PREDICTING STOCK AVAILABILITY AT JAGO MINI MARKET USING MULTIPLE MODELS

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USING MULTIPLE MODELS

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ABSTRACT

Inventory management in general and stock availability management in particular hold crucial role maintaining the supply chain in a company. The project explained in this paper concerns mainly with predicting stock availability for an item based on sales data. Three models are used throughout this project to do the prediction calculations. They are Simple Exponential, Holt, and Winter models.

The process starts by creating the database as a prediction basis for the models. The next step is to create prediction procedure calculations. The last step is building an user interface to give user ease of use.

With the completion of this project, the author wants to implement three methods presented here to create an application that can help people, especially store manager to make decision on stock availability based on prediction result from the application produced.

Keywords: holt, winter, stock availability, stock prediction

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Chapter 1: Introduction

1.1 Project Summary

This project is intended to help the store manager monitor stock availability flow and to enable the manager make decision regarding stock ordering based on the analysis provided by the system. Therefore, this project concerns with providing desktop-based application to assist that purpose. For the start, after some observations and discussions, the author able to gather the requirements needed and create model diagrams needed for the project. The administrator will do user management task while manager will draw the analysis of stock availability based on sales (invoice) by processing the stock data. For security measure, users with no privileges will not be able to access the system.

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1.2 Company Background

Jago Mini-market was established in 1965. It was located at Urip Sumoharjo Street 24 Jogjakarta, Indonesia. In Jogjakarta, Urip Sumoharjo Street is one of Jogjakarta main streets consisting of many stores, mini markets, or malls beside Malioboro Street. Besides, it was also located near education and health facilities such as Duta Wacana Christian University (DWCU), Bethesda Hospital, and AA YKPN (Accounting School). People keep coming on the street everyday due to its proximity with the city downtown.

Jago Mini-market was a family business from the start. Therefore, crucial decisions relating to operation of Jago mini – market will be taken during the family discussions. Jago mini market is owned by Mrs. Maria and Mrs.Uli. Mrs. Maria is responsible for taking decision upon financial decision while Mrs. Uli act as its manager. Mrs Uli is responsible for the daily transaction at Jago Mini-market and also helps her elder-sister to make decision.

Jago Mini-market provides daily needs such as soap, shampoo, detergent, liquid-cleanser, and etc. It also provides sewing kits (such as needle, thread, ribbons, etc),

household utensil, food and beverages too. Since it was located closed to universities, Jago Mini-market's customer is focused to be students, university students, and local customers.

1.3 Issues with Current System

Jago Mini-market does not have an Information System to support the transaction process. They still use the traditional hand-writing manual receipts and cash register for the accounting system. Using hand-writing manual receipts may be more authentic than computerized print-out, but using hand-writing manual receipts also have disadvantages too.

Before moving further, the procedure of the accounting system in Jago Mini-market will be explained first. Each employee will collect all invoices they get within that day. Next, they'll summarize all of items sold in the wrap-up sheet. Each employee will hand-write the wrap-up sheet. Both invoices and wrap-up sheet then will be submitted to the manager. For proofs, please refer to the Appendix.

With hand-writing manual receipts, the staffs work twice because after they have been finished, they need to make copies of the data in the receipts. Not only time-consuming, but it also doesn't assure the validity of the data. Sometimes if we use hand-writing, we can do several mistakes such as wrong item names, items amount sold, wrong calculation and many more. Thus, sometimes the data written on the receipts are not matched with the reality. For instance, data recorded in the invoices sometimes not matched with the one in wrap-up sheet.

Another issue concerns unstructured data which occurred in Jago Mini-market. They do not have general standardization in items name. For instance, item with label "ribbon" may represent different colors. Therefore, this will affect the inventory control because we don't know which color of the ribbon was sold due to redundant naming. Additionally, the naming appears in both invoices and wrap-up sheet which lead to unmanaged inventory.

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Concerning with the author project, inventory control is the key. From time to time, we need to place an order to replenish the item which already or near out-of-stock state in order to maintain inventory condition and satisfy customer needs. In the case presented above, we need to know which item is nearing out-of-stock state. However, since the name is the same for different items, there is no way to know which item that nearing stock-out.

1.4 Benefits and Constraints of Proposed System

The proposed system should be able to overcome the issues mentioned in the section 1.3 before. The system will help the store manager (Jago mini market manager in this case) monitor their stock flows in the inventory. User (manager) can generate report showing which items need to be replenished and monitor its flows in the past in just a few clicking. Thus, the system will be beneficial for the Jago manager.

For administrators, the system will provide the user management function so the administrators can add, edit, and delete user account's information in just one window. Any new user account created must be approved by the administrators before it can be used.

Alas, this project will produce the system that can assist the issues faced (as explained in section 1.3) above. One last thing needs to be emphasized is in Jago Mini Market, all daily works (such as stock and invoice management are done by the manager. Therefore, administrator in the author's project created only for user management purpose.

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1.5 Project Description

The end users for the system are administrator and the user (manager). The system would be a standalone system. The functionalities for the system are mentioned below.

Functionalities for the manager are:

- Log into the system

- Monitor stock flows
- View prediction result for t

While functionalities for the administrator are:

- User management (add , edit, and delete)
- Log into system

Lastly, outputs expected from this project are:

- ✓ Predict stock amount should be supplied
- ✓ Enable manager to make decision
- ✓ Enable manager to monitor stock flows
- ✓ Provide analysis on stock circulations/flows certain item

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1.6 Project Aim

The aim of this project is to help the store manager to predict stock availability for a certain period in Jago shop specifically. Another aim is to create desktop-based system that facilitates the stock prediction. In addition, this project will help store manager monitors – in this case, Jago store manager - availability of stock. This is meant to manage the capital flow of the store in order to avoid useless investments such as ordering items that have under target sales.

