Development of a Hotel Inventory System through Agile Methodology

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ABSTRACT

This paper presents the daily inventory experience of Hotel ABC, the problems with their business operations, and the researchers' solution to their problems. Due to the fact that Hotel ABC does not have an automated inventory system, all their data and records are manually stored in Excel sheets or just handwritten on paper. All inventory processes are generally taken care of by the accounting department which results into a bottleneck in their operations. Another issue is the delayed generation of inventory reports. In order to solve the current problems, the researchers proposed to make a hotel inventory system. The goal of the inventory system is to reduce the inaccuracy and loss of data and eliminate the bottleneck in the daily operations of the hotel. The system should be able to display the complete list of products and their respective quantities in order to avoid overstocking and understocking of products of hotel inventory. The system also monitors the returnable and consumable products of the hotel. It would monitor the location of the returnable products at any point in time. Moreover, the data recorded should be kept securely such that it is only accessible by authorized personnel which are the admin and, senior manager, and those from the accounting, housekeeping, and purchasing

departments. The Agile methodology for software development was chosen because it promotes client collaboration during the whole development process. At the end of every sprint, the researchers would show

the prototype of their system to the client in order for the client to give their insights, comments, and suggestions to make the system better address their needs.

KEYWORDS – Software Development, Agile Methodology, Hotel Inventory, Returnable Products, Client Collaboration

INTRODUCTION

Among the many accommodation options in Pasig, Hotel ABC, with their 34-story hotel, remains the top choice as a vibrant business and leisure hotel with a convenient location, affordable rates, and a packed list of facilities. Their guests are mostly corporate businessmen, weekend vacationers, and families. Hotel ABC has 3 floors for their hotel-side and the rest of the floors is for their condominium residency. The mission of Hotel ABC is to provide a more convenient place to stay and good services.

However, the hotel does not have an automated inventory system and their inventory operations are mainly handled by the accounting department. The researchers conducted meetings and interviews with the accounting department to know the current problems in their operations. It was found that the main problem in managing their inventory is that their inventory data are stored in an Excel workbook wherein multiple records of the same transactions relating to their business operations are kept.

Another problem was the inaccuracy of inventory status. When there is a huge amount of guests staying in their hotel, the housekeeping department would not follow the normal process of returning products in order to save time. Since there are many guests, there are a lot of requests. The housekeeping supervisor would get an excess amount of products and distribute the products to the housekeeping staff. All the products are kept in their quarters. The process of hoarding can lead to inaccuracy of the data in the master Excel workbook. When the accounting department would count their inventory and there is a difference in numbers, they would add quantity of that product in the hotel's next purchase order. The inaccuracy also extends to the data in the master Excel workbook. The status and location of the products are not precise, which can result to loss of items, before storing the records to the master inventory Excel workbook.

The researchers propose to develop an inventory system to address the problems found using the Agile methodology. The system will only focus on the hotel-side of their operations. The objectives of this system are to monitor the status and weekly reports of the hotel's inventory, to ensure that the hotel's transaction records are kept securely, and to decentralize the work done by the accounting department.

LITERATURE REVIEW

Automated systems have dramatic effects on the performance and efficiency of a company in many ways such as easy storage and retrieval of data in the system. An inventory management system is the management of inventory and stock of an organization. "As an element of supply chain management, inventory management includes aspects such as controlling and overseeing ordering inventory, storage of inventory, and controlling the amount of product for sale [2]." This type of system is a necessity for better performance that could tackle problems such as waste of resources and deficit number of supplies in the inventory.

According to F. Curtis Barry & Company, the top six features in an inventory management system are the following: (1) basic inventory control to have a systematic way of tracking and monitoring inventory through all channels, (2) barcoding and scanning process to eliminate the bottleneck of business operations, (3) demand

forecasting to help assess which products are selling and performing well, (4) accounting integration that has general ledgers to keep track of all inventory transactions, (5) lot tracking to identify the specific stock or product, and (6) support for kits [4].

