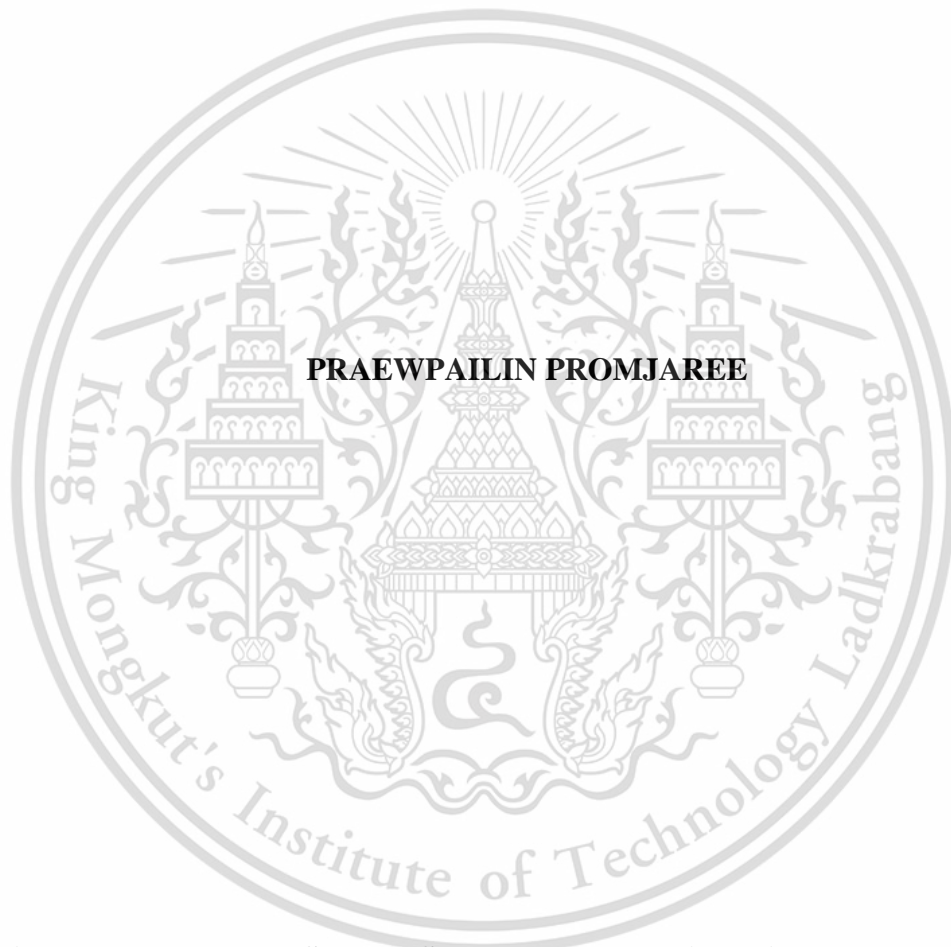


**IMPROVEMENT OF STOCK MANAGEMENT IN CASE STUDY COMPANY
USING VBA SOFTWARE**



**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT
INTERNATIONAL COLLEGE
KING MONGKUT'S INSTITUTE OF TECHNOLOGY LADKRABANG
2017
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INDIPENDENT Improvement of Stock Management in A Case Study
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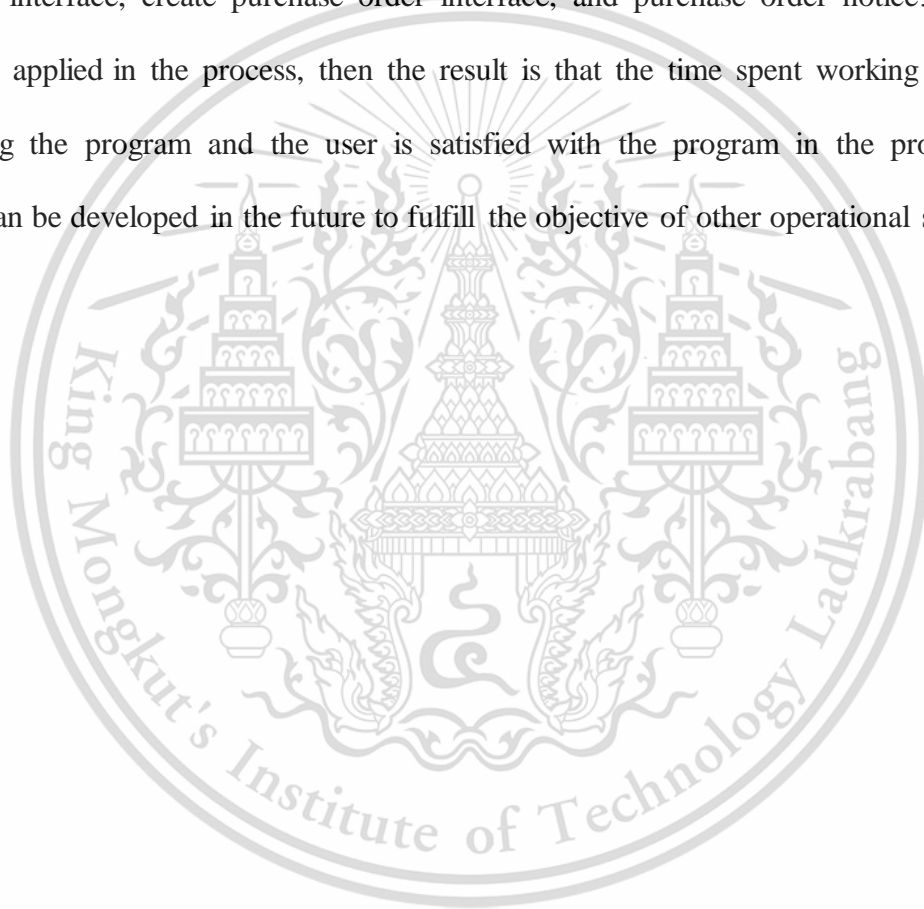
ABSTRACT

Small and medium-sized businesses or SMEs are part of the Thailand economy. They produce up to half of all products and services with high competition in the market. Currently, the SME's have to regularly monitor their overall order volume, sales volume, production volume, operating costs and business profits are down. This independent study will discuss about Sahathongkam's Company which is doing business mainly about coating, folding, welding, palate building, rack building and shelf building. This company is currently facing inventory, purchasing and budget control problems. The company records data by using hard copies which is the cause of lost some data. The unsystematic management makes their project delayed. Moreover, losing document confuses receivers when raw materials have been delivered to company's warehouse because the receivers do not know the specific delivery date and forgets the ordering. These problems may contribute to performance. Therefore, the company should have a data management system for the purchasing department and the warehouse to control inventory and reduce data errors. In this independent study, a set of programs is developed. The requirement collects from top

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management together with a business process analysis is used as a framework to develop such software. The Visual Basic Application (VBA) is employed as a main tool for software coding. This program can be used in the purchasing and warehousing department processes. The documents are put into one file and the user can recheck them and categorize them for easy searching. The program has four interfaces: inventory control interface, create requisition interface, create purchase order interface, and purchase order notice. When the program is applied in the process, then the result is that the time spent working is reduced when using the program and the user is satisfied with the program in the process. This program can be developed in the future to fulfill the objective of other operational sections.



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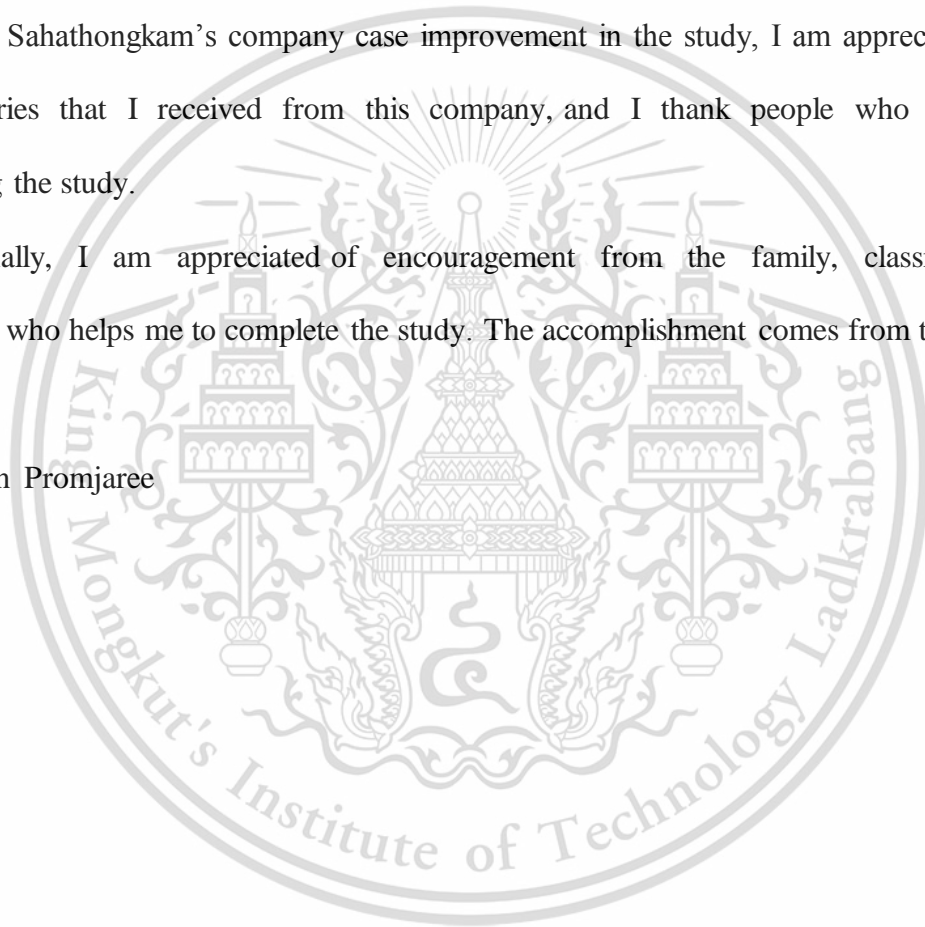
I would like to thank everyone who contributed to the success of this study.

To my independent study advisor, Asst. Prof. Dr. Phaopak Sirisuk of International College at King Mongkut's Institute of Technology Ladkrabang, I would like to thank you for the consultation and suggestions from the beginning to the completion of the study.

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Praewpailin Promjaree



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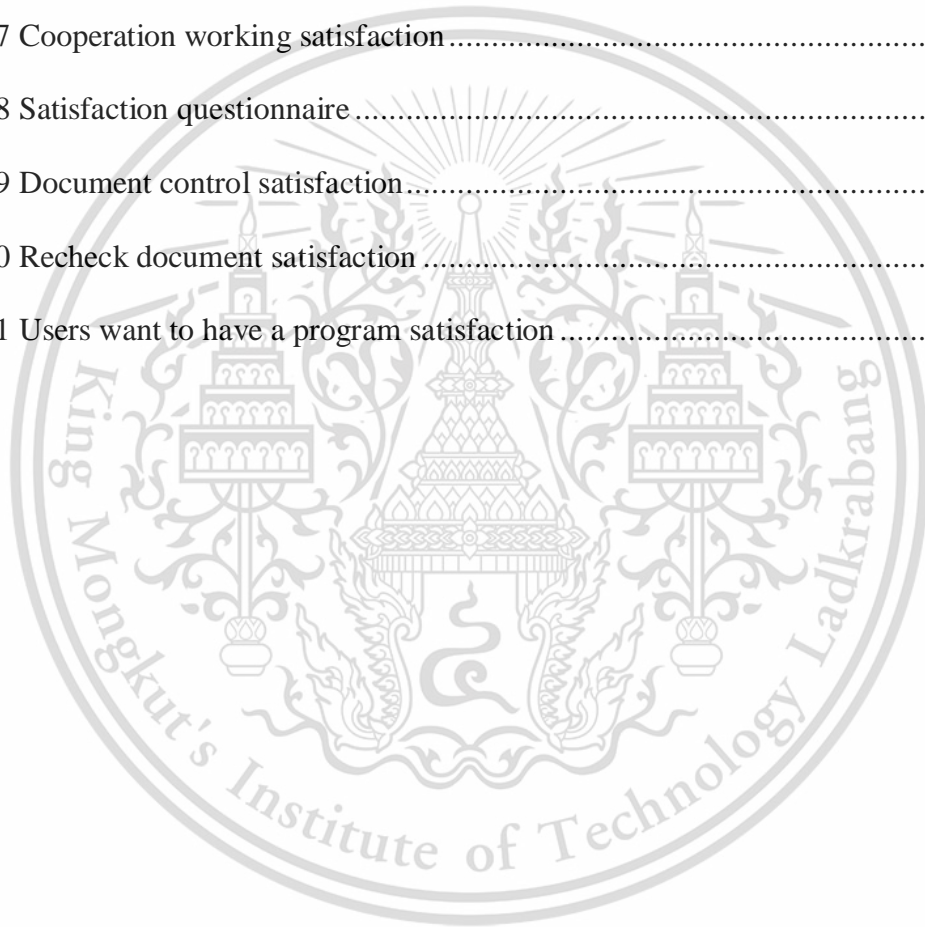
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CHAPTER 1

INTRODUCTION

1.1 Research and Background

The study focuses on small and medium-sized businesses or SMEs that are the parts of the economy. These can produce up to a half of all products and services. There are advantages in the economy in both small and large businesses such as generating income for the society and the country and introducing new careers in present innovation. It also helps large businesses in the production of efficient products and services. However, according to the report of the situation of small and medium enterprises in Thailand in March 2017, Thai Industrial Sentiment Index (TISI) declined in overall order volume, sales volume, production volume, operating costs and business profits due to the slowdown in demand and purchasing power. Meanwhile, large industrial enterprises were concerned about the foreign exchange rate of the baht which became strong in the region, and SMEs were troubled in terms of liquidity issues, unpredictability and increasing cost of production. New businesses in May 2017 compared to those in April 2017 have increased by 2.7 percent, while business cancellations have dropped by 28.7 percent. Based on this data, the competitiveness of SMEs has been raised among the economic recessions. The companies in this case experience delayed delivery and exceeding budget due of lack of document management system, especially in the purchasing department and the accounting department which have some errors and no comparison in price with other suppliers. In addition, the most important issue is that the inventory brings about the interruption. Due to the feasibility of deficiency in

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systematic recording, importing, or withdrawing, they cannot perform the account balanced stock. All of these issues affect the competitiveness among the companies.

1.2 Background and Statement of Problem

Nowadays, many SMEs businesses have been growing with a high competition; thus, the production and transportation businesses have been considered. This independent study will mention to Sahathongkam's Company which is mainly running the business of coating, folding, welding, pallet building, rack building and shelf building. This company is currently facing problems concerning inventory, purchasing and budget control. Recording data by using hard copies causes loss of certain data. The unsystematic management act on their project encounter delay. Furthermore, losing document makes receivers confused when raw materials have been delivered to the company's warehouse because the receivers does not know the specific delivery date and forget their orders. These problems may contribute to performance.

Consequently, the company should have a data management system for the purchasing department and the warehouse to control the inventory in order to reduce data errors. The tool for solving this problem and development is VBA, which collects all the spreadsheets in a single file and the authorized person can also edit and update the data in this file. By using the data from the database, it can avoid wasting time for repeated work, this program is for beginners.

1.3 Objective of the Study

1. To develop a management tool for the purchasing department and warehousing department
2. To create a program to record all activities into one file
3. To compare results in costs and times between the existing system and the trial system

1.4 Scope of the Study

To integrate operations among purchasing, warehousing and accounting departments of this SME's company by using VBA in a form of excel, apply the program to the process, compare the system with and without the program, and then analyze the results from the designed questionnaires.

1.5 Methodology

The study starts with gathering data from the company documents. The data include hard copies of purchase orders, item lists in warehouse and suppliers' quotations. The data are collected in the database to select suitable usage for each function. The study aims to make a practical use in the company. The basic program in the study is a VBA in a form of excel which is a tool for classifying the entire data. A simple is then designed and the programming interface is completed into a single file. The questionnaire is created to survey users' satisfaction in the company. Times of task are recorded before and after using this tool. The total cost and error information in each project before and after using this tool are

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compared, and the data are analyzed to find the results and improvement methods in this system.

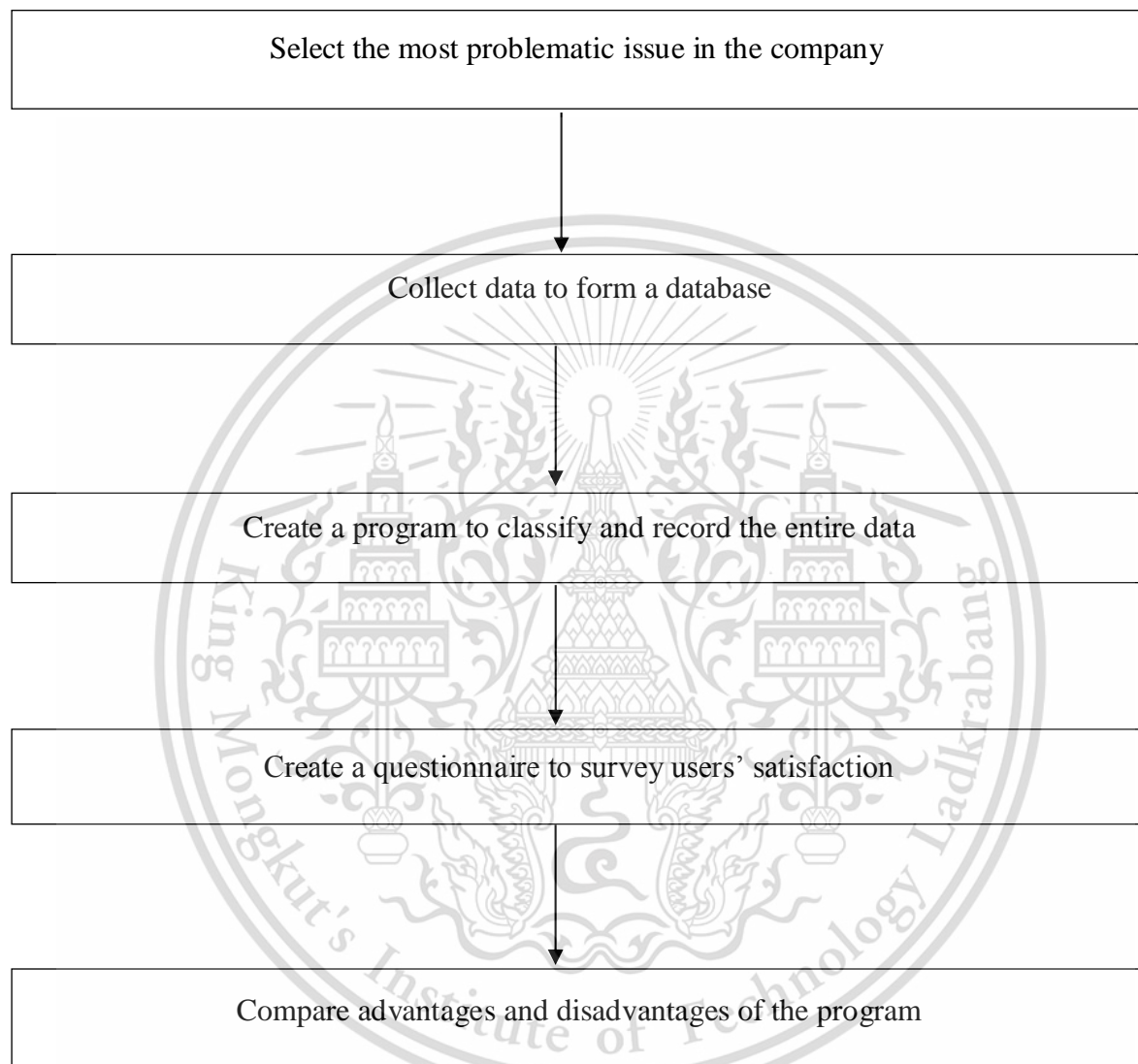


Figure 1.1 Procedure of the Study

CHAPTER 2

LITERATURE REVIEW

This chapter discusses all the theories used in the study to improve the process in this company. It starts with describing the flow of inventory management of the company, explains the theory of data flow diagrams with DFD symbols, DFD's component meaning, and shows example DFD level 0-1. The questionnaire, design theory and difference between the survey and the in-depth interview are explained. Then, the theory of fish bone diagram to analyze the problem in Chapter 3 is described. In addition, the theory of pseudo code to create the program in Chapter 4, the tools used to create the program, which is VBA in Excel, are explained. After that, the flow chart theory used in Chapter 4 is described.