1.7 Project Objectives

The objectives for this project are as follows:

- To predict the number of stocks that should be supplied into the store.
- To enable store manager make decision of stock availability (future order) based on system prediction.
- To enable store manager monitors the circulation of current stock.

- To enable store manager search for stock availability for a certain items.

1.8 Project Scope

The agreeable scope of the project is to develop desktop-based data system that covers a total of 7 use cases. Those 7 use cases will serve the administrator and the user (manager).

1.9. Software and Hardware Requirements

1.9.1. Software Requirements

Software required for managing this project are:

- Microsoft Visual Studio 2010 as development tool
- Microsoft Visual Basic as development language
- Microsoft Office Project 2007 as Gantt Chart maker
- Microsoft Office Word 2007 as word processor
- Visual Paradigm 8.0 Community Edition as analysis and design (UML) modeler
- Balsamiq as GUI mockup designer tool
- SQL Server 2008 as database engine

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1.9.2. Hardware Requirements

- Laptop to do the project
- USB Flash Drive to back up the project data

1.10. Development Methodology

The author will use Rapid Application Development as development methodology for Final Year Project II. Core Partners (Core Partners, n.d.) points out that in general RAD intended to describe a process of development that involves application prototyping and

iterative development. According to Case Maker (Case Maker, 2000), RAD is an iterative process that the items could be developed quickly and produced high quality system at a relatively low investment cost. It is designed to take the maximum advantage of powerful development software that has evolved recently. Lastly, Case Maker (Case Maker, 2000) mention that with RAD, the risks while working on project are reduced with splitting the project into several smaller parts and providing more ease of change during development process.

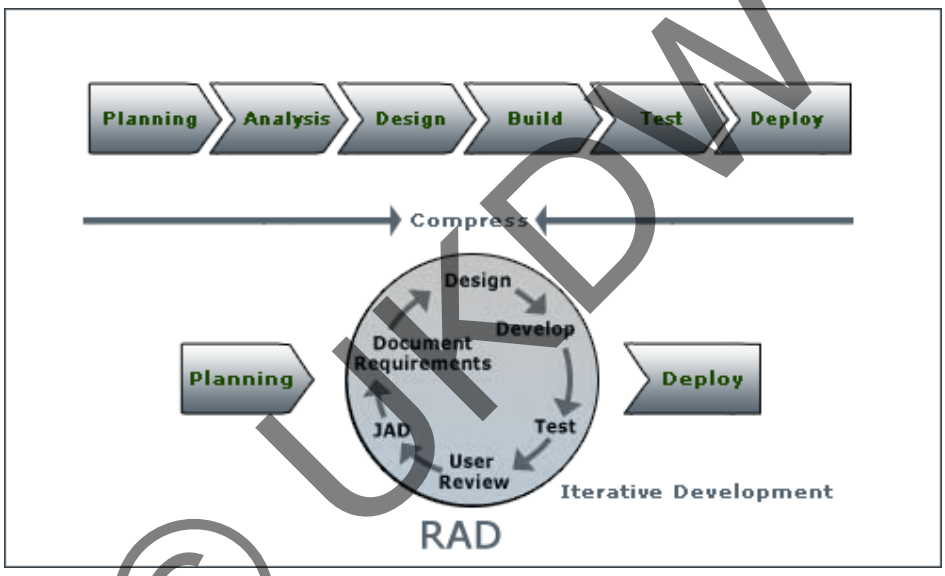

Figure 1.1. RAD Phases (Trust System & Software, 2000)

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Based on figure above, we can see that the six phases of software development life cycle (SDLC) are compressed into just three phases: planning, iterative development, and deployment. The core of RAD is located on the iterative development (second phase) involving several steps started from Document Requirements, Design, Develop, Test, User Review, and JAD. After pass the iterative development phase, the software can be deployed to the client.

There are several advantages and disadvantages from RAD (Core Partners, n.d.). The advantages are increased speed (in terms of development speed and decreased time of delivery) and increased quality (in terms of specifications conformation and low maintenance costs). On the other hand, the disadvantages are reduced scalability (lack the scalability of a solution that was designed as a full application from the start) and reduced features (due to time boxing where features are pushed off to later versions in favor of delivering an application in short time frame).

1.11 Gantt Chart

Please refer to Appendix C for complete Gantt Chart at the end of this report

1.12 Vision

There are several work items that the author needs to finish in the BIT305. First thing is creating database as base for the data mining analysis for Simple Exponential, Winter, and Holt's calculations. Because data provided are raw, thus the author must input the data to the database manually. This may draw setback to the project deadline. The author also needs to prepare several reports including interim presentation, monthly progress reports, and technical reports. Time management becomes key factor here.

Another important issue is changes. Change is inevitable in this kind of project. For instance, either database design or use case diagram may need to be revised. Another scenario is both of them must be revised according to the project. Therefore, this also becomes a factor the author needs to be solved.

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Chapter 5: Conclusion

5.1. Conclusion

There are two kinds of conclusions that can be inferred.

1. To the Jago mini market:

    - Based on analysis produced in the chapter 4, the author could say that most item on the Jago mini market can be defined and predicted by Winter method.

    - The author feels that Jago mini market is not ready yet for the author's application because they don't have Information System yet.

2. From science point of view

    - For this kind of store (such as Jago mini market) the most appropriate method that can be applied into the store is Winter.

5.2. Future Works

1. More sales data shall be added to the database

2. Develop more interesting and understandable GUI

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