U.S. Small Business Administration conducted a study about inventory management and said that inventory "refers to stocks of anything necessary to do business [5]." According to the group, an inventory management is declared successful if it keeps stock cost under control. This can be achieved in 5 ways. First, "maintain a wide assortment without spreading the rapidly moving items too thin [5]." Second, "increase inventory turnover without sacrificing service [5]." Third, "keep stock low without sacrificing performance [5]." Storing too much inventory is risky. Fourth, "obtain lower prices by making volume purchases [5]." Finally, "maintain an adequate inventory without an excess of obsolete items [5]."

In a study conducted in Oklahoma State University entitled Asset and Inventory Management in the Hotel Industry using RFID technology: An Experimental Study with Economic Analysis focused on a cost-effective solution on how to improve hotel organizations efficiency through inventory management. In this system, they used RFID to track the available inventories and provide information of the assets in organizations. Inventory discrepancies due to shrinkage, misplacement, and theft of products, and transaction errors wherein the products are given to the incorrect customer are among the problems that can be addressed by implementing an automated inventory system [3].

METHODOLOGY

The researchers visited the hotel many times to immerse themselves with the hotel's day-to-day activities and made a system implementing Agile methodology with the intention of monitoring the progress of the system and also guarantee the participant's collaboration.

The researchers used an Agile methodology in order to develop the system in increments. A prototype of the system was presented to the client after every sprint cycle. According to Luis Goncalvo [6], the Agile methodology is a process that helped the researchers come up with immediate response based on the feedback given by the client. It also helped in creating opportunities to evaluate the project's direction. The assessment process done during the regular meetings are called sprints. Following the Agile methodology, the project was divided into three sprints, 20 working days per sprint. The meeting with the client is held after every 1 sprint.

Agile methodology is a continuous planning, continuous testing and continuous feedback iterative software development model which divides the whole process into sprints [1]. The researchers chose to implement this framework because through this, they were able to involve the client, mainly the hotel's accounting supervisor, throughout the progress of the system and build strong relationship with them. During the scrum meetings with the clients at the end of each sprint, the researchers were able to get all the requirements needed.

RESULTS AND DISCUSSION

To analyze the current system of Hotel ABC, the first meeting with the head of the accounting office, as the main participant, was set to initially gather all the needed information and specifications. In addition, the researchers asked the participant for any functionalities that the management wants to see at the end of each sprint. The researcher conducted a meeting with the participant for the testing of the functionalities every end of sprint for her feedback, comments or suggestions on the correctness and overall look and usability of the system. In addition, the researchers and the client were able to negotiate other specifications that the client wants.

Initially, the researchers' system focused on the development of the booking and inventory tracking component of the system. However, during the follow-up interview conducted by the researchers, they found out that the client had purchased a booking system over the midterm break. Because of this, the researchers had to revise their entire Systems Analysis and Design manuscript over the course of the new school year. The incident made time a major constraint for the researchers. The gathering of new data consumed one month of the initial sprint 1. The researchers had to adjust their timetable to have three sprints of 20 days each.

The researchers built an entity-relationship diagram of the system based on the data gathered during the interviews.
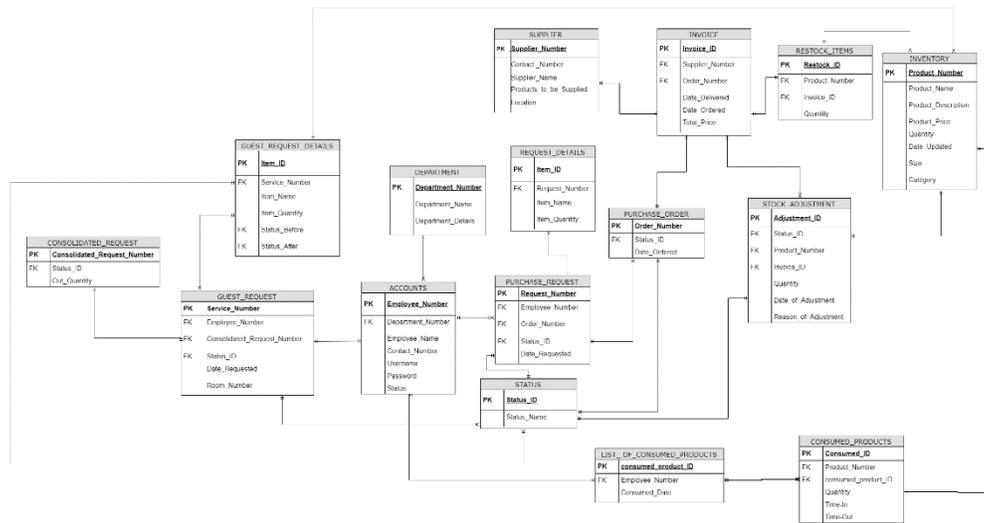