2.1 Flow of Inventory Management

The business starts from customers ordering specific products from the sale department. Salers check raw materials at their warehouse and plan to buy the special materials to produce products. Engineers design working procedures and then produce the specific products. The accounting department makes an account payable and recievable to complete a project. Figure 2.1 shows the relationship among business divisions, which consists of 3 divisions: sales department, manufacturing department and purchasing department. All of these processes should have the tools to communicate properly and deliver the goods on time.

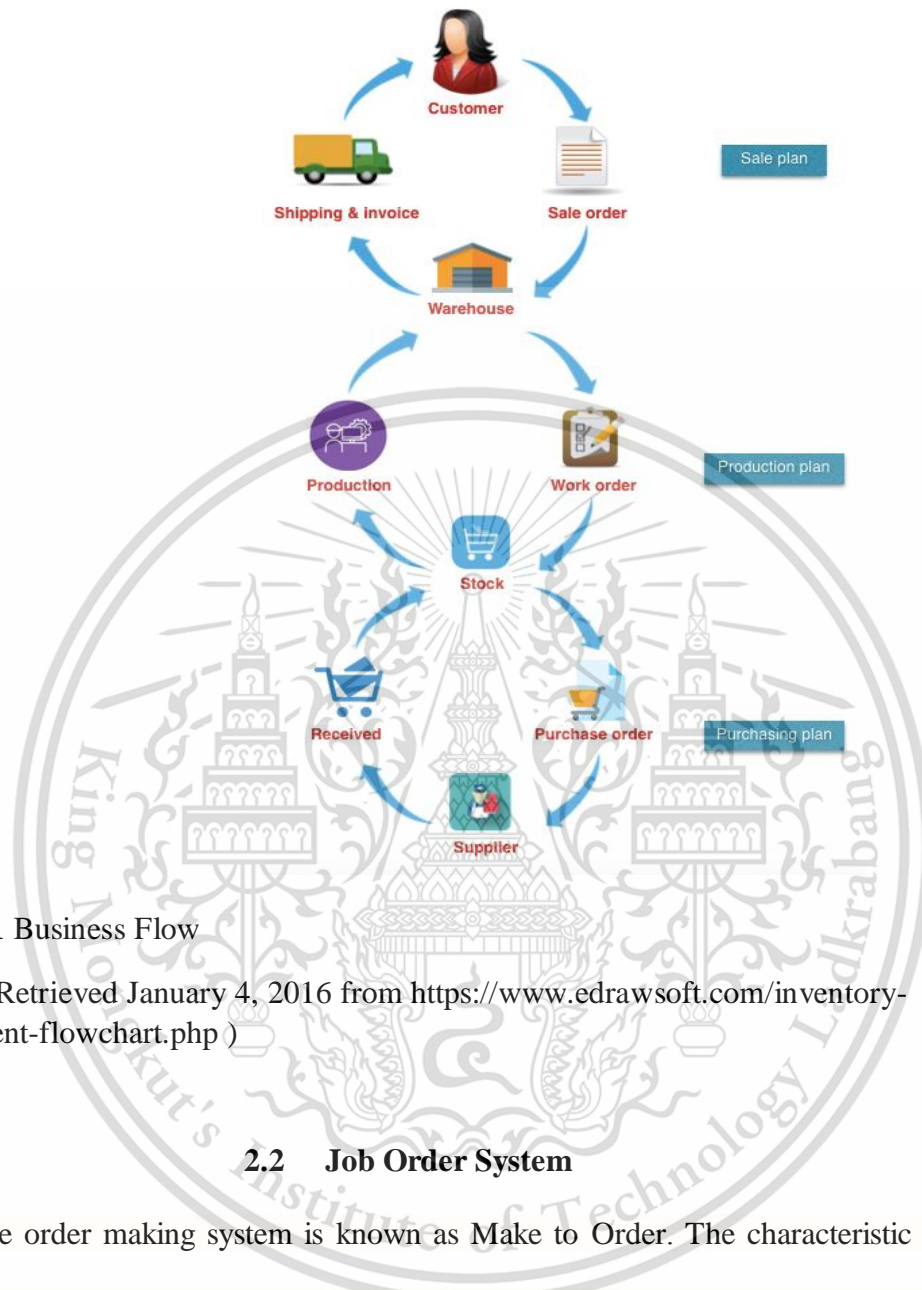


Figure 2.1 Business Flow

(Sources: Retrieved January 4, 2016 from <https://www.edrawsoft.com/inventory-management-flowchart.php>)

2.2 Job Order System

The order making system is known as Make to Order. The characteristic of Make to Order is a variety of products, and the quantity of each product is not much. The machinery used in production consists of flexible machines, lathes, milling machines. It can work in a variety of forms depending on the production required. The most important is the process of production which will vary depending on the shape of the work required including raw materials. Besides, the components vary according to the design and requirements of the customer.

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Every department in the company should support the cost-effective production. Starting from the sales department, they should forecast the price for each product required. In addition, this is a special-order type or special product that requires short time for production. The next part is the design department. In this type of work, more than 80% of designs are new designs that need to be redesigned at all times which requires some designs and skills. Although each work is different, designers can design certain parts to be used with other jobs which can help reduce production costs in the raw material stock. When they use several standard parts, they can order a lot of them at the same time. Besides, they have the power to bargain with suppliers to make prices lower.

The way to produce goods and reduce production costs is waste reduction in the production process. They can reduce the cost of production of the raw materials, the labor and the time required to produce the product. [12]

2.3 Data Flow Diagram

2.3.1 Data Flow Theory

The definition of data flow diagram is a tool which represents data flows. It shows the relationship among objects in the system. DFD helps users analyze and understand the entire system because the models contain symbols that stand for words.

2.3.1.1 DFD Symbols

The symbols in DFDs are represented in four components: data flows, data stores, and entities. The DFDs have various different styles, but they all work for the same purpose. DFDs have two standards which were invented by Gane and Sarson (1979)

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and DeMarco and Yourdon (SeMarco, 1979). Although some symbols are different, the principals and elements are similar. [1]









Symbol's name	DeMarco & Yourdon symbols	Gane & Sarson symbols
Data Processing		
Data Store		
Data Flow		
External Entity		

Figure 3.2 Four Components of Data Flow Diagram

(Sources: Retrieved January 12, 2016 from Donald (Donn) S. Le Vie, Jr. Information Development Director Integrated Concepts, Inc.)

2.3.1.2 Definition of DFD's Components

The process has been described as converting data, making efficient calculations, deciding or data flow of business rules. Otherwise, some outputs are generated by inputs received in a process. A circle or square can be drawn on the DFD including the name and number process. The process stores data used in DFD for one or more processes for later use.

The flow of data is the movement of data between entities, processes and data.

The flow of data represents the connection between DFD components. The flow of data is

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represented by the arrow which is drawn with title data. The source or destination of the data is an entity. These entities that are external are represented in the source DFD. The entities can be drawn as a rectangle. [2]

2.3.2 DFD Levels

DFD has several levels, including the highest level, the context diagram level, and the next level. The context diagram shows an overview of the system's functioning relative to the external data, and level 1 shows the main processes and secondary data involved in the system including primary data. DFD Level 2 shows the process flow in level 1. The flow diagram of Level 2 consists of a sub-process of Level 1 by using decimal number to define the relationship between the processes.

DFD shows diagrams to understand simple workflows in the system. It has many components. Figure 2.3 shows the process which represents the overview system. The arrows display input and output data, but no data is stored locally because they are in the next level. Next level is level 1 DFD. Level 1 DFD must fit the context diagram. Inputs which are going into a process are different from outputs leaving the process, and data stores are first shown at this level. Figure 2.4 shows example of DFD level 1.

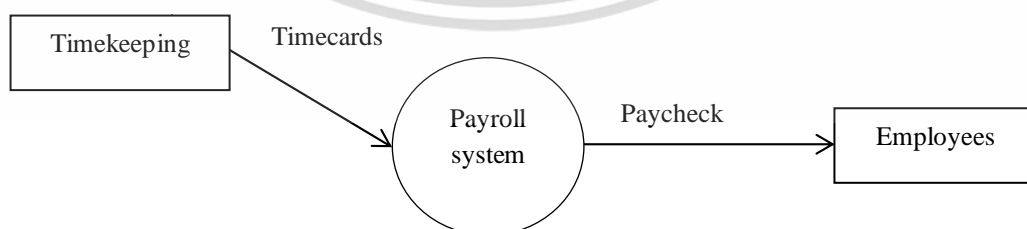


Figure 2.3 Example of Context Level DFD

(Sources: Retrieved February 14, 2016 from <http://myyee.tripod.com/cs457/dfd.htm>)

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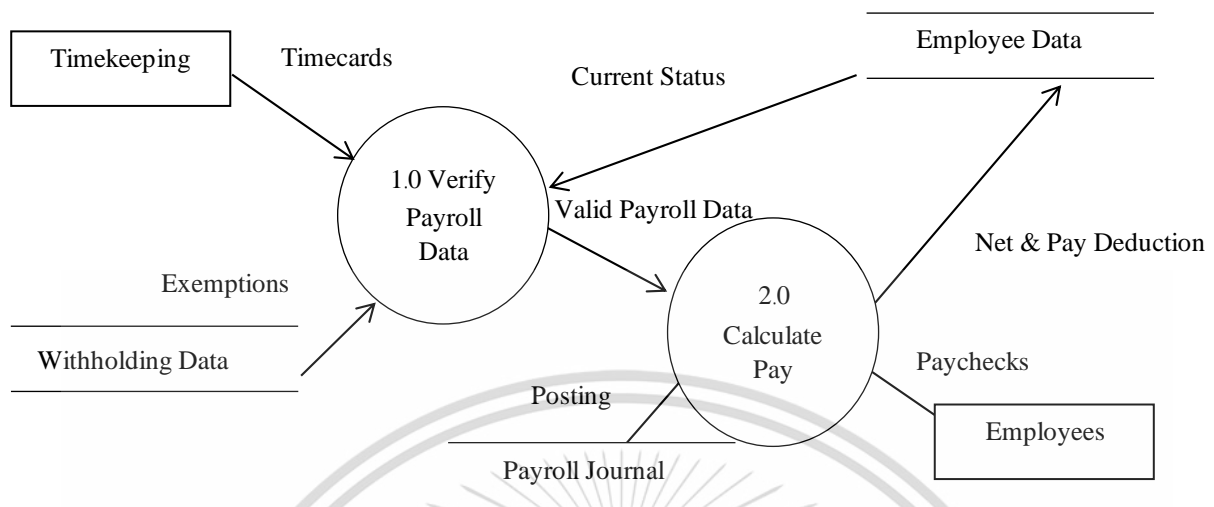


Figure 2.4 Example of Level 1 DFD

(Sources: Retrieved February 16, 2016 from <http://myee.tripod.com/cs457/dfd.htm>)

2.4 Questionnaire Design

The questionnaire refers to the form of a series of questions. It has been collected systematically to measure facts from the sample group. The questionnaire contains questions to gather information about opinions or facts by submitting the questionnaire to volunteers.

The questionnaire is a popular research tool because it is convenient for data collection. Besides, it can measure samples widely. The questionnaire is collected by interview or self-response.

The structure of the questionnaire consists of three main sections: explanations, questions about personal data, and questions about features or variables to measure the respondent's opinion on the feature or variant. [3]

2.4.1 Objectives in Survey Research

In theory, it is explained that the purpose of questionnaire design has two main parts: to increase the proportion of volunteers who respond to our questionnaire and to obtain accurate information.

Increasing the response rate, the purpose of the survey is explained, and volunteers are reminded to make response. The questionnaire should be of appropriate length. For the purpose of getting relevant information properly, the researcher needs to focus on the questions asked, the sequence of asking, and the questionnaire form. [4]

2.4.2 Steps to Design a Questionnaire

When the researcher knows the features or issues to measure and define the types of questions that will be included in the questionnaire, the researcher writes questions to cover all the features or issues that will be measured. The principle of creating the query is as follows:

1. Define the exact aim, what to ask and consider if the questions are related to the objectives of the research
2. Create questions to follow the purposes and avoid questionable issues and creating too many questions
3. Create questions to cover the subject of measure in a sufficient number
4. The sequence of the questionnaire should be serial to make the reply clear and easy to answer. In addition, a simple question should be the first to induce the respondent wanted to answer the question. The important questions should not be placed at the end of the questionnaire because of interest in the response may be less. [3]

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2.4.3 Scale and Scoring Measurement in the Questionnaire

Significance in the questionnaire is used as a scale that provides the necessary and appropriate information to the respondents. There are two types of responses: fixed response and open response. Fixed response is yes/no, true/false, multiple choices, rating scale, agree/disagree and rank ordering. [5]

2.4.4 In-depth Interview

Qualitative research is a tool for collecting the important information that researchers use by communication and talk which is called an interview. It collects information, whether factual information, opinions or attitudes. The interview forms are structured and semi-structured questions and conversations to find facts. Truths from the interviewer are called in-depth interviews. The questionnaire is not used in the data collection; instead, the in-depth interview is used to find details on the issues. In-depth interviews are often studied in small populations. The interview is not intended for the interviewee to make an answer but for the interviewee to comment and give a detailed description of the importance of the subject and the situation as well as their belief. [6]

For effective interview, the interviewers should feature the following: interviewers need to understand the objective, must have no bias, be a good listener and allow the interviewee to speak independently, understand and help others with honesty, not to show too much sympathy, not to argue with the interviewee. After that, the interviewer brings qualitative data to analyze and summarize. [7]

2.5 Fish Bone Diagram Theories

The fishbone diagram is defined by the Japanese Industrial Standards (JIS) showing a systematic relationship between several causes and the possible causes that affect one problem.

The fish bone diagram has several objectives as follows: to find out the cause of the problem, to understand other processes because the employees only know the problems in their area. If there has a fishbone diagram, it will be easier to know the processes of other departments and to bring everyone interested in the problem to brainstorm and find out problem as a group.

2.5.1 The Creating of Fish Bone Diagram

- 1.) Determine the problem at the fish head
- 2.) Determine the factors that cause the problem
- 3.) Brainstorm to find out causes of each factor
- 4.) Find the root cause of the problem
- 5.) Prioritize causes
- 6.) Find ways to improve

2.5.2 Determination of Factor on the Fish Bone

The fishbone diagram consists of the following sections: problem or effect, which is displayed at the fish head. Causes can be further subdivided. The fish head is a summary of the cause of the problem. The fishbone is place of the causing problem. Figure 2.5 shows the main factor as the bone and minor factors on the arrows. The main problem is a head fish. [8]

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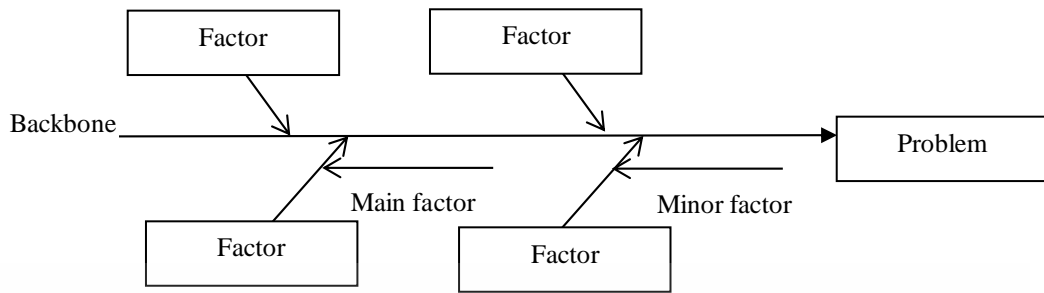


Figure 2.5 Structure of the Fish Bone Diagram

2.5.3 Determination of Problem on the Head of the Fish

The problem on the fish head should be set correctly and clearly. If it is unclear, it may take some time to find a major and minor factor. The problem defined should be possible for finding a method to solve. After defining the problem and finding a solution, the researcher should follow up the results and plan to gather the data to measure.

2.6 Pseudo Code

The tool used to describe computer programming by converting to a computer language is called pseudo code. Pseudo code is a very popular tool for programmers because it can describe long words and is a clear structure not dependent on a particular language. There are common agreements in the creating pseudo code. The main components of the pseudo code are: command name, task command, command control, group of commands.

2.6.1 The Creating of Pseudo Code

The creating of a pseudo code is the use of English words to show how computers work and then collect the sentences that will be shown to the reader to understand each step of the process. The good Pseudo code must be clear and concise, and before writing

the algorithm, the writer must set variables before use. The sequence of writing the pseudo code is as follows.

- 1.) Getting program input
- 2.) Displaying output
- 3.) Computation or mathematical operation of a program
- 4.) Setting initial value in the program
- 5.) Comparison of two data and one way or multiple choice of work
- 6.) Repeating job in the program

2.6.2 Comparison between Pseudo Code and Flowchart

Example: Write an algorithm to get price per unit and the amount purchased.

Then calculate the total price under the following conditions.

If the buyer buys less than 6 units: Discount 10%.

