in order to use it in the revision of the following sprint. At the end of every sprint, an interview with the client is done to review the progress and identify any modifications that need to be done to the system. Due to the restrictions of

the pandemic on in-person interactions, the researchers used online messaging services and collaboration tools to keep in touch with the client and the rest of the team.

## 4.2     Research Participants

The company owners were interviewed, and surveys and feedback were gathered. Also, a dedicated tester prepared the test cases used and applied them to the system.

## 4.3     Data Gathering Procedure

Due to safety precautions, the researchers aren't allowed to go to the corporate premises because the research was conducted during the coronavirus pandemic. The only means of communication between the researchers and the firm is thus Zoom meetings, Facebook Messenger, or E-mail. Every sprint is followed by a meeting with the company. In order to create the application, the researchers will need to acquire the most recent information possible.

Weekly Scrum meetings are held for one to three hours each session, depending on the subjects covered, however, the timetable is flexible based on the availability of the researchers. These sessions are held to make sure that the system is moving forward and to make sure that each researcher completed their allotted tickets in the Trello board. Scrum meetings are also used to update what has been accomplished and what action plans are required up to the next scrum meeting.

## 4.4     Validation

Based on the needs of the company, a system was put together.  After each sprint, we would meet with the client to present the system we had constructed and get their feedback on the system.

The client would rate the system revisions using the ISO 25010 Likert scale during the end-of-sprint survey based on how easy it was to use and how satisfied they were with the system. The ISO 25010 framework is useful for defining software metrics crucial to a specific project. It is more of a guide that you can utilize, depending on the situation, than a complete, detailed map. This standard gives ample room to work with all of the goals and metrics that change between development projects (Rebes, 2019). The fundamental benefit of Likert Scale questions is that they follow a standard way of data collection, making them simple to comprehend. Creating conclusions, reports, findings, and graphs from quantitative data are simple when using the responses received (SmartSurvey, 2023). The feedback form primarily contains the following criteria: (1) Functional Suitability, (2) Reliability, (3) Usability.

## 5    RESULTS AND DISCUSSIONS

After the requirements analysis, we developed a system that will accommodate the needs of the client. This considers the constant feedback and suggestions. At the start of the development of the system, we decided that the system should have separated functions based on roles as their business process is limited to who can do what. We made 4 roles that are the Manager, Stand-in Manager, Salesman, and Stockman. All of which have different actions that can do that is specific only to them. In the research objectives, we discovered that the system needs to find a way to show a summary of the inventory and sales so we developed an automatically generated inventory and sales report that will show the total sales of the day, month, and year as well as the various inventory information such as the stock count, product information and batch data.

The resulting sales and inventory system caters to the requirements of the client, they require that it should complement their business in both online and physical stores. The sales module of the system has included sales from physical stores and online stores. It uses a dynamic view with search options that will make it simple and easy for the comfort of the end users. The inventory module of the system requires data from the suppliers and the stocks available within the warehouse of the physical store which makes it more convenient for the business since their products are easily accessible with the use of this system. All operations require the use of a database using MySQL.

The system is only applicable to the business and is customized and tailored to the specific needs of the company and cannot be used by any other companies. This system is only able to handle products related to shoes that have multiple varieties and has specific batches that allow the business owners to see the batch histories so that adjustments and decisions such as procuring more stock for that specific product are needed. The reports are limited to what is stored on the system and do not use any external data sources.

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**5.1 Test Cases**

Table 1. Initial Test Case Results

| Test Result | Number of Test Cases | Percentage |
|---|---|---|
| Pass | 121 | 87.68% |
| Fail | 17 | 12.32% |
| **Overall** | **138** | **100%** |

In this section, we will now be discussing the results that were observed after the development of the system, and the test cases were used to debug and validate if the functional requirements meet the standard. With the majority of the test cases passing, the time and effort it took to debug was reduced significantly. The system is considered a success as the remainder of the failed test cases were subjected to a focused solution since it was not the majority and they were finished inside the projected timeframe we set.