Figure 1. Entity-Relationship Diagram

The class diagram representing the main components of the proposed system is shown in Figure 2.

The researchers' system used the layered architecture pattern where every functionality of the system is separated into layers. The first layer is the System Support which handles the operating system and database. The second layer focuses on the servers and libraries used for the system execute its functions and features. The third layer clearly separates business logic and the graphical user interface; it focuses on document management, knowledge management and access management. This layer manages the data collected from the interaction the user makes with the system's components. On the top layer is the user interface layer which mainly involves how the user interacts with system. The topmost layer involves the graphical user interface. It is seen in a form of a browser which users can easily navigate.

The system is the enhancement to and automation of Hotel ABC's inventory management process that also involves generating reports from the inventory operations. It contains all information such as list of all products and their suppliers as to avoid loss of records. Keeping track of inventory transactions will be easier for all employees because all the data will be stored in the database and can be accessed anytime. The primary goal of the system is to organize all inventory-related processes of the hotel in such a way that authorized personnel are able to monitor the transactions and to reduce the bottleneck work done by the accounting department.

The system monitors the status of the hotel inventory by doing the following: (1) the accounting and purchasing department, housekeeping supervisor, and senior manager can view and update inventory details specifically the product name, product description, price, quantity, date updated and size of the product, (2) the accounting department approves all purchase requests, and (3) the senior manager checks and verifies the values of the inventory report that the system generates.
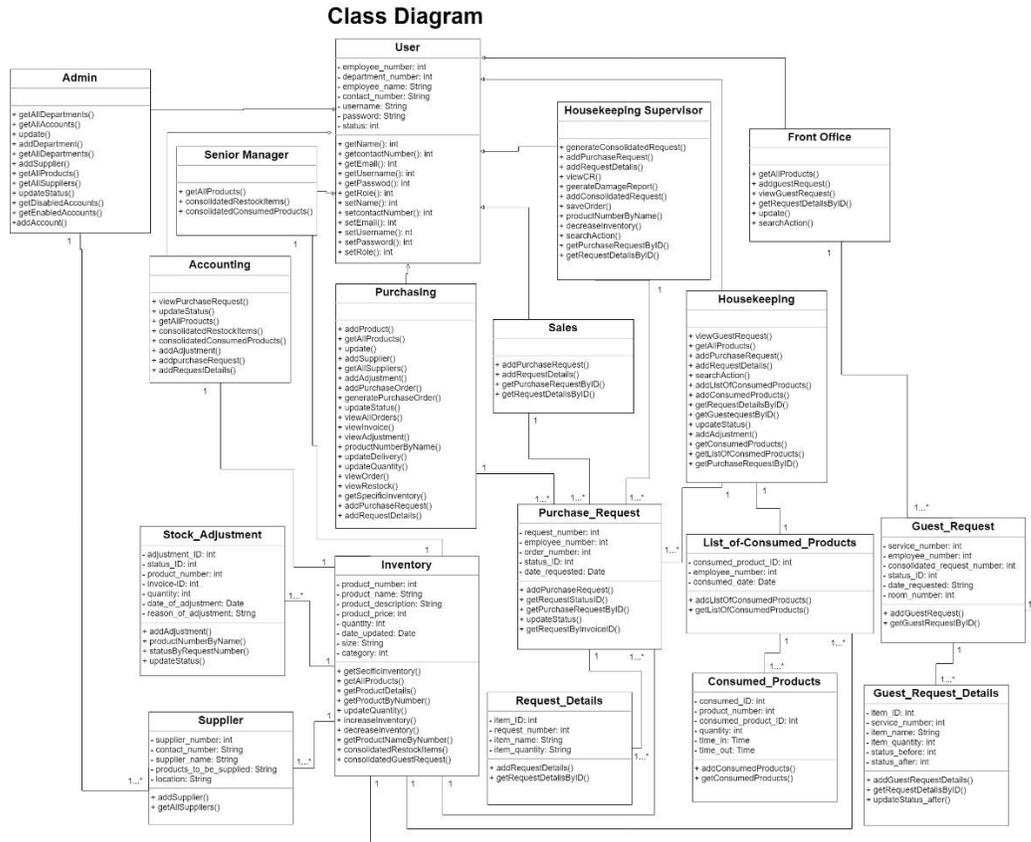
Figure 2. Class Diagram