If the buyer buys equal or more than 6 units: Discount 15%

Solutions: 1.) Set the default value of the total price

2.) Get the input with price per unit and number of items purchased

3.) Compare items quantity

If the buyer buys less than 6 units: Total Price = (Unit Price x Units) x 90/100

If the buyer buys equal or more than 6 units: Total Price = (Unit Price x Piece) x 85/100

4.) Display the price of the product from the calculation [9]

```

Start grandtotal = 0

read price, numbers

if (numbers < 6)

then compute grandtotal = (price * numbers) * 90/100

else compute grandtotal = (price * numbers) * 85/100

endif

write grandtotal

Stop

```

Figure 2.6 Example of Pseudo Code

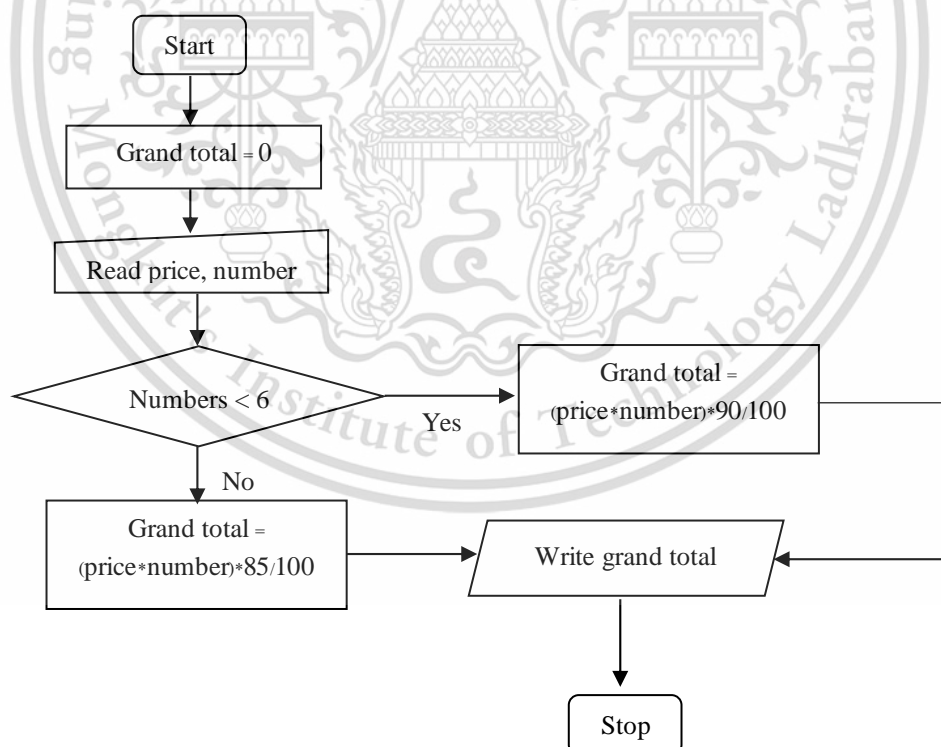


Figure 2.7 Example of Flowchart

(Sources: Retrieved March 4, 2016 from <http://academic.udru.ac.th/~samawan/content/3-Pseudocode.pdf>)

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2.7 Flow Chart

To write a workflow algorithm fast and easily, the programmer should plan before write a program. There are two types of algorithms: pseudo code and flow chart. In this section, the definition of flowchart, flowchart components and example will be described. The flowchart is a diagram that describes how the program works by using geometric shapes and arrows to show sequence of steps and flow of data. [10]

2.7.1 Definition of Flow Chart

Structured programming is a program that consists of three processes: sequence, decision, and loop.

2.1.7.1 Sequence

The simplest programming model is to write a statement from top to bottom. Write a command line and write a step by step at a time from the top line down to the bottom line. There are 3 processes: read, calculate and print. [10]

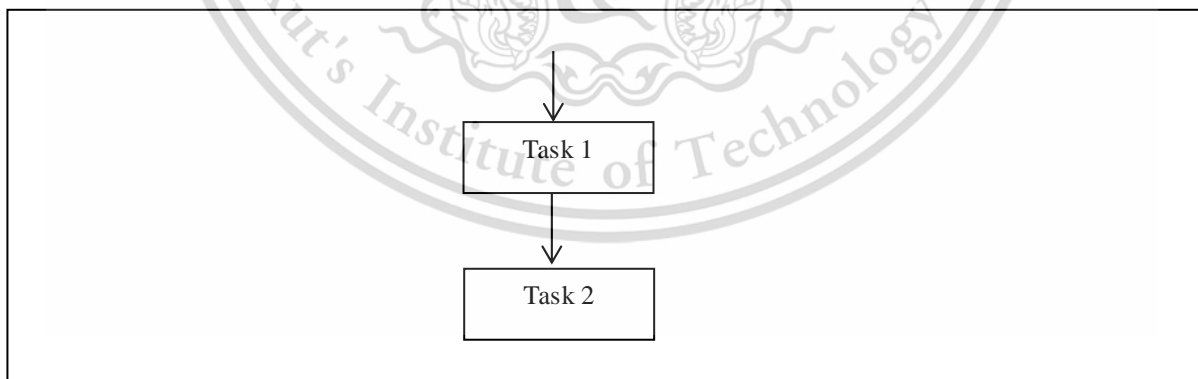


Figure 2.8 Sequence Processes in Programming Model

2.7.1.2 Decision

Decision is programmed to bring value to action. Usually, there are two events to be done under the condition in the process. If it is false, then another process will be chosen.

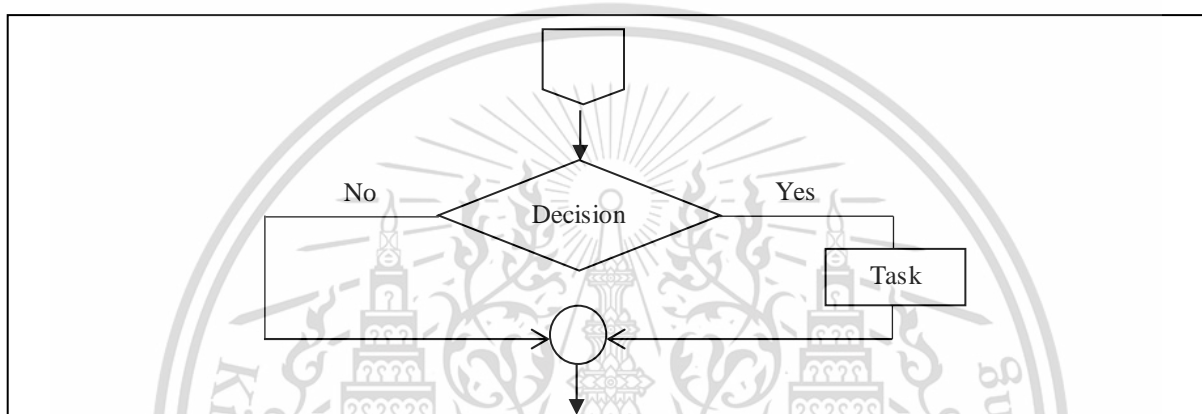


Figure 2.9 Decisions in Programming Model

2.7.1.3 Loop

This step is operated several times with conditions to control the process.

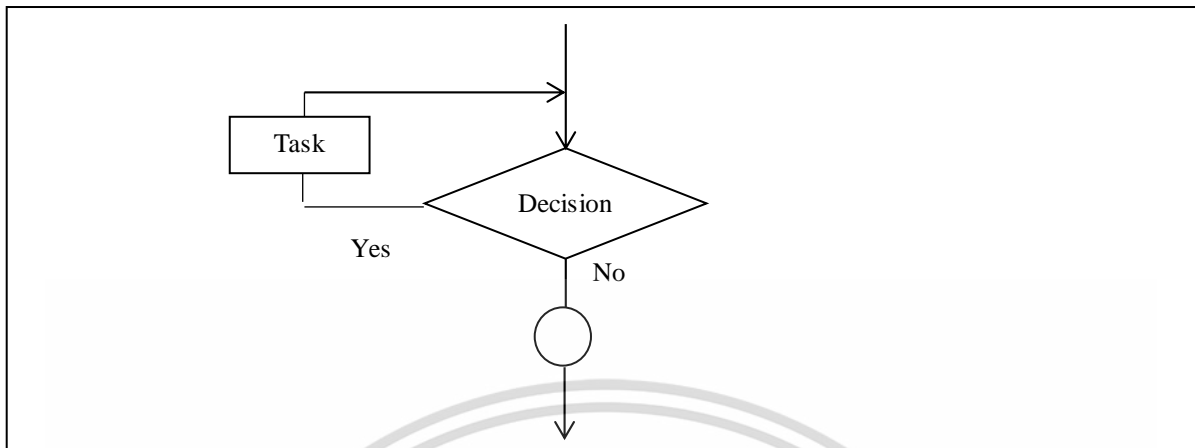


Figure 2.10 Repeating or Loop in Programming Model

2.8 Visual Basic in Excel

Visual basic is a programming language developed by Microsoft. The language is based on Basic, which stands for Beginner's All Purpose Symbolic Instruction. The basic language allows those who do not have the basics of numerical programming to learn and use it easily and quickly compared to other computer languages, such as C or Pascal.

Visual Basic for Application is writing commands in Visual Basic to run Microsoft Office programs automatically. This allows users to reduce redundant work. Also, users can work using VBA more quickly and accurately than manually.

2.8.1 The tools of VBA in Excel

The Project Explorer is a window showing the list of items available in a project as Figure 2.11 is list of Worksheets.

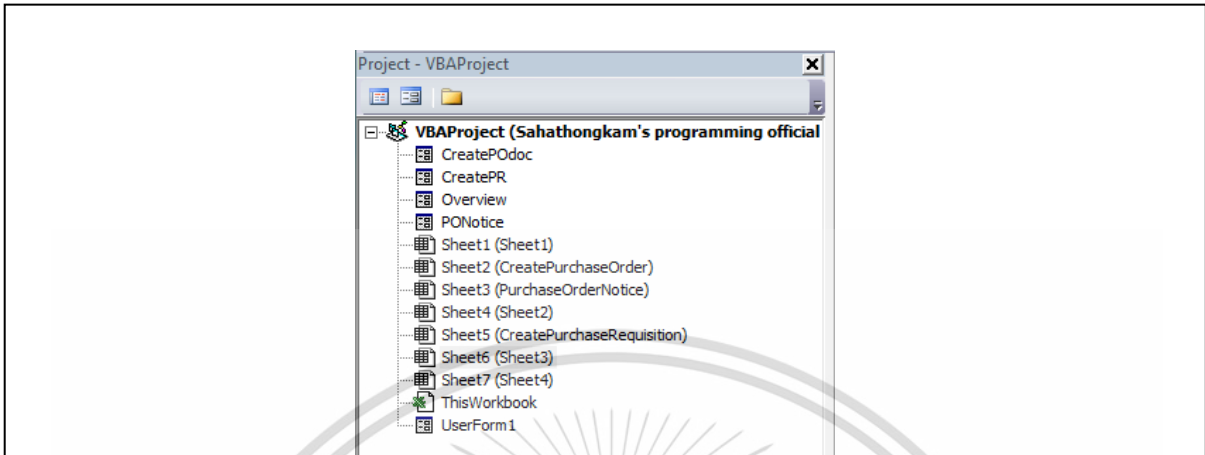


Figure 2.11 Project Explorer Window

Figure 2.12 shows the Properties Window which is a display window that defines the basic properties of controls and objects: names, colors, and sizes, which can be identified by writing more code later.

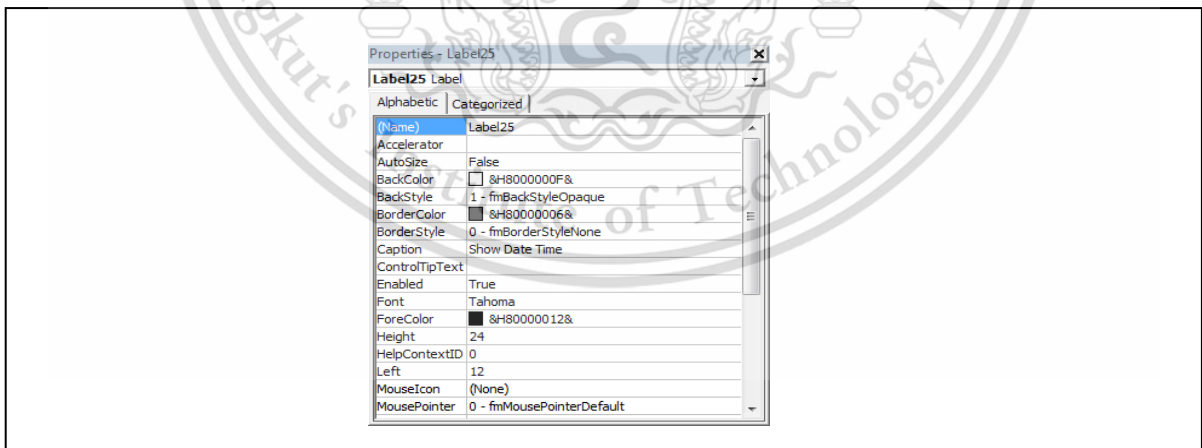


Figure 2.12 Properties Window

Figure 2.13 shows the Code Editor which is a window to write code to control the action of the program after designing the program and setting the properties of the command.

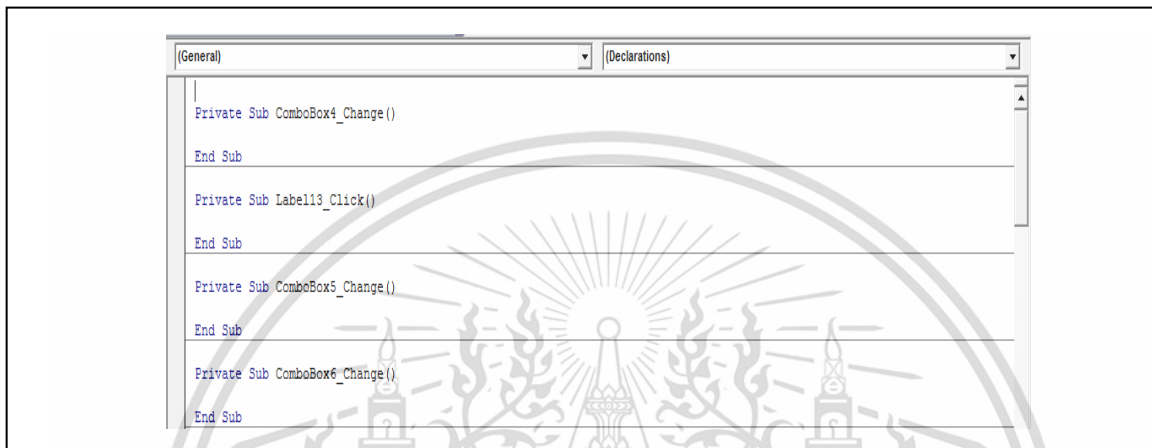


Figure 2.13 Code Editor Window

VBA is used when the work is repeated, running hundreds of steps in the same way. If VBA is used once, it will work no matter how many times. When the work is complex, such as data from the first step into the next step and taking the information from step two to use in the third, fourth, and fifth steps, users can reduce the complex work to a single step by using VBA. In addition, VBA is used for works related to the database and those that require a data link in the company. [11]

2.9 Related Works

2.9.1 Integrating the Use of Spreadsheet Software and VBA in Inventory

Simulation

In study, the advantages and disadvantages of computer programming and spreadsheet modeling in logistics education and inventory control were explained and described using Microsoft Excel and VBA. One of these approaches, integrating the use of spreadsheet software and VBA, has been used in recent years in a logistics systems management course with a large enrolment at a major university.

The development of an integrated spreadsheet model requires knowledge of the supply chain and distribution processes within the organization as well as the impact of alternative scenarios on suppliers, customers and on the organization, itself. Integrated spreadsheet modeling and VBA is a powerful tool for analyzing opportunities and calculating benefits, and it can be done very successfully within the confines of current spreadsheet software. This type of modeling lends itself well to the abilities of most engineers, consultants and managers that have a comprehensive knowledge of their company or client.

[13]

2.9.2 Inventory Management in Small and Medium-Sized Manufacturing

Companies and Its Main Dilemmas

The study has been explained on small and medium-sized manufacturing companies with very complex production processes. The main goal is to outline the major difficulties influencing the performance of small and medium-sized manufacturing companies in connection with the complexity of their production processes. Some examples

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from the Czech business environment and results from the previous researches of the author are briefly analyzed and discussed in several parts of the study. Each of the interviewed companies confirmed that the main problems of the current business environment are permanently higher customer's requirements for delivery times, product innovations and high unpredictability of customer demand. These factors negatively influence the complexity of the whole production process and logistic costs. Then, the production planning is chaotic, production orders are often delayed and all engaged people are disgusted. It is especially because of the following reasons: lack of communication between individual departments and people inside the company, especially between a sales representative and logistic or production manager, absence of unified standards and procedures (for example the standard of communication with the end customer – what can be promised, in which delivery times etc.), absence of any inventory management system, absence of classifying produced items and related materials into several groups according to their turnover and material costs. [14]

2.9.3 Design of Purchase-Sales-Inventory Business Software Based on Excel

The study has been explained that purchase-sales-inventory software is a common tool of small business enterprise information and can be designed by using Excel. This paper focuses on the idea of “fool” business software design with Excel sequence, record pointer and ActiveX control, and introduces the skills in invoking development tool, setting Macro security, using name and sequence, using Excel function, eliminating loop computation, designing record pointer, and designing “Reset” and “Confirm” control buttons in software design.

Purchase-sales-inventory software is a common tool for information of supermarkets, personal stores or other small enterprises. The operation method includes:

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Firstly, initially setting, inputting product information and initial; inputting sales, according to economic business, purchasing data; after clicking the "Confirm" button, automatically processing to generate information flow, such as purchasing and selling account by the software, automatically carrying over the cost of sales, calculating gross profit and generating purchase-sales-inventory quantity or amount of sub-species. [15]



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CHAPTER 3

RESEARCH METHODOLOGY

This chapter discusses the details of the business studied, starting with the working process in the business, organization chart, and department to improve purchasing, warehousing and accounting. It describes the data flow of the company with context diagram and DFD level 0-3, finds out the cause of the problem from in-depth interviews and creates the fishbone diagram to find major and minor factors that lead to the problem. Then, it shows the exiting working flow and how to improve it to the new working flow. After the present working flow is completed, this chapter will show the design of the program interface and describe which parts in process have been improved.

3.1 Business Details

This study focuses on solving the problems of Saha-Thongkam Engineering Company which is a SMEs business. It is located at 28/2 moo 2, Khlong Ban Pho, Ban Pho District, Chachoengsao. The company was established in 2005. The president of this company is Worawit Thongkam. This company type is business made to order. It produces several products such as coating, folding, welding, palate building, rack building and shelf building. The company employs a total of 54 employees, and the company's organization chart and details are shown in Section 3.1.1. In order to make enough profit to pay the salaries of employees as well as welfare, the company should reduce costs and increase profits by working efficiently and quickly. Therefore, it requires cooperation from all departments in the company.

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Figure 3.1 Saha-Thongkam Engineering Co., LTD

3.1.1 Organize Chart

Figure 3.2 shows the organization chart; the director and advisor general manager are on the top of the chart. There are 4 manager sections: safety manager, marketing manager, engineer manager and accounting manager. The cost personnel are responsible for budget review on each project. The planners are responsible for planning the schedule before starting and ending the project. The human resources team manages the welfare of employees, recruitments, including housekeeping. The company employs a total of 44 employees, with each department working entirely separately. The company operates on 6 working days, Monday – Saturday, 8 hours per day. This organizational chart is suitable for SMEs. However, if the customer requests a lot of new projects, the human resources team needs more staff to work to meet the demand. Because of a small number of employees, the company encounters delayed delivery due to overloaded work. Therefore, having more staffs means that the business grows bigger.

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3.1.2 Working Process in the Business

Figure 3.3 presents a working process of the business. The business is an operation model of custom making order to the specifications. Starting from the customer requesting specific products or services, when the company receives the task, the marketing or sales department will estimate the cost of the project and inform the customer. Afterward, the finance or accounting department will submit a quotation to the customer. Subsequently, the planner team creates a purchase request to the purchasing department, and the purchasing department will make a purchase order to vendors or suppliers. When these processes are completed, the engineering team can start a project by designing a product. The product design will be approved by the customer before the engineering team can install a product.