**5.2 Feedback Form**

Table 2 Mean Score of Client Evaluation

| Criteria | Mean Score (Out of 5) |
|---|---|
| Functional Suitability | 5 |
| Reliability | 4 |
| Usability | 4.83 |
| **Overall** | **4.61** |

The target score for each criterion is 4 and we were able to achieve it based on the client feedback forms that we referenced from the ISO 25010 standard. With this, we can say that it has passed the requirements of the client since the functional suitability means completeness of the system, reliability refers to how prone to faults the system is and the usability implies that they are able to use the system with their current knowledge of it. Functional Suitability is used in the feedback form so we can track if what we were developing was in line with what the company wanted. We used reliability so that we can determine that the system was up to standard for them when it comes to data being reliable and correct to what was entered into the database. Lastly, usability is included since it gives us a general idea of how they want the UI/UX of the system should look and if they are comfortable enough with the current system.

**5.3 Time and Motion Study**

**Table 3** Test Cases Used for the Time and Motion Study

| Test Case | Time it took w/ system | Previous Time w/o system |
|---|---|---|
| Find Sales for the day/month/year | 30 seconds-3 minutes | 10 minutes -1 hour |
| Find Inventory Data (Stock, Batch, Availability, Product Variant) | 30 seconds-3 minutes | 10-50 minutes |
| Search for suppliers | 1-3minutes | 10-20 minutes |
| Editing Data | 2-4 minutes | N/A |
| Adding Data | 2-3 minutes | N/A |
| Removing Data | 2-3 minutes | N/A |

After creating this function, we found out that the time it took for the employees of the business to find similar information has shortened significantly to about 2-5 minutes since the time it took with the existing business process was 10 minutes to an hour. With this, the manual effort it took to tally and look through the business records was lessened since the digitalization of data allowed for a quick search of the relevant information such as the need for restocking or possible damaged products existing within the system.

We were also able to verify that the function of being able to validly deduct from the inventory based on recorded sales was done since it was tested by both clients and people outside the business and the time it took ranged from 10 seconds to as long as 4 minutes depending on how well they know and memorize the inner workings of the system. When testing the system with the client, the process for each took about 1-2 seconds with 5 seconds being the longest time it took to load and process data.

**5.4    Client Feedback**

The client has been helpful with accommodating the researchers when questions about the business were asked. The researchers made sure that after every sprint, the clients were made aware of the changes, and all of it was documented through either evaluation forms or interviews. The researchers created a test plan and conducted several test cases to ensure the performance of the system. After the system is finished the client was able to properly test the system and mentioned that the system was able to give the requirements that they asked for.

# 6     CONCLUSIONS & RECOMMENDATIONS

The different roles within the business such as the Manager, Stand-in Manager, Salesman, and Stockman are tailored to have what they need in their respective accounts. Each role is given a certain amount of action and responsibility and this is shown throughout the use of the system. When creating and finishing the system, the researchers placed importance on client feedback and how the client will be able to use it in their business since client satisfaction is needed to maintain a level of dignity and purpose of the system. The research objectives were achieved with the use of validation through test cases, the feedback forms that passed the target scores for each criterion, and the time and motion study that verifies the execution performance of both the functionality and loading time of the system.

After finishing the system and observing what further improvements can be made, the researchers would like to recommend that the source code be improved in terms of code readability since all the functionalities are already there and the system made it easy since everything they need, data-wise, is already present. If an opportunity arises in the future, perhaps they should look at the method handling as well as the objects to further make it readable for the next upgrade. There could also be improvements to be done such as the potential branching to another e-commerce platform such as Lazada. There could also be tighter security measures in place such as authentication for highly classified information that should only be accessible to the store owner and manager. Lastly, a recommendation from us would be the portability of the system wherein they would be able to use the system on their phones so that those who need to access it at certain times can do so readily.

In conclusion, the Company A Sales and Inventory system was able to achieve its objective as client requirements were met. The researchers arrived at this conclusion because the client mentioned that the system was able to give the requirements they asked for and the system is able to functionally work as requested when tested by both the client and the other test end user. The system has been acknowledged to have a good system design in terms of the needs of the client as well as having the correct functionalities for the business to use. The business processes such as inserting and storing sales, viewing the sales conducted, adding and removing stock, and creating and accepting stock purchase and removal requests are also present within the system.

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