The system also decentralizes the work done by the accounting department. Every month, the system generates a consolidated purchase order based on all the approved purchase requests and it will automatically send the purchase order to the purchasing department. The housekeeping supervisor can deduct the product quantity in the inventory and update the product's status.

The hotel has both returnable and consumable products. The returnable products are the items that the guest can request for laundry or exchange if it is damaged, e.g. towels and bed sheets. On the other hand, consumable items are those that cannot be returned once used, e.g. soap and shampoo. A special feature of the inventory system is that it monitors at any point in time where the returnable products of the hotel are, e.g. bed sheets can either be in the floor stockroom, in-quarters, in-room, or in the laundry. The system keeps track of returnable and consumable items that have been issued to a room, as well as who issued it.

The participant was given an evaluation form every end-of-sprint meeting to assess the functionalities of the system to see if it they are complete or needs improvement. Table 1 shows the participant's final evaluation of the system.

CONCLUSIONS AND RECOMMENDATIONS

With the insights, comments, and suggestions gathered by the researchers from the initial interviews and end-of-sprint meetings with the participant, the system was developed and improved in sprints. The researchers created a better prototype throughout the development cycle. Although the system is not yet deployable and its functionalities are incomplete, the participant has expressed satisfaction with the functionalities, usability, and layout of the partial system that was presented.

Functionalities that will still be added are the following: (1) generation of a weekly report of the items used, the "ins" and "outs" of the returnable products, total costs made, and the remaining inventory left, (2) a notification for each user regarding updates on their requests, (3) the weekly report can be downloaded, and (4) a more secure system. One more sprint meeting with their advisor and the client will be conducted to present the final version of the system.

Table 1. Final Client Evaluation of the System

Criteria	Mean Score
USABILITY	
The software product is easy to learn and use.	4.66
The software product's appearance is pleasant.	4
DEPENDABILITY AND SECURITY	
The software product works reliable without major issues.	3.66
The supervisor is confident that the software product is secure.	4
EFFICIENCY	
The software product performs its functions swiftly and efficiently.	4
ACCEPTABILITY	
Presented functionality is complete and according to supervisor's requests.	3.33
The supervisor views that the software product has all the features the client needs.	3.33
The supervisor is convinced that the current state of the system can be deployed in the company.	3.66

The future researchers may expand the scope in terms of keeping stack of the inventory of the other facilities like the residential/condominium part of Hotel ABC. The functionalities of the system may be improved by making the system more user-friendly.

For this study, Agile methodology is best used and necessary because it enabled researchers to adopt and analyze the client's needs and how to fulfill the gaps in order to satisfy their needs; a different software development approach may be employed.

ACKNOWLEDGEMENT

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