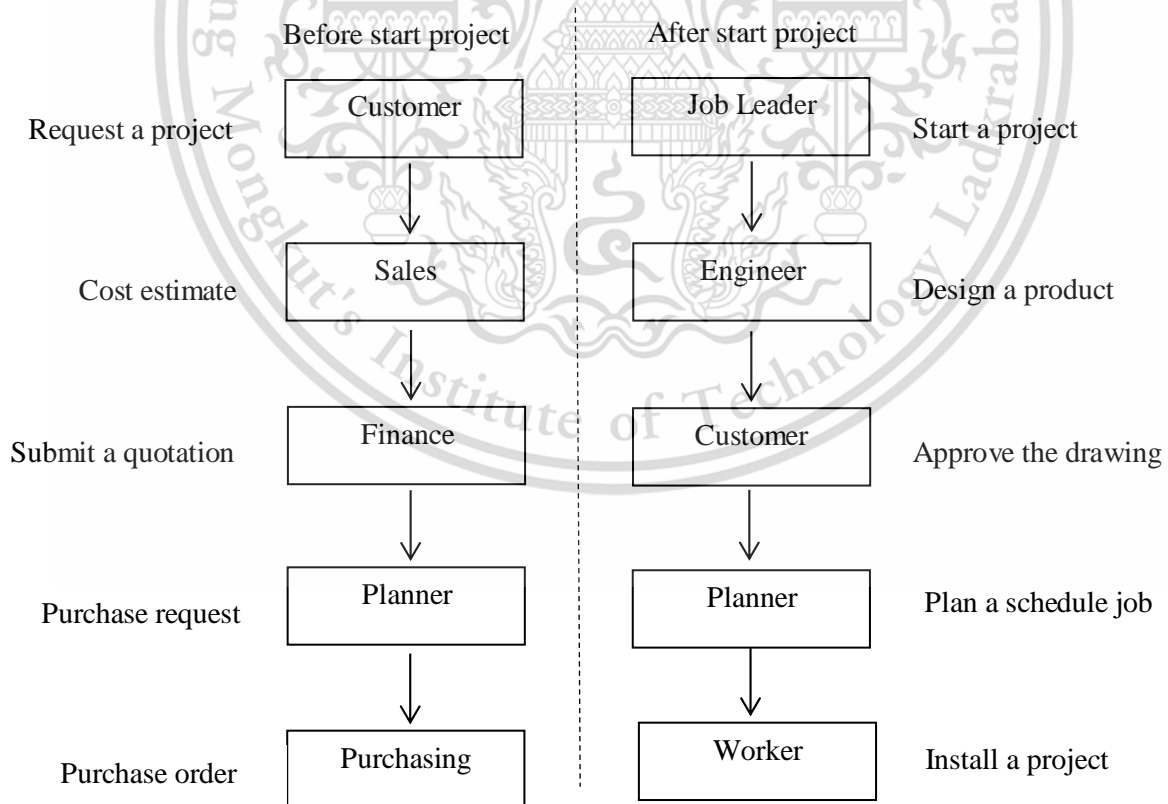


Figure 3.3 Working Process in a Business

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3.1.3 Department Target

This study focuses on three departments including purchasing, warehousing and accounting due to the essence to create a program which is able to fill data and update them. Purchasing is a process which selects suitable suppliers and also follows up delivery dates. Warehousing is a department which manages raw materials or equipment in the store. Accounting is involved with the entire of business finance. The program can support operations in these departments. Moreover, it is convenient to use the program in order to reduce time and to increase reliability. Normally, the accounting department does not receive any data from the purchasing department; thus, the accountants cannot calculate the right figure. Likewise, the purchasing department may have already made a purchase, but they did not remember the dates when the items will be delivered. In order to improve this procedure, the company requires a program to manage the system.

3.2 Data Flow of the Company

The data flow diagram and theories discussed in Section 2.2 are applied in this section. The data flow diagram model represents the figure below. This figure displays the relationship among the purchasing, warehousing and accounting departments. It is simple to understand the working process in the business.

3.2.1 Context Level DFD in the Company

The company's process is described in a context diagram, starting with the customer's order. Then, the sales department will estimate the price and inform the customer. After that, the purchasing department orders raw materials to create a project. When the project is finished, the accounting department sends an invoice to the customer to complete

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the process. In Figure 3.4, there are 5 main sections in the working process: customer, purchasing, sales, accounting and warehousing. The customer submits job orders to the sales, and then the sales will reply acknowledge to customer. The sales department receives sales order data from customer and sends the cost estimate to the customer for confirmation. When the customer approves, the engineering team designs and makes a purchases request to buy raw materials and equipment by sending a request to the purchasing department. Then, the purchasing department sends the purchase order to the vendor. The warehouse receives the goods from the vendor and sends the stock balance data to all users. The vendor brings invoice to sign for acknowledgement at the warehouse and sends an invoice to the accounting department. The accounting department then pays the vendor's bill and sends invoices to the customer.

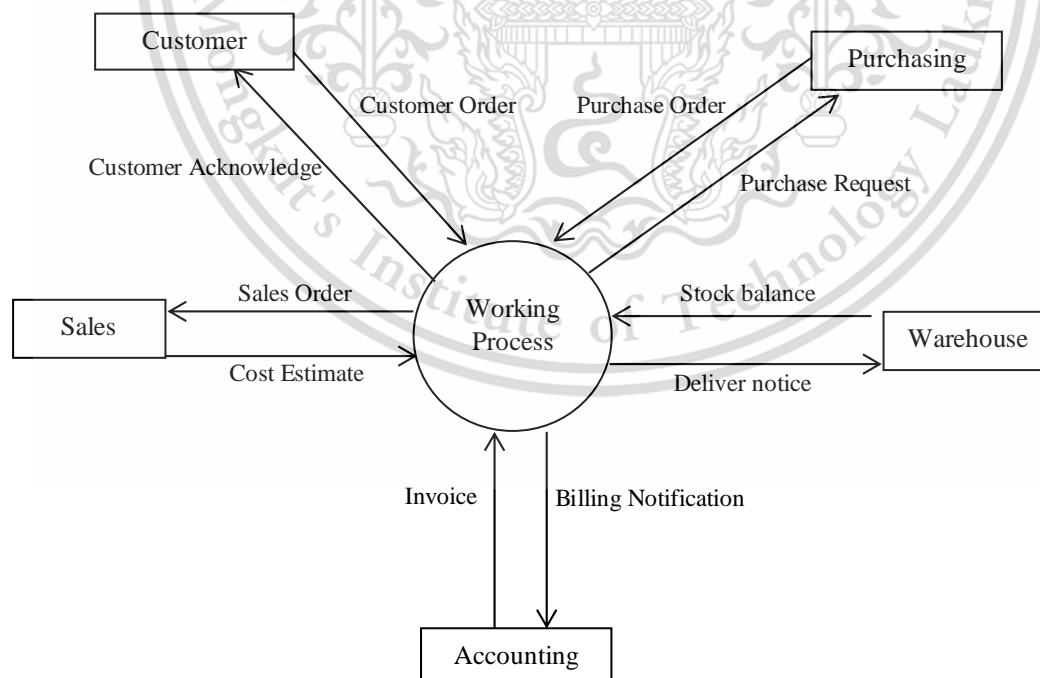


Figure 3.4 Working Process Context Diagram

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3.2.2 Level 0 DFD in the Company

In level 0 DFD, Figure 3.5 indicates the workflow of each department in the company, starting with the customer order which enters the activated sales DFD 1.0 order using customer data and sales data. Moreover, the DFD 1.0 is controlled by the sales department. Manage billing DFD 2.0 is controlled by the accounting department by collecting accounts receivable data for making a decision. The activated purchasing DFD 3.0 is controlled by purchasing department by getting purchase requisition data from other departments and stores vendor data to compare prices and then send a purchase order to the vendor. After that, the accounting department decides the account payable after the purchasing department issues the PO. Subsequently, the vendor receives the PO and sends the goods to the warehouse. The warehousing department controls and checks the inventory available DFD 4.0 and stores the inventory data for recheck later. According to the context diagram, it can be seen that the customer and the sales department are transferring the data. Therefore, the sales department should store the data of each customer in order to classify the customer to facilitate the job category. The purchasing department will send a purchase order data to the vendor, and then the vendor sends invoices to the accounting department to issue payment bills. The warehouse receives the goods from the vendor and informs the stock balance to all users. It is obvious that all departments are interconnected by data transmission and data reception. There is no department that operates separately. Communication should be clear, and data sent should be accurate. If the information is incorrect, such information will be distributed to other departments, which results in the process error.

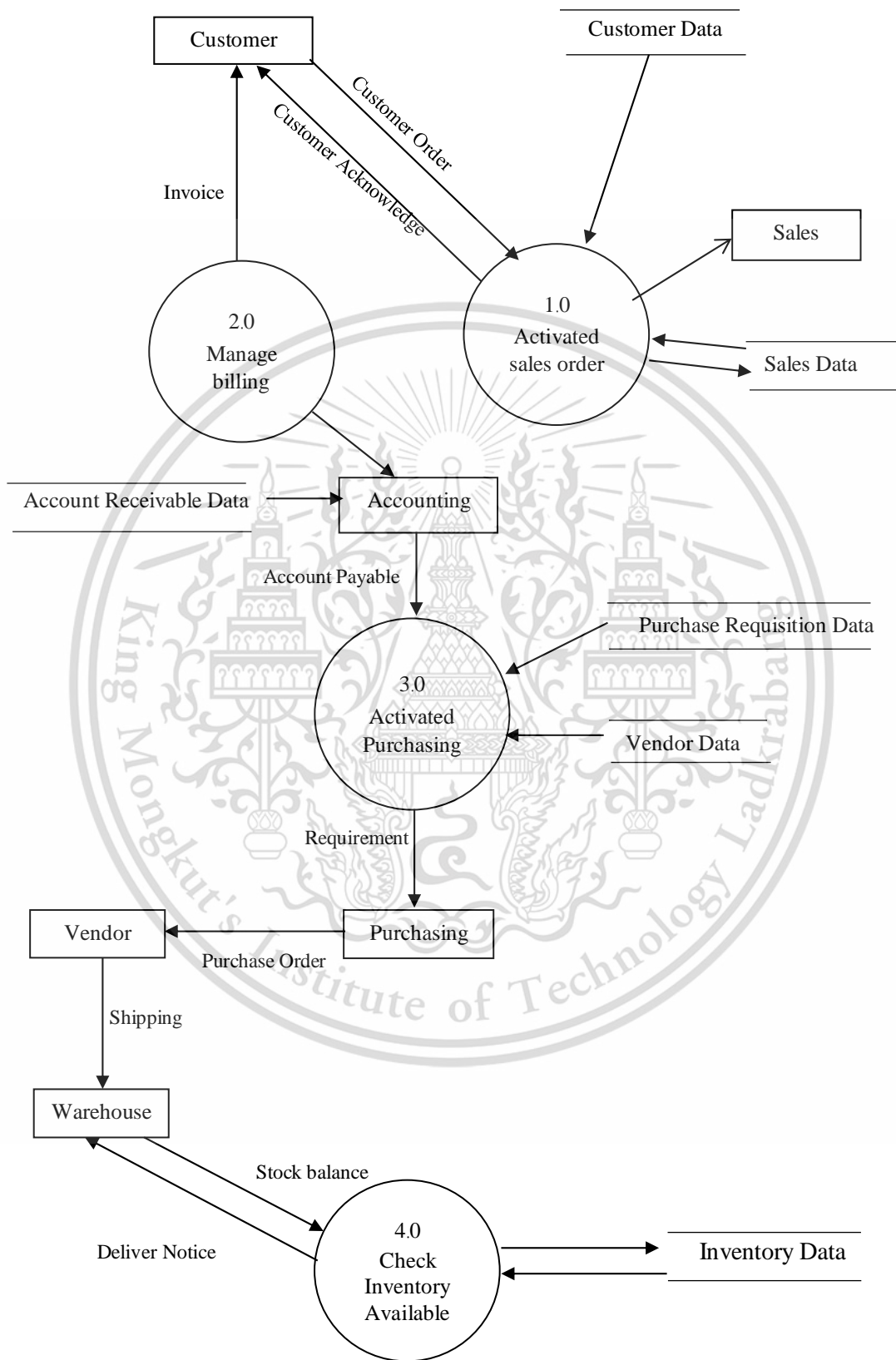


Figure 3.5 Level 0 DFD in the Company

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3.2.3 Level 1 DFD in the Company

3.2.3.1 Activated Sales Order 1.0 DFD

Figure 3.6 demonstrates the Activated Sales Order Level 1.0 DFD which describes the process of the Engineering & Inventory's Available. 1.1 DFD receives a customer order and then stores it in marketing data. Then, the project order is sent to Check Credit 1.2 DFD to decide whether to accept or reject the order, and this process uses data from customer data and sales order data to make decisions. After the customer order is accepted, it will be notified to the process of Complete Sales Order 1.3 DFD. The process will use the inventory data to make a decision before informing the customer.

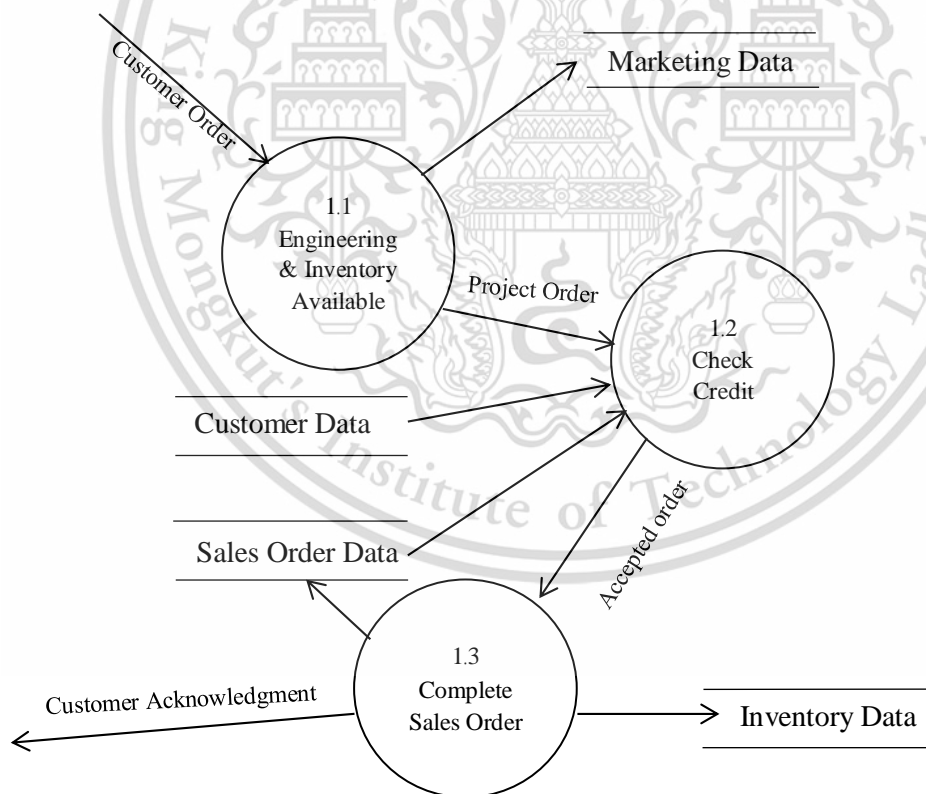


Figure 3.6 Activate Sales Order 1.0 DFD

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3.2.3.2 Manage Billing 2.0 DFD

An overview of this process is the sales department and the accounting department working together. The sales department sends sales order data to verify the correction of data received and then confirm and notify the accounting to send the invoice to the customer. Figure 3.7 presents the process of the Managing Billing 1.0 DFD, which starts with the sales order notification and using data to compare in the Verify Data 2.1 DFD. The next process is in order to check the information. If it is completed, the information will be sent to Make an Invoice 2.2 DFD process. All information in this process should be stored in a category and be rechecked at any time. When the accounting department and sales department receive and transfer the information, they can make a decision which works quickly and accurately and the customer will get the information on time.

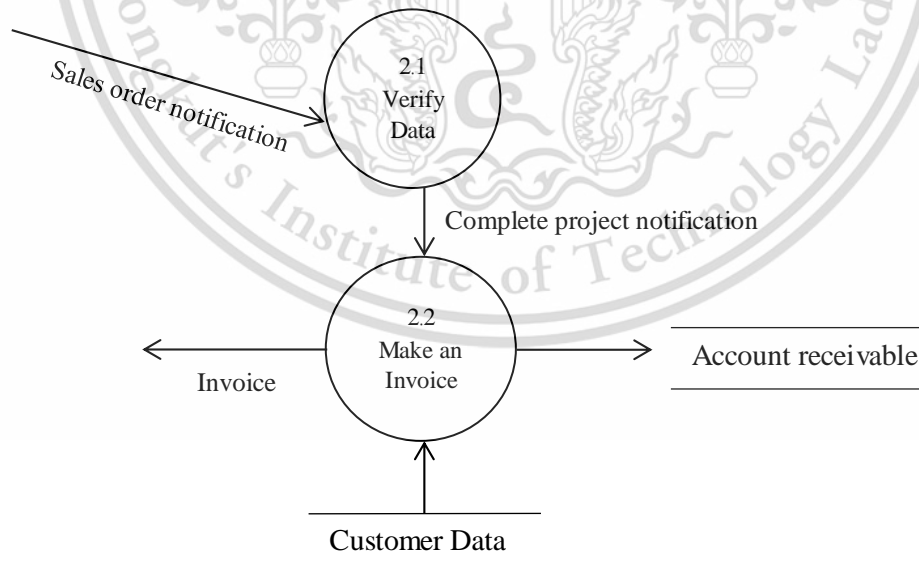


Figure 3.7 Manage Billing 2.0 DFD

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3.2.3.3 Activated Purchase 3.0 DFD

Figure 3.8 illustrates the process of the Activated Purchase 3.0 DFD. It starts from other departments making a purchase requisition to the purchasing department. The procurement department will make a decision in the Select Vendor 3.1 DFD which uses data from vendor data to select vendors. Then, the data will be sent to the Make a Purchase Order 3.2 DFD. When the PO is released, it is sent to the vendor and saved into the purchase order data. The relationship between the vendor and the purchaser is linked by vendor data and purchase order data. The purchasing department stores the order history data with each vendor in order to recheck them later. If the same product is ordered, some vendors will charge the price higher than the previous price. The purchasing department has the information to bargain with the vendor because of the order history data. Therefore, they can bargain with the vendor, and then the vendor discounts the price and the cost of the project will also be lower. According to the above information, the purchasing department selects the vendor appropriately and place orders with the vendor quickly.

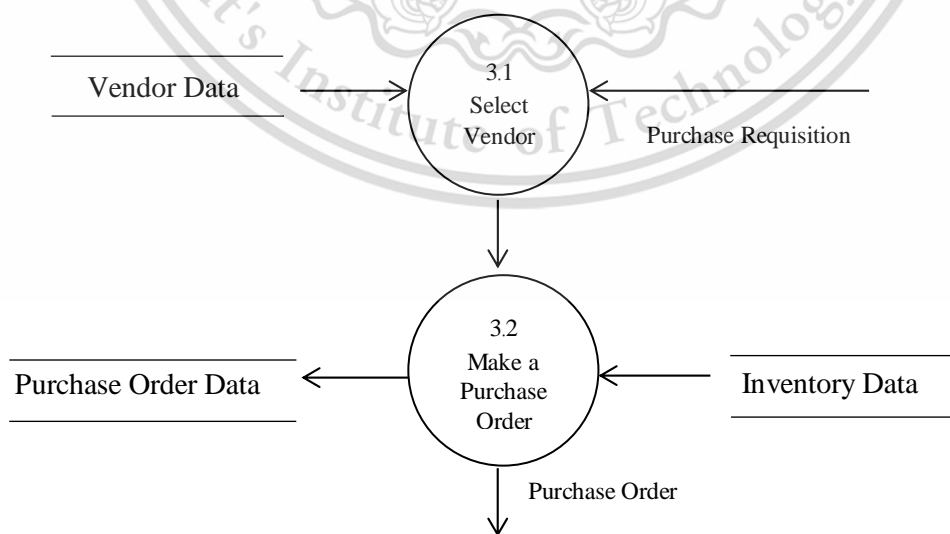


Figure 3.8 Activated Purchase 3.0 DFD

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3.2.3.4 Check Inventory Available 4.0 DFD

Figure 3.9 displays the process of Check Inventory Available 4.0 DFD.

It starts from other departments requiring items in the warehouse. The process goes into the Check Stock 4.1 DFD process, which uses the inventory data to check the stock. After that, the stock balance will be sent to the Management Inventory 4.2. In this process, items will be export out of and import into the inventory, and the stock balance is sent back for checking and storing in the inventory data. The warehouse is a place to store both equipment and raw materials. A good warehouse should have all the required materials and proper placement for convenient use. Therefore, the warehouse must store the inventory data for stock checking. If certain materials are out of stock, the warehousing department goes to the purchasing department to buy the items to fill in the stock. Nevertheless, there are the items that are not common, which is the special type of the specific work. This cannot be stored in the inventory; on the other hand, the items will be purchased if required. Otherwise, unnecessary items are not stored, meaning no loss of space of the warehouse and no loss of needless budget.

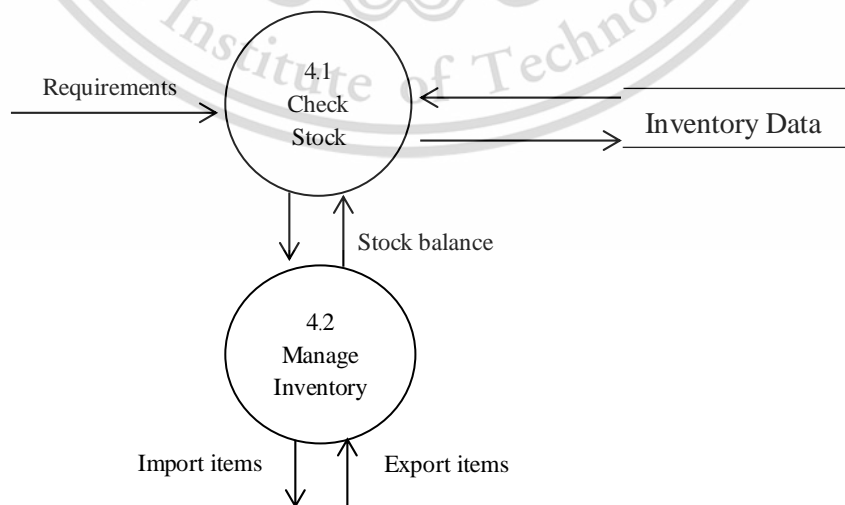


Figure 3.9 Check Inventory Available 4.0 DFD

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3.3 In-Depth Interview in the Company

This survey starts with the in-depth interview with the planning, purchasing, warehouse, and accounting departments. The problem is the delayed project due to insufficient data to make decisions. In addition, missing data have not been calculated for the project budget. Therefore, sometimes the total budget is not accurate. The planning department has commented that using hard copies to collect the data in the warehousing department is not suitable because when the equipment/materials are drawn from the store; some of them are not updated in stock balance. Therefore, the staff does not know the exact quantity of all items in a warehouse which results in delay. When the user requires some items in a warehouse but they are not in stock and all items have no material number because there are never registered in the system, it will take a long time to find such items. Moreover, the company does not record the date of receipt and when the supplier ship, so the user forgets the item and cannot predict the exact date of the project completion. In the purchasing department, the main problem is the ordering of the supplier. There is no system to record the ordering histories which will be rechecked with the quotation, and it also takes a long time to find the old documents. Furthermore, sometimes some items are not recorded as purchase orders because they are urgent jobs. The company does not have a systematic documentation management. Therefore, the company should have a simple program that records each operation for later review, and such simple program should store all documents for related departments. If the company is able to review its operational histories, it will reduce the time and also reduce the exceeding budget. Hence, establishing a program that includes and creates the purchase requisition interface, the purchase order notice and create purchase order documents, and another interface for the inventory control will solve the above problems.

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3.4 Fish Bone Diagram

The theories of fishbone diagram in Section 2.5 and several problems described in Section 3.3 are explained here. Figure 3.10 shows the fish bone diagram, where the head represents the company's problems. It is a project that the company has done slower than scheduled and exceeded the budget. There are four main reasons: people, system, purchasing, document control, warehouse, and inventory control.

- 1.) People consist of minor factors: employees are accustomed to working the old style, not adapting themselves to new technology.
- 2.) The system consists of minor factors: lack of communication among departments, no IT management.
- 3.) Purchasing consists of minor factors: there is no comparison with any supplier, urgent order and the department cannot issue a PO.
- 4.) Document control consists of minor factors: no database stored in the system, hard copies are missing and unclassified.
- 5.) Warehouse consists of minor factors: out-of-stock items are not imported, and it take a long time to find items.
- 6.) Inventory consists of with minor factors: lack of stock monitoring and no required items available in the stock.

Thus, the company should focus on the IT system and should have the document management system to record each job. The company's core issues are involved with the purchasing department and the warehouse, which concerns delays and exceeding budget. If there is a simple program that includes all the information in one file, it will make the work easier and faster, as well as reduced error. Therefore, the company should create a simple program with Visual Basic in Excel by collecting all lists in the warehouse into the

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database to keep the data up to date. The company should use soft file storage to prevent loss of data.

This program will solve the problem of purchasing without comparing suppliers by rechecking the documentation in this program. It is the decision to buy next time, and the key part of the problem is that the warehouse lacks a systematic storage system. When this program is implemented in the company, each activity is recorded more accurately and the company knows which item should be ordered. This is a better plan than ever before.

This fishbone pattern is derived from the information the in-depth interview with a company. Problems in the organization are categorized as the fishbone to solve the problem on the right spot. Therefore, this Fishbone diagram will link each problem to the solution mentioned above. The use of fishbone diagram analyzes the problems that lead to the main problem which is delayed delivery to the customer. It is analyzed based on the information received from the staff. Thus, this Fishbone is an important tool to solve the problem and to explain to those who do not easily understand. Furthermore, it can be applied to other companies that face similar problems. The study of this problem has been analyzed and further refined in Section 3.5, which discusses the improvement of working flow. The improvement will explain the old style of work that poses many problems and after fixing the bug a new working flow is obtained. The difference of the links between old and new flows is explained, as well as the user part which is updated and what is improved. All of these will be explained in the next section.

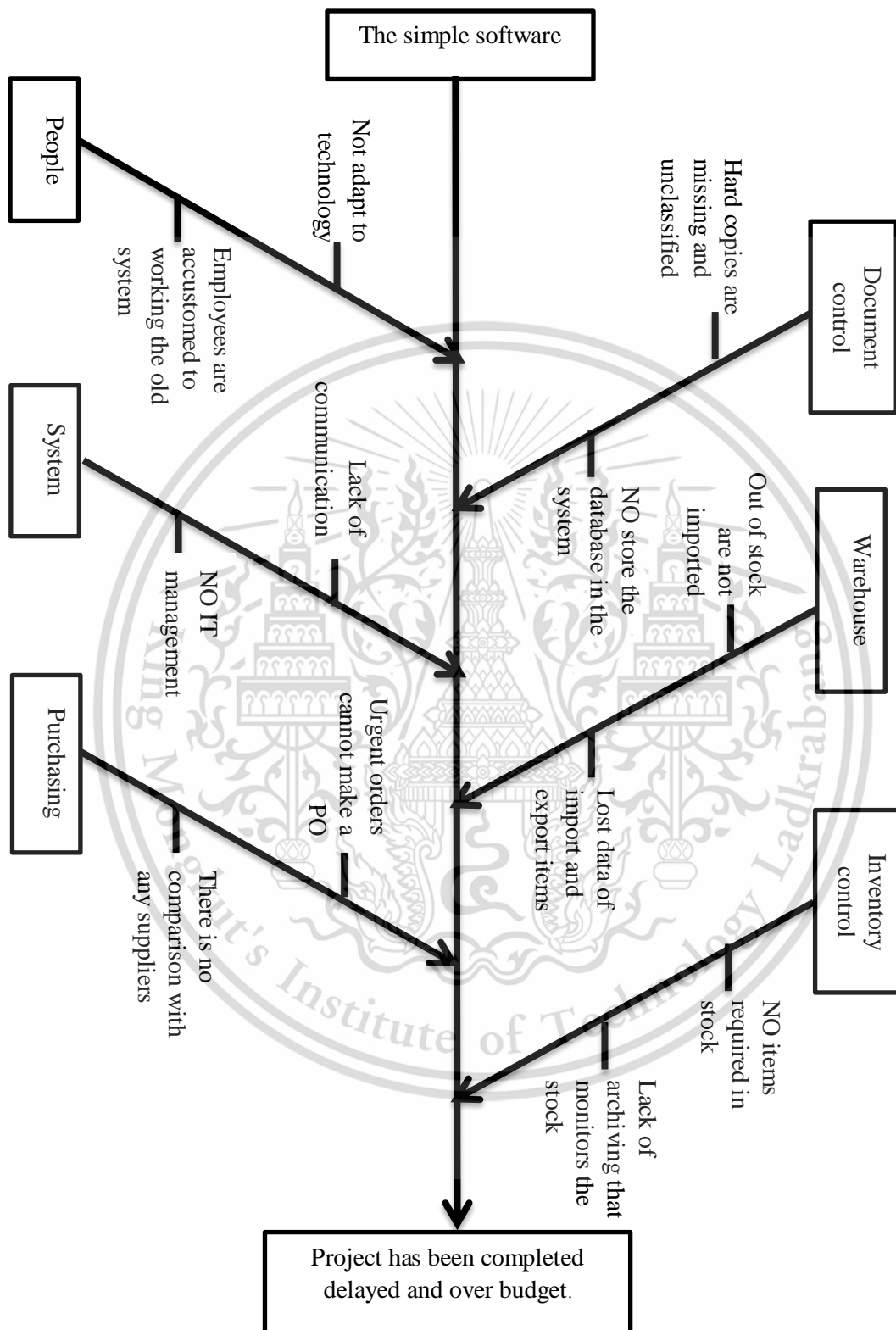


Figure 3.10 Fish Bone Diagram in the Company

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3.5 Improvement in the working flow

The fish bone diagram of the company shows in Section 3.4 is improved here.

1.) People consist of minor factors; employees are accustomed to working the old style, not adapting themselves to new technology.

Improvement: Gradually modify the work and describe the advantages of the new system.

2.) The system consists of minor factors: lack of communication among departments, no IT management.

Improvement: Create simple applications to use in organizations, store database, and share with related departments. It is a communication.

3.) Purchasing consists of minor factors: there is no comparison with any supplier, urgent order and the department cannot issue a PO.

Improvement: This simple program created to allow the user to recheck histories for each purchase and compare prices of suppliers.

4.) Document control consists of minor factors: no database stored in the system, hard copies are missing and unclassified.

Improvement: The simple program stores all activities in this area and classified documents.

5.) Warehouse consists of minor factors: out-of-stock items are not imported, and it take a long time to find items.

Improvement: The simple program calculates stock balance. If the item is out of stock, it will alarm the user.

6.) Inventory consists of with minor factors: lack of stock monitoring and no required items available in the stock

Improvement: The user can recheck all activities including stock balance in a simple program.

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3.5.1 Existing Working Flow

The original style of work is the user who wants to pick up equipment or raw material uses hard copies. The warehousing department checks inventory stock manually without inventory management system which makes each work delay because it takes time to find items in the warehouse. If the user wants to purchase special type items, the hard copy must be filled out to request the purchasing department to make an order. Then, the purchasing department sends the PO to the Vendor. To recheck, it is difficult and time-consuming to find old documents if they use hard copy documents. When the PO has been sent, the vendor sends the goods to the warehouse and submits the invoice to the warehouse. However, the warehousing department does not know the exact date of shipment. Besides, sometimes they do not inform the user that the item has been shipped. The accounting department does not pay the bill to the vendor because the hard copy is not sent to the accounting department.

Figure 3.11 shows the original working flow. It starts with other departments making a purchase request to the purchasing department. Then, the purchasing department places a purchase order to the vendor. After that, the vendor sends the product to the warehouse and the user does not record each operation. The warehouse does not count the remaining stock and inform the user that the item is out of stock.

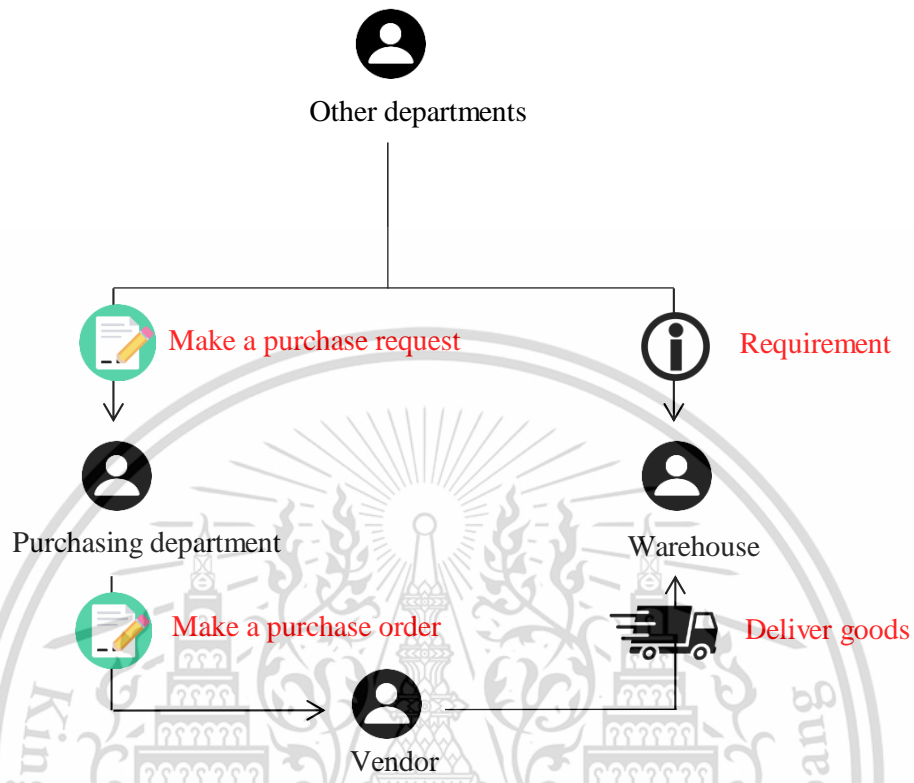


Figure 3.11 Existing Working Flow

3.5.2 New Working Flow

Figure 3.12 shows the new working flow starting with other departments making a purchase request to the purchasing department by recording the operation. Then, the purchasing department places a purchase order to the vendor and record data in the database. After that, the vendor will send the product to the warehouse and the user knows the exact receiving date. The user fills data into a program and then the program calculates the remaining items in the warehouse and update stock balances in this file.

The new working flow after the improvement allows the user who wants to pick up the item send a request to the warehousing department. Then, the warehouse will check the stock using the program created by VBA in Excel. This program stores updated data of all

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items in the warehouse. Then, the user can check the total number of items quickly. If some items are out of stock, the program will alert the purchasing department to purchase the items to fill the stock in the warehouse. When the user wants to purchase special type items, the request must be made in the created program to inform to the purchasing department. Then, the purchasing department will place a purchase order to the vendor and the vendor sends the goods to the warehouse. The warehouse will update the stock balance in the program and send the information to all users. All processes are executed through the newly created program. All operations are recorded in this application for convenience, and all departments communicate through this program.

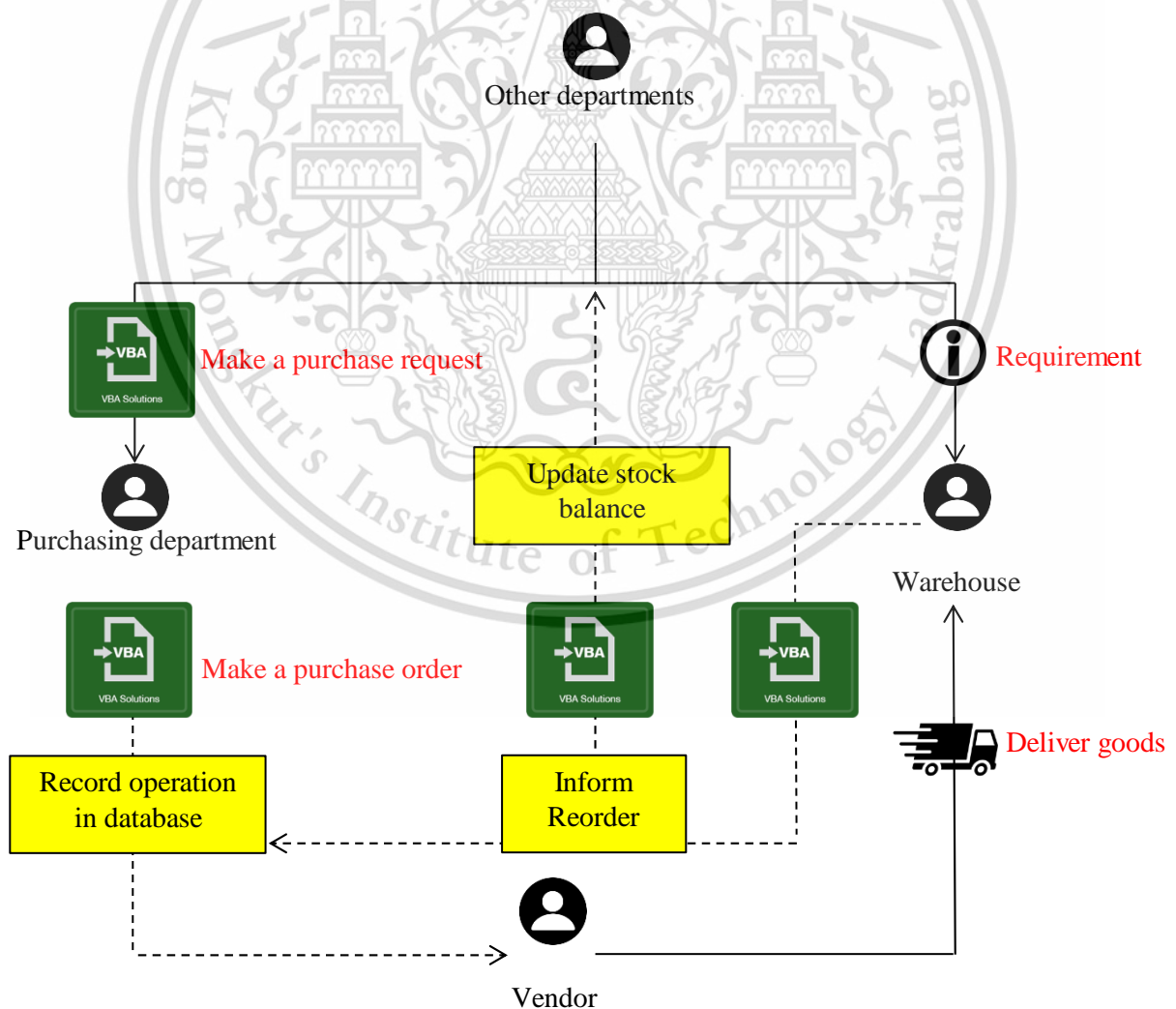


Figure 3.12 New Working Flow

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3.5.3 Program Overview

The program will be created in the next chapter and should have interfaces of departments such as purchasing department, warehousing department and accounting department. The overview window will display 3 windows: create purchase requisition, purchase order notice, create purchase order's document. Create a purchase requisition is an interface for the user to fill each purchase order and put all the information on the create requisition excel file. Create purchase order is an interface for the purchasing department. Data are required to be filled to create a purchase order document and saved to create a purchase order in an excel file. This file stores job number, PO number, supplier's name, job name, purchase price and date. The purchase order notice interface is used to record the date, PO number, quotation number, order type, supplier's name, job name, request date and receive date, and all of this will be stored as a sheet in the same file. Another interface, which is the inventory control, displays all available items in the warehouse and has a window for selecting items to be imported or exported. Enter the desired quantity, select import or export, and then the program will calculate the stock balance. The accounting department can use the historical data in this file to re-check the accuracy of the calculation.

CHAPTER 4

RESULTS AND DISCUSSIONS

This chapter explains the procedure for creating the program. This includes the flowchart, pseudo code, and interface of the program. Moreover, it will show how the program works and the results of the program as well as comparing the time spent while working with the program and not using the program and showing how the result differs. Also, this chapter will show the comparison between before and after using the program. Then, the user assesses the user's satisfaction for the program by using the questionnaire. Finally, the results will be analyzed in the next chapter.

4.1 Flow Chart of the Inventory Control

Flow Chart theories in Section 2.8 are applied here. Figure 4.1 shows the Flow Chart of the Inventory Control in the programming. The working process of the inventory control interface starts by choosing equipment lists from the selection lists in the warehouse. All item lists are stored in the database of the program which can be created and updated any time. After the user selects items required, the user fills in the amount to export or import. After that, click the import button when adding items to the warehouse or click the export button when picking items out of the warehouse. The program will calculate the amount of stock balance. If the quantity of the item is smaller than 5, the "reorder" message will be displayed. If the items equal zero, the message "out of stock" will be displayed. This flowchart is part of the program for warehousing department. Users can check the stock without a part manual counted by human. This program reduces the operation time. In addition, it also makes the operation easier and more convenient.

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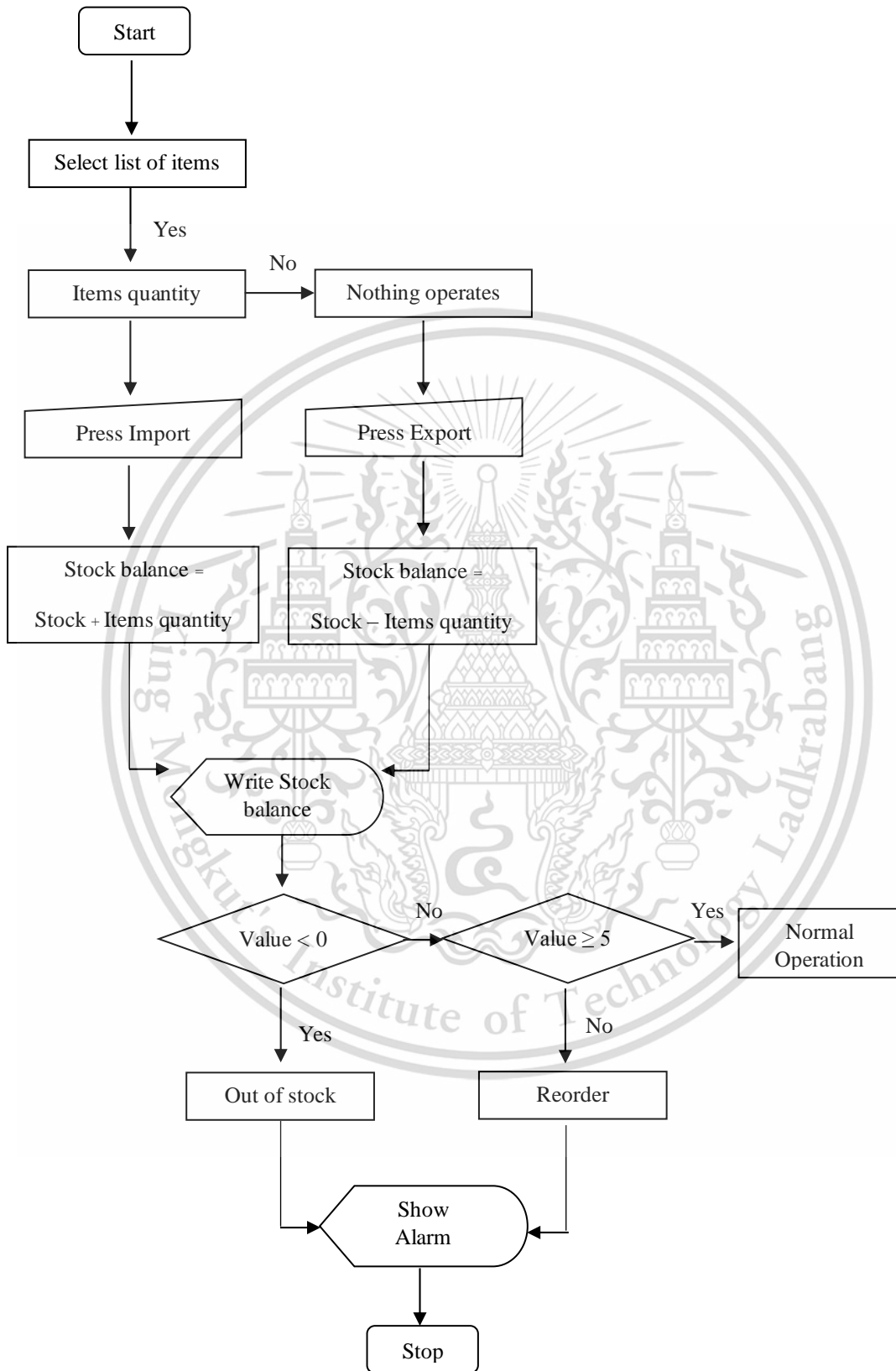


Figure 4.1 Flowchart of Inventory Control in the Programming

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4.2 Pseudo Code and Interface of the Programming

The pseudo code theory and creating methods described in Section 2.6 are applied here. This chapter discusses the Inventory Control interface, Create Purchase Order interface, Create Purchase Request interface and Purchase Order Notice interface. The pseudo code of inventory control interface is referred to by the flowchart in Section 4.1. It is mentioned and the user interface is shown in this chapter.

4.2.1 Pseudo Code Example in a Simple Program

4.2.1.1 Inventory Control Interface

This section shows an example of pseudo code in a window of the programming for warehousing. The user has to fill in the amount of items to be imported or exported. Then, press the OK button to calculate the number of items left in the warehouse. The staff can check the remaining amount of inventory in the warehouse easily. If items are running low, then the order to purchase items comes into the stock. Therefore, the workflow will be faster than that of the conventional system when the company switches to a simple application, which is intermediate between the user and the soft copy.

Figure 4.2 shows the pseudo code of the inventory control using if else statement. When no list is selected, items will not be added or deleted. If the user selects the list of items, then the amount of items will be filled. The program will calculate the stock balance. If the number of items is less than 5, the user should reorder. If the item is less than 0, this indicates that the item is running out.

Figure 4.3 shows the Inventory Control interface used for the warehouse. The user selects the list of items to be added or deducted at number 1, fills the

amount of items at number 2, and then clicks the import or export button. Then, all values will be updated in the excel file as shown in Figure 4.4.

```

Sub btnDeduct_Click()
Dim C As Range
With lstRng
Set C = .Find(cbxDList.Value)
If C Is Nothing Then
MsgBox cbxDList.Value & " is not listed"
ElseIf Not C Is Nothing Then
Select Case C.Offset(0, 1).Value
Case Is >= CDec(tbxDStock)
C.Offset(0, 1).Value = C.Offset(0, 1).Value - tbxDStock.Value
Case C.Offset(0, 1) < 5 're-order level
Sheet1.Range("a1").Value = "Order " & C.Value 'enter order
Case C.Offset(0, 1) < 0
MsgBox C.Value & " is out of stock"
End Select
End If
End With
Me.cbxDList.Value = ""

```

Figure 4.2 Pseudo Code of the Inventory Control interface

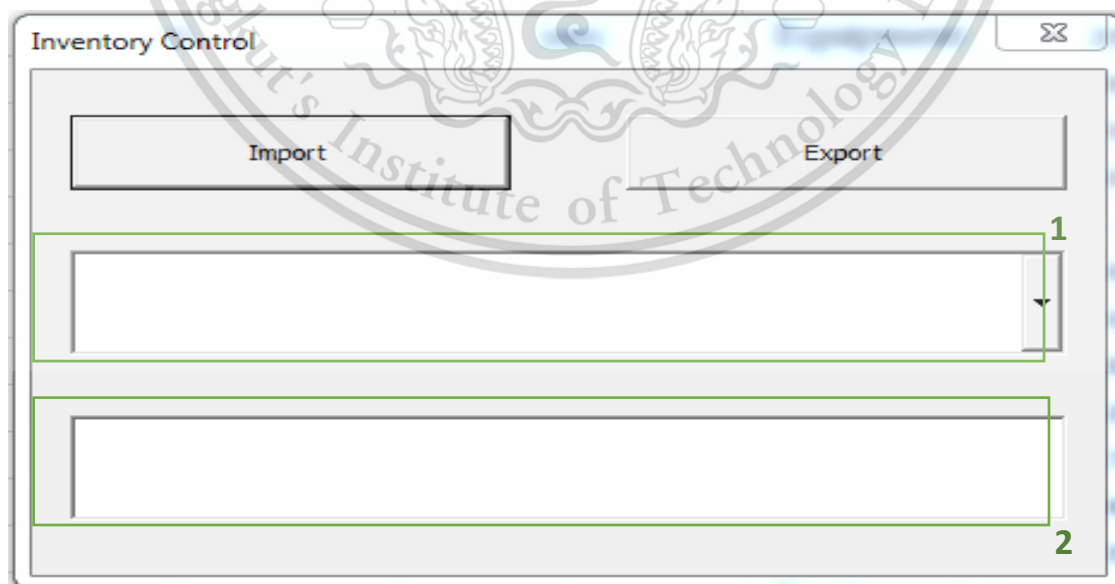


Figure 4.3 The Inventory Control Interface

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	A	B	C	D	E
	ชื่อสินค้า	QTY on Hand	หมายเลขสินค้า	TYPE	ราคาต่อหน่วย
2	กรรไกรตัดสังกะสี	10	1001	Equipment	200
3	กรวย	11	1002	Equipment	380
4	กระเบื้องน้ำ	13	1003	Equipment	45
5	กระสอบป่าน	13	1004	Equipment	60
6	กำมะลอ	13	1005	Equipment	-
7	เกียงแซะ	13	1006	Equipment	45
8	เกียงใบโพธิ์	13	1007	Equipment	42
9	ขาวแดง	13	1008	Equipment	400
10	เข็มขัดนิรภัยแบบเต็มตัว	13	1009	Equipment	1180
11	ไขควงแฉก+แบน	13	1010	Equipment	175
12	ค้อน	13	1011	Equipment	240
13	คัตเตอร์	13	1012	Equipment	20
14	คีมตัดลวด	13	1013	Equipment	35
15	คีมถ่าง	13	1014	Equipment	110
16	คีมล็อก	13	1015	Equipment	280
17	เครื่องดูดฝุ่น	13	1016	Equipment	-
18	เครื่องตัดไฟเกลียว	13	1017	Equipment	-
19	จอบ	13	1018	Equipment	300
20	จาดักปูน	13	1019	Equipment	-

Figure 4.4 Excel Files of the Inventory Control

4.2.1.2 Create Purchase Order Interface

This section shows some parts of pseudo code in a window of the programming for purchasing. The user has to fill the order details in the space provided and then press saves. Figure 4.5 shows Create Purchase Order Document interface that provides space of job number, job title, supplier, and purchase order number, dates and section and items detail. The data will be saved in the create purchase order file and sheet 4, which is the purchasing order will be sent to the vendor. After saving the data, then all data will be stored in the create purchase order and sheet 4 file. Sheet 4 is a PO slip that will be sent to the supplier when ordering. Create Purchase file is shown in Figure 4.6 and sheet 4 is shown as Figure 4.7. The crating purchase order and the original form will be filled in the document, as shown in Figure 4.8. Message box must be retyped every time according to the vendor name, address, phone number. Besides, no data is collected for the next recheck.

The conventional method often has an error due to the unsystematic of the record. This causes an uneasy progress to find historical data and documentation loss.

However, the problem can be solved by recording the document in the soft file with back up data; also, the data can be saved. The design of this kind of program allows the user to work more organizedly.

```
Private Sub ComboBox4_Change()  
Worksheets("Sheet4").Range("B9").Value = ComboBox4.Value  
End Sub  
Private Sub CommandButton15_Click()  
Dim iRow As Long  
Dim ws As Worksheet  
Set ws = Worksheets("CreatePurchaseOrder")  
iRow = ws.Cells(ws.Rows.Count, "C").End(xlUp).Row + 1  
With ws  
.Cells(iRow, 1).Value = Me.TextBox36.Value  
.Cells(iRow, 2).Value = Me.TextBox89.Value  
.Cells(iRow, 3).Value = Me.ComboBox4.Value  
End With  
End Sub  
Private Sub CommandButton3_Click()  
CreatePOdoc.Hide  
CreatePR.Show  
End Sub  
Private Sub CommandButton5_Click()  
CreatePOdoc.Hide  
PONotice.Show  
End Sub  
Private Sub TextBox31_Change()  
Worksheets("Sheet4").Range("H14").Value = TextBox31.Value  
End Sub  
Worksheets("Sheet4").Range("I6").Value = TextBox90.Value  
End Sub  
Private Sub UserForm_Activate()  
Label25.Caption = DateTime.Date  
End Sub  
Private Sub UserForm_Click()  
End Sub  
Private Sub UserForm_Initialize()  
Me.ComboBox4.List = Worksheets("Sheet2").Range("B2:B133").Value  
End Sub
```

Figure 4.5 Pseudo Code of Create Purchase Order Interface

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 บริษัท สาทองคำ เอ็นจิเนียริ่ง จำกัด SAHA THONGKAM ENGINEERING CO., LTD. 28/2 Moo 2 T.Klongbanpho A.Banpho Chachoengsao 24140 Tel.038-587425 Fax 038-587407.E-mail: saha_purchase@hotmail.com เลขประจำตัวผู้เสียภาษีอากร 0245548000789 ใบสั่งซื้อ เลขที่ / NO: วันที่ / DATE : PURCHASE ORDER SH/2017: 518 5/4/2560							
ผู้ขาย: บริษัท ศรีวัฒนา สติล จำกัด 1815 ม.6 อ.เทพารักษ์ ต. เทพารักษ์ อ.เมือง จ. สมุทรปราการ 10270 TEL : 02-385-0160,385-0563,66 FAX : 02-754-7200		เลขที่ใบขออนุมัติซื้อ Purchase Requisition:		แผนกที่ขออนุมัติ Section : Marketing		ผู้ขออนุมัติซื้อ Requisition: คุณจุฑารัตน์	
ใบเสนอราคาเลขที่ / Quotation No.		เงื่อนไขการชำระเงิน / Term Of Payment เครดิต 60 วัน		JOB NO : STM_20/2017		JOB TITLE : Change stairs for dust collector	
ลำดับ Item	รายการ Description	จำนวน Quantity	หน่วย Unit	หน่วยละ Unit Price	จำนวนเงิน Amount	กำหนดส่งมอบ Delivery	
1	ท่อส่า 3/4" x 2 มม.	10	เส้น	165.00	1,650.00	5/4/2560	
2	ฉาก 50 x 3 มม.	3	เส้น	280.00	840.00	5/4/2560	
3	ซีวาง 100 x 50 x 5 x 7 มม.	10	เส้น	110.00	1,100.00	5/4/2560	
ยอดเงิน Amount	หนึ่งหมื่นสี่พันแปดร้อยหกสิบสองบาทสามสิบสองวางค์ จำนวนเงิน / Sub Total ภาษีมูลค่าเพิ่ม / Vat 7% จำนวนเงินรวมทั้งสิ้น / Grand Total				13,890.00 972.30 14,862.30	รวม / Total รวมภาษี / ITEM	
หมายเหตุ / REMARK : 1. เมื่อได้รับใบสั่งซื้อ กรุณาส่งนามขายผู้ขาย หรือผู้รับใบสั่งซื้อ แล้ว FAX กลับด้วยทุกครั้ง / Please sign in this order and return by fax 2. กรุณาแนบสำเนาใบสั่งซื้อเมื่อมีการส่งมอบด้วยทุกครั้งพร้อมระบุเลขที่สั่งซื้อขออนุมัติซื้อ ใบสั่งซื้อคืนหรือใบกำกับภาษีของท่าน Please inclose copy purchase order every shipment indicating P/O No. and P.R. No. on your invoice and tax invoice. 3. ปรวออกใบกำกับภาษีให้ใช้ที่อยู่ของสำนักงาน / Please put address of office in your tax invoice							
(นางสาวลัดดาวัลย์ ย้อยสิง) วันที่ Date..... ผู้สั่งซื้อ		() วันที่ Date..... ผู้ตรวจสอบ		() วันที่ Date..... ผู้จัดการฝ่าย		(คุณรววิทย์ ทองคำ) วันที่ Date..... ผู้อนุมัติ	

Figure 4.8 Purchase Order Files

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4.2.1.3 Create Purchase Order Notice Interface

This section shows some parts of pseudo code in a window of the programming for purchasing. The user has to fill the purchase order details in the space that has been provided and then press saves. Figure 4.9 shows purchase order notice interface that provides space of date, PO number, quotation number, order type, supplier, job name, request date and receive date. After pressing the save button, all data will be saved in the purchase order notice file.

```
Private Sub ComboBox4_Change()  
End Sub  
Private Sub CommandButton14_Click()  
    PONotice.Hide  
    Overview.Show  
End Sub  
Private Sub CommandButton15_Click()  
Dim iRow As Long  
Dim ws As Worksheet  
Set ws = Worksheets("PurchaseOrderNotice")  
iRow = ws.Cells(ws.Rows.Count, "C").End(xlUp).Row + 1  
With ws  
    .Cells(iRow, 1).Value = Me.TextBox39.Value  
    .Cells(iRow, 2).Value = Me.TextBox34.Value  
End With  
End Sub  
Private Sub Label1_Click()  
End Sub  
Private Sub CommandButton6_Click()  
    PONotice.Hide  
    CreatePOdoc.Show  
End Sub  
Private Sub UserForm_Activate()  
    Label42.Caption = DateTime.Date  
End Sub  
Private Sub UserForm_Click()  
End Sub  
Private Sub UserForm_Initialize()  
Me.ComboBox4.List = Worksheets("Sheet2").Range("B2:B132").Value  
Me.ComboBox5.List = Worksheets("Sheet3").Range("A2:A3").Value  
End Sub
```

Figure 4.9 Pseudo Code of Purchase Order Notice Interface

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4.3 Specification of the Program

- Able to record all operations in the purchasing and inventory processes.
- Able to work in purchasing, warehousing and accounting departments.
- Able to create purchase order document by filling in the blanks.
- Able to calculate the balance stock in the warehouse including a review of each work history and calculating the budget for each purchase.
- Fast and easy to check stock in the warehouse.
- Able to store the database to share data to other departments.
- An option to record supplier's details and price of products.
- An option to alert when out of stock in the warehouse.

4.4 Comparison of Times when Using and not Using the Program

For the purchasing process, the user has to type a normal document file which is completed through excel files and is not kept in the same file. If the user uses the program to fill in the data, it will automatically show the items without any further typing, making it easy to use and faster. It also stores necessary information to recheck.

Before using the program, the data is uncategorized and some data was not filled out due to the time condition. To improve, some data should be filled out even if the purchasing department does not use the data because the data can be useful for others department. Therefore, the program categorizes the information and adds the necessary information.

The result is less time spent in the operation. Then, the time is recorded 3 times for the same data, and the results are shown in Table 4.1 and Figure 4.12 with 61.33 % improvement.

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Table 1 Time when Using and not Using the program

Process	1st Time (Min)	2nd Time (Min)	3rd Time (Min)	Average (Min)
Before using a program	9.2	8.9	9.3	9.13
After using a program	5.4	5.7	5.7	5.6

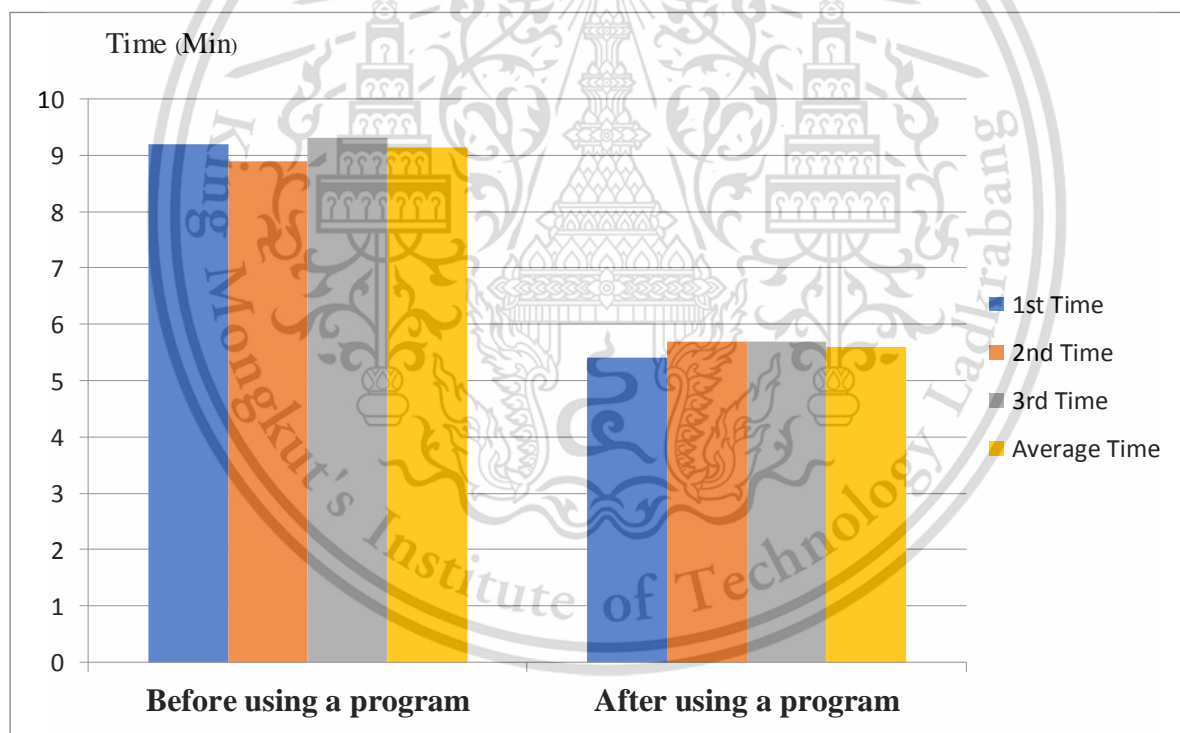


Figure 4.12 Time Comparison Chart when Using and not Using the Program

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4.5 Satisfaction Questionnaire

The questionnaire design described in Section 2.4 is applied here. The objective of this survey is to find out the satisfaction of users when they use the program instead of the existing process. The questionnaire uses a scale that provides the appropriate information to the respondents. It is a fixed response measured by rating. The previous section shows the quantitative results that the program can help improve performance. This chapter shows the questionnaire satisfaction of users who use the program. The purpose of this questionnaire is to quantify the quality of the user's assessment, and the questions are fixed. The questionnaire is a rating scale response. It assesses the respondents' satisfaction levels at five levels: 1 = very dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied, 5 = very satisfied. Then, the results are analyzed to improve the program in the future. This questionnaire is distributed to 1 person in the purchasing department, 2 people in the accounting department and 2 people in the warehousing department. Then, the respondents are suggested to evaluate the questionnaire without bias and personal preference and write suggestions at the end of the questionnaire in the part of improvement and defective of the program. When the respondents rate their satisfaction on using the program, then results from the survey are displayed in a pie graph in the next section. It shows the rating of satisfaction of the program evaluated by the users in various areas. Then, all feedbacks from the respondents written about the program update are shown in Section 4.5.

According to the questionnaire shown in Figure 4.13, all 5 users: 2 people from the store, 1 person from the purchasing department and 2 people from the accounting department gave responses to the questionnaire, and the results are as follows. The users are satisfied with the overall program as shown in Figure 4.14. The users think that the program manages the work better than the original workflow, as shown in Figure 4.15. The users think that the program can reduce all the working time as shown in Figure 4.16. The users think the program helps each department work together better, as shown in Figure 4.17. The users think the program to improve each project, as shown in Figure 4.18. The users think that the program has improved the document control, as shown in Figure 4.19. The users think that rechecking documents is easier and faster, as shown in Figure 4.20. The users want to apply this program to their workflow, as shown in Figure 4.21.

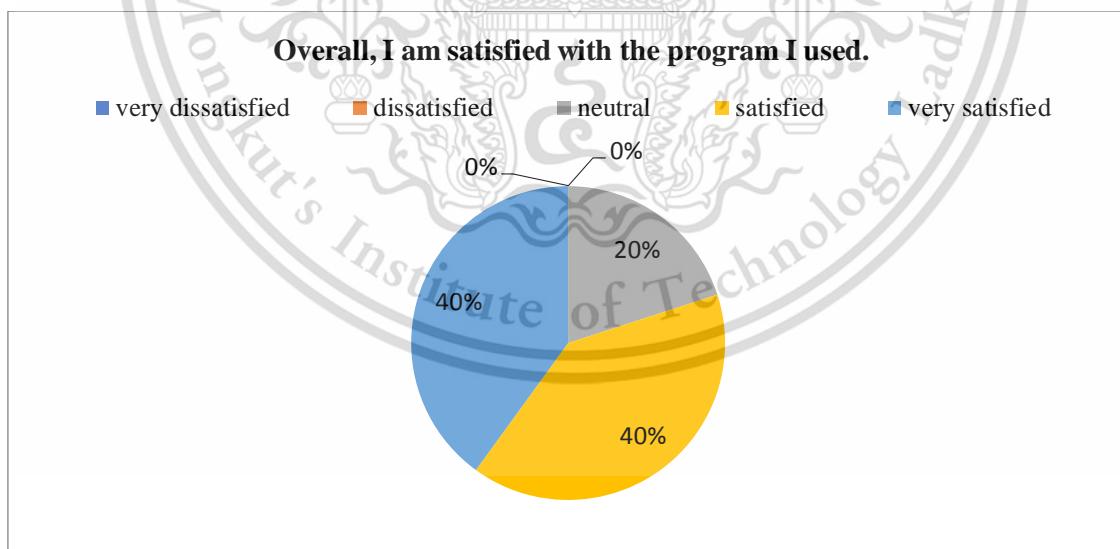


Figure 4.14 Satisfaction on Overview of Program

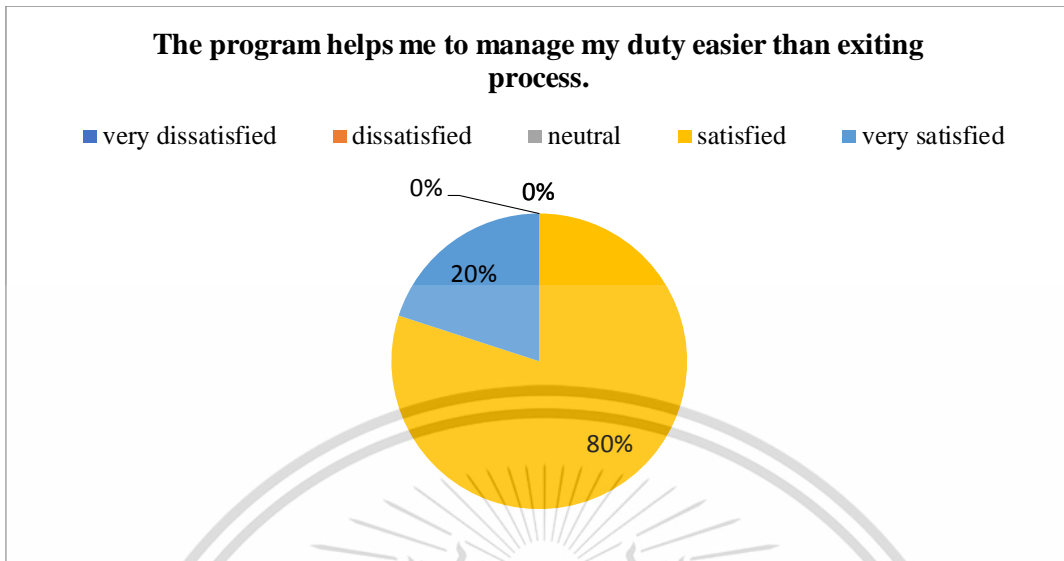


Figure 4.15 Satisfaction on Work Management

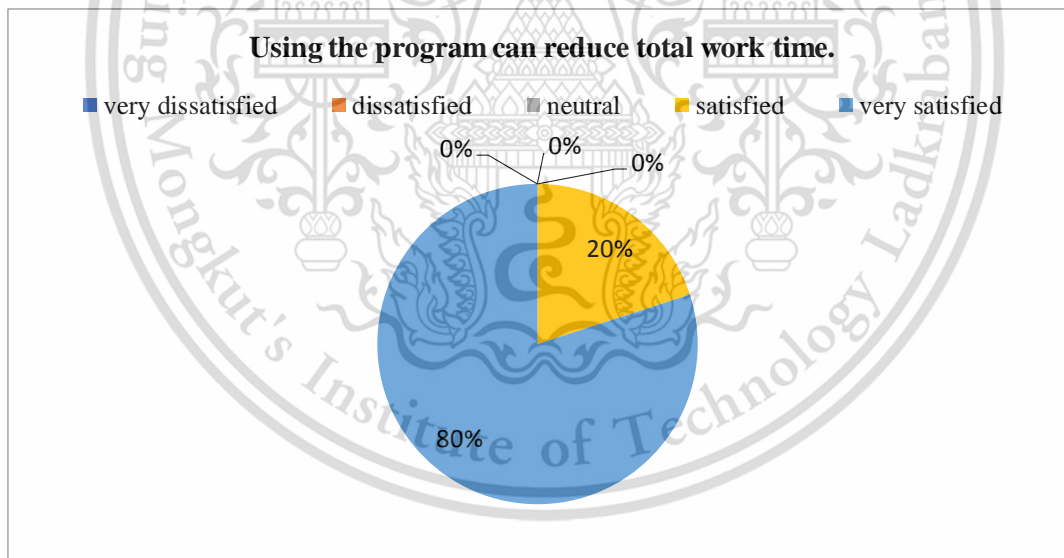


Figure 4.16 Satisfaction on Reducing Working Time

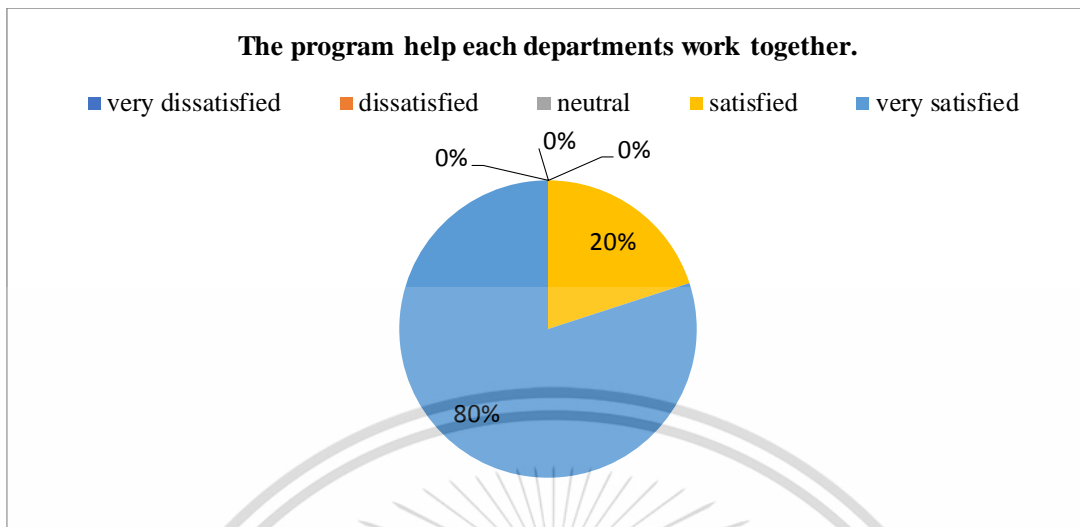


Figure 4.17 Satisfaction on Cooperation

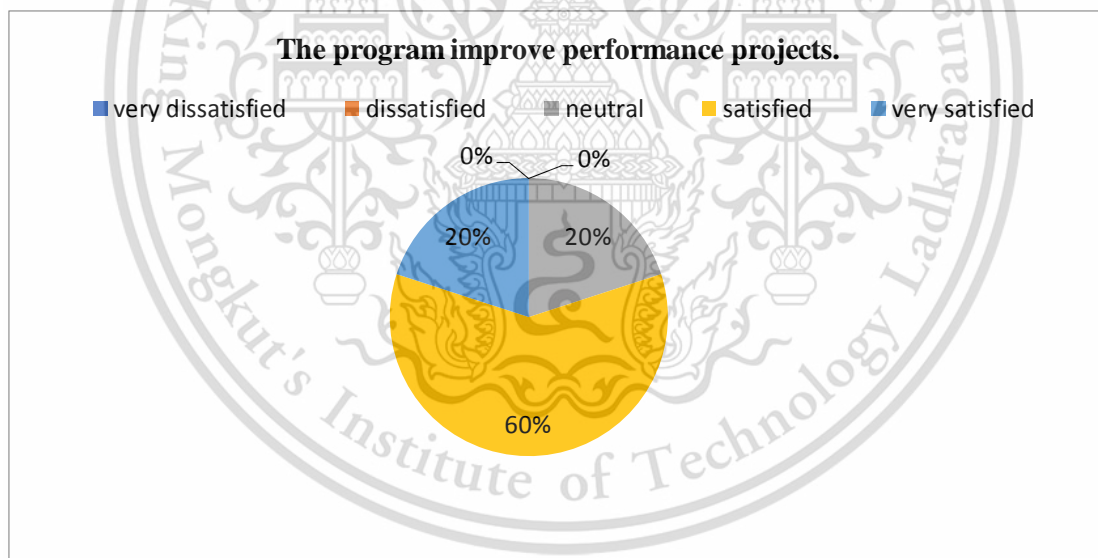


Figure 4.18 Satisfaction on Performance Improvement

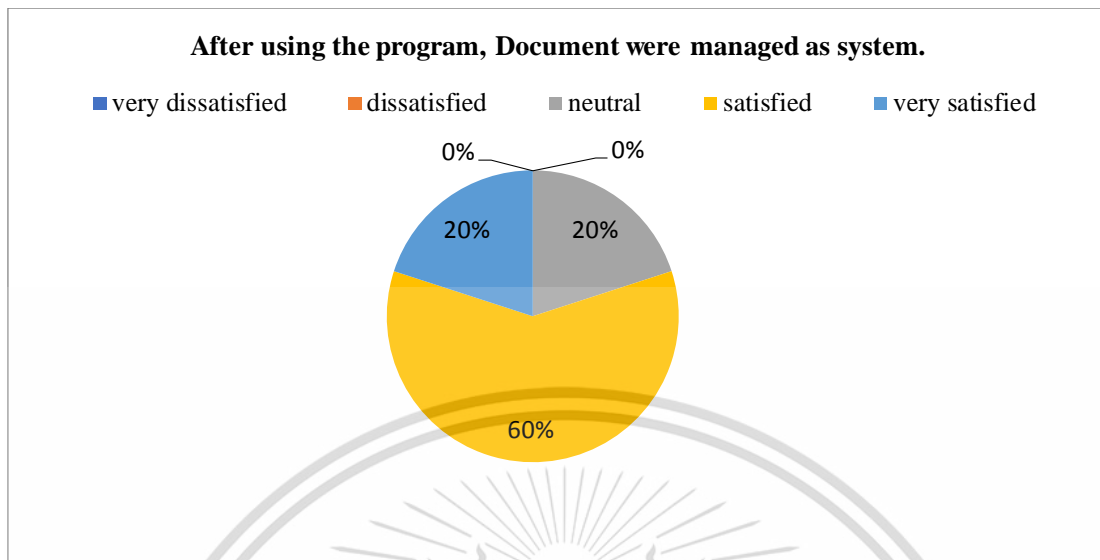


Figure 4.19 Satisfaction on Document Control

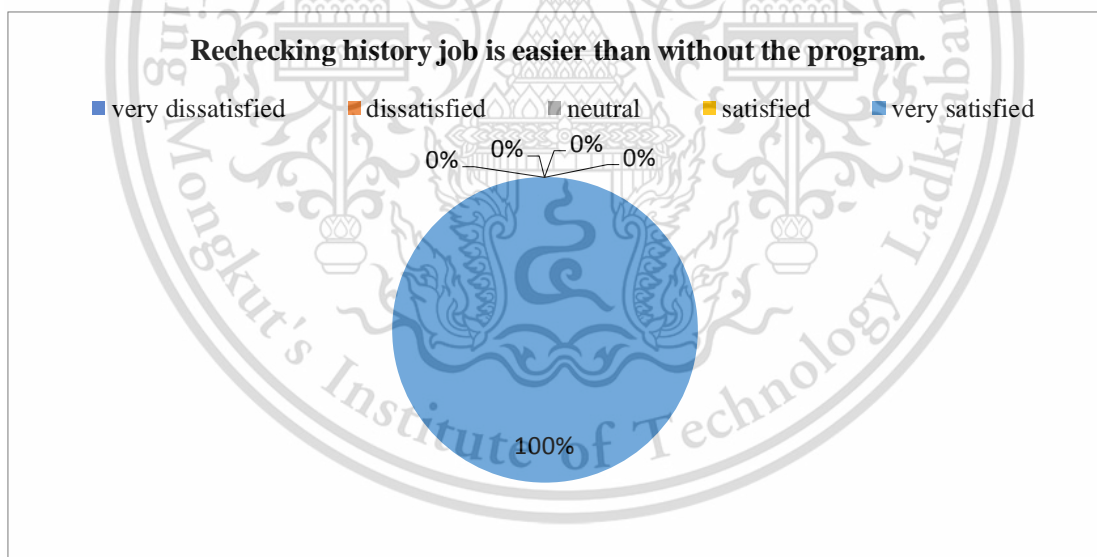


Figure 4.20 Satisfaction on Document Recheck

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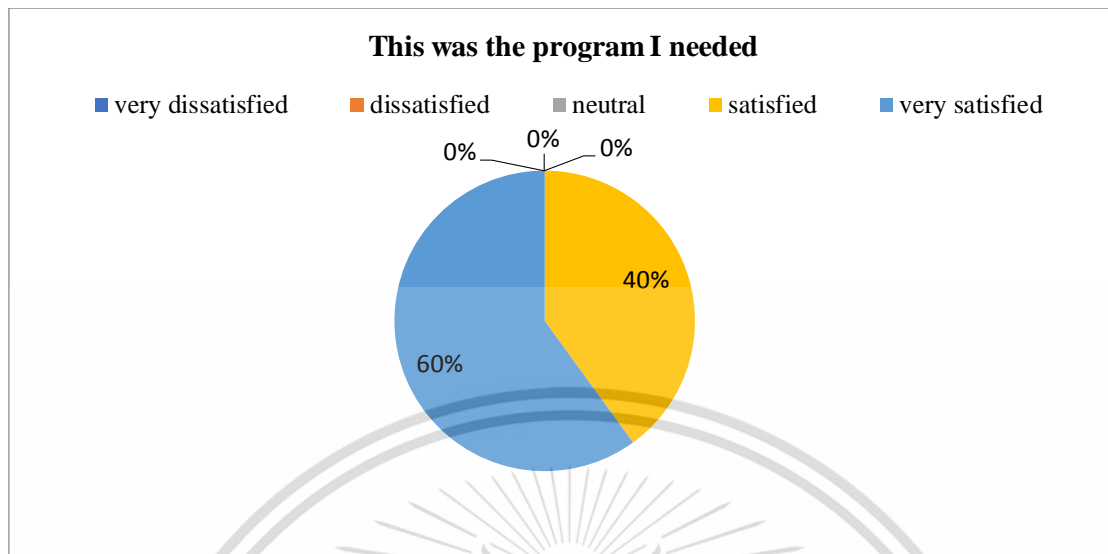


Figure 4.21 Satisfaction of Users Who Want to Use the Program

According to this pie chart, it indicates the level of satisfaction in the program. This is measured from the overview of the program satisfaction, satisfaction on work management, satisfaction on reducing working time, satisfaction on cooperation, satisfaction on performance improvement, satisfaction on document control, satisfaction on document recheck, satisfaction of users want to use the program. The result is that the users are satisfied with the program. In addition, the users want to use the program in their operation. The program makes it faster and easier to use even for those who are not good at technology. This program is suitable for the organization. The users can fill out the data easily and can recheck the document. However, the program is not complete because there is another part that needs further improvement. There is another department that needs to be included in this program to work together systematically. The questionnaire measures the user's satisfaction with the program, but there are also other suggestions, which will be discussed in the next chapter.

4.6 Suggestion of the Program

When the program is implemented with all 5 users: 2 people from the store, 1 person from the purchasing department and 2 people from the accounting department, for the store department, the user thinks that this application is suitable because all items in the database are included in the file. Also, inventories in the warehouse are easy and accurate. For the purchasing department, this program needs to be added as part of the section of the vendor's document that cannot be stored in the database. This quotation is used as a proof of price in the actual trading because if the user fills out in incorrect data, then it can be rechecked in this document. In addition, another thing that needs to be added is set the cost code of each project in order to be checked later which project uses a lot of budget and what is the use of that statement. It will be able to categorize the users who order the product. For the accounting department, the work is not very relevant to this program, but it can be used to check the purchase from vendors who pay bills. The accountant comments that it should have an interface for billing calculations and historical customer receipt categorized by each customer. It can check the deal history later to be useful for pricing on the next project. If the customer uses this company regularly, then it may reduce the price of the project. It keeps old customers and finds new customers at the same time. If there is management information, the company gets more projects from the customer. The customer wants to deal with the company when the work is quick and the delivery is on time. The company will have more customer bases and grow.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

In this chapter, the background and the program improvement are summarized. The problem of the company's default and the solution by applying the program are discussed. Then, the results are measured by using a timer, and the user's satisfaction is measured with the questionnaire. Then, all the results are analyzed and summarized in this chapter.

5.1 Conclusion

Chapter One describes the main problem of the study that new SMEs increase while many business profits decline. For this reason, the competition of SMEs is increasing, and the overall problems are order volume, sales volume, production volume, operating costs and business profits due to the slowdown in the demand and purchasing power. The company in this case faces delays in manual jobs and exceeding budget due to lack of document management system. Therefore, the company should have a data management system for the purchasing department and the warehouse to control inventory and reduce data errors. The tool for problem solving and development is VBA, which collects all the spreadsheets in a single file.

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Chapter Three describes the detail of the company. It covers several products, such as coating, folding, welding, palate building, rack building and shelf building. The organization chart of the company is shown and then the working process in the business in each work is explained. This study focuses on three departments including the purchasing, warehousing and accounting, and the data flow of the company is shown, starting with the context diagram and DFD level 0 -1. The context diagram has five main parts: customer, purchasing, sales, warehouse and accounting. The in-depth interview is conducted, and problematic factors from the user are presented in the fishbone to find the main and minor factors. Then, the differences between the previous working flow and the new working flow is compared.

Chapter Four describes the program's overview and flow chart, the pseudo code of the program, and then outputs all four interfaces: inventory control interface, create requisition interface, create purchase order interface, and purchase order notice. Then, the program is put on trial, and the time is recorded to measure the result. The result is that the program can help reduce the operational time. The user's satisfaction is measured by using the questionnaire, and then the results are shown in a pie graph.

Objective of the Study

1. To develop a tool for managing purchasing department and warehouse department.

The program is designed to be used as a document management tool and develop it for the purchasing and warehousing departments.

2. Create a program to record all activities into the programming in one file.

This program can be used in the purchasing and warehousing department processes. The documents are put into one file and the user can recheck them and categorize them for easy searching.

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3. To compare results in costs and times between the existing system and the trial system.

When the program is applied in the process, then the result is that the time spent working is reduced when using the program and the user is satisfied with the program in the process.

5.2 Future Work

For further study, to improve program, all users in all departments should share the program in one file, and other departments should be involved in sharing and using the programs in order to increase the efficiency of the program and the efficiency of operation to reduce errors and keep all document for rechecking later.

This program can be developed in the future to fulfill the objective of other operational sections. The project has not yet been improved completely to the efficiency as expected.

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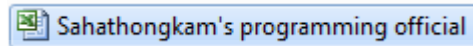
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APPENDIX

User's Manual

1.) Overview

Firstly, Click on this sheet.



It will show the overview window.



Figure 1.1 Overview Interface

2.) This excel contains 7 sheets in total according to Figure 1.2

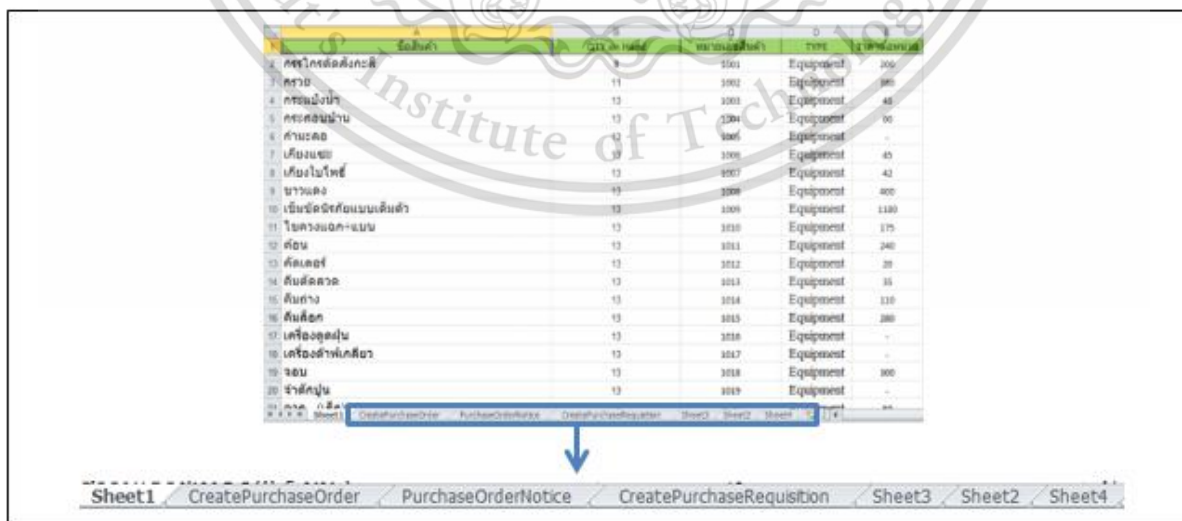



Figure 1.2 All Sheets in the Excel

3.) Data Recording in All Sheets

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Sheet1  has all name lists in warehouse for recording data. It can add and deduct items then update item's quantity in column QTY on hand. The inventory control window will be displayed when the user clicks Sheet 1.

When the user clicks No.1, the item lists will be displayed and the user can select the specific item. The user fills in item's quantity in No.2., and the user can add and deduct the item's quantity in No.3 and No.4.

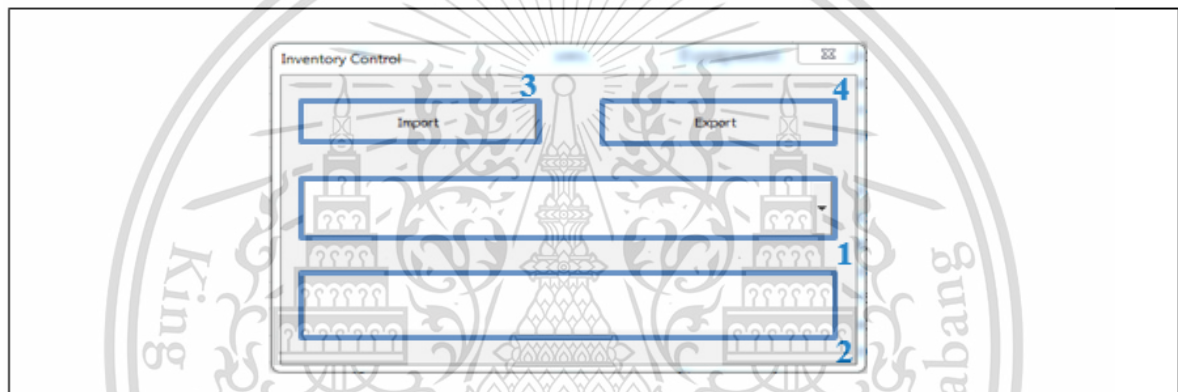


Figure 1.3 Inventory Control Interface

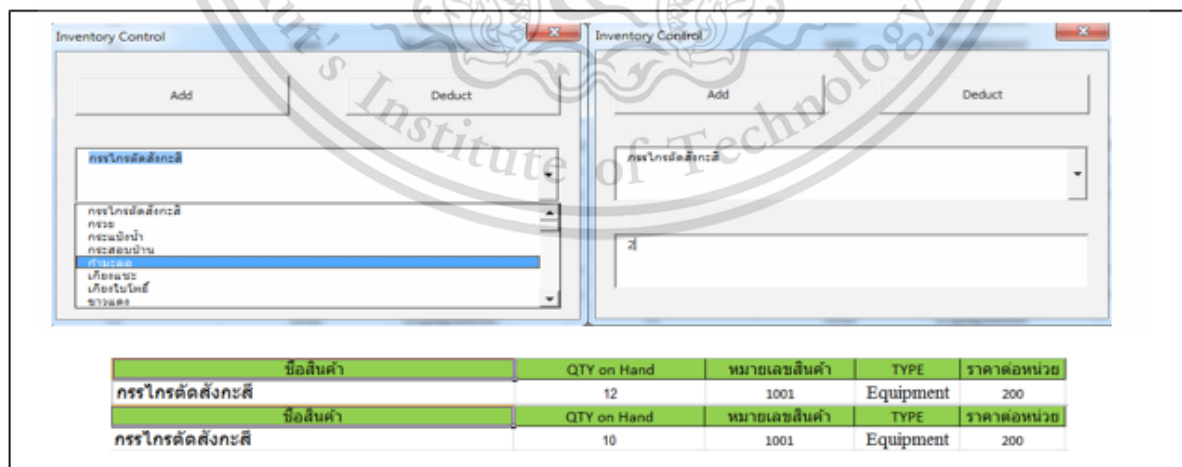
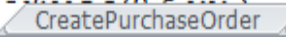


Figure 1.4 Select Item in Warehouse when the User Adds 2 Units of กรรไกรตัดสังกะสี

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4.) CreatePurchaseOrder  When the user clicks this sheet, it will display the overview window. Then, the user clicks Create Purchase Order's Document as shown in Figure 1.5

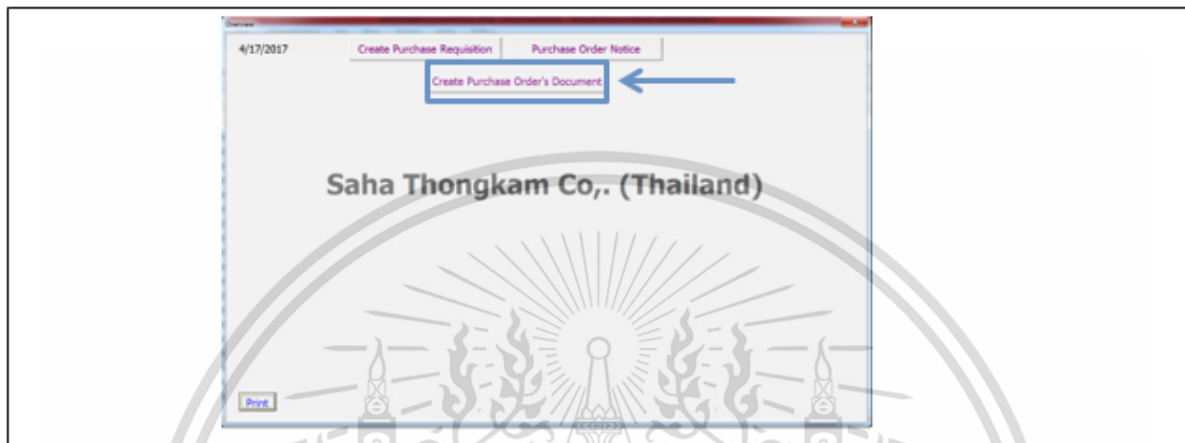
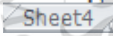


Figure 1.5 Overview Interface Displayed when the User Clicks Create Purchase Order's Document

Sheet4  is file for recording data in Purchase order's template in purchasing department. The user fills in complete data and click save. Example shown in Figure 1.6 and 1.7.

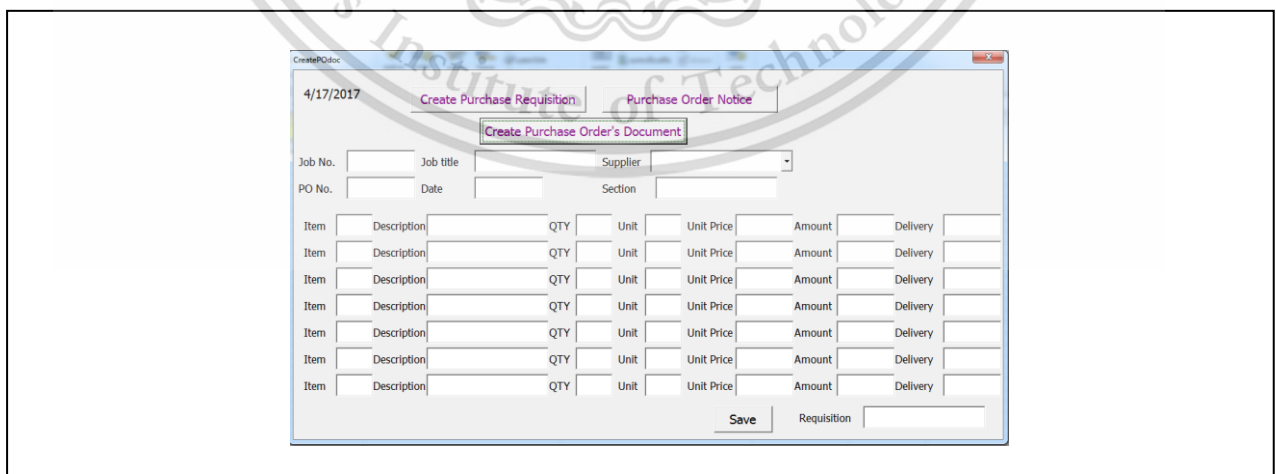


Figure 1.6 Create Purchase Order's Document Interface

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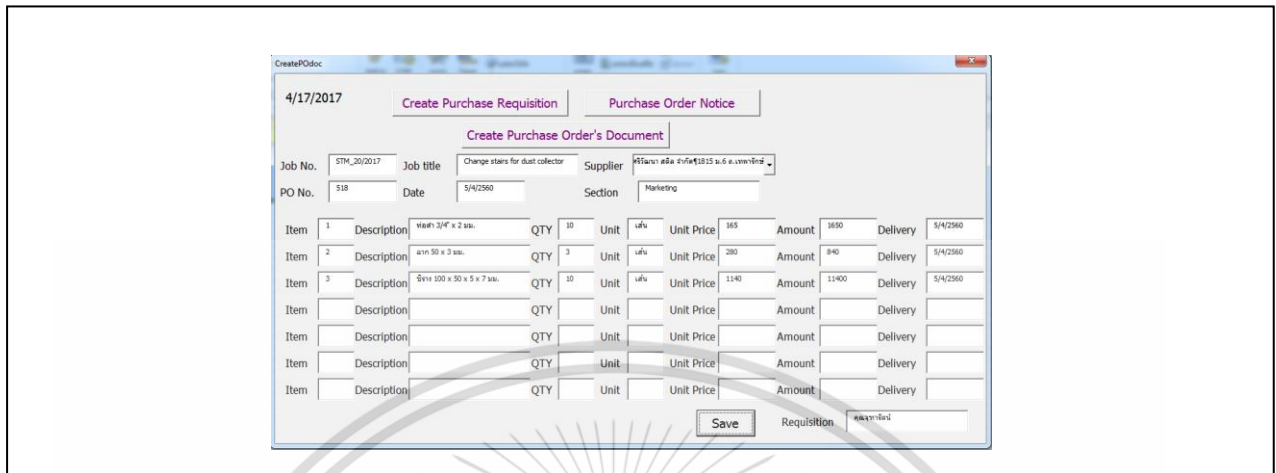


Figure 1.7 Example of How to Fill Data in Create Purchase Order's Document

The user clicks cross on top right side and then all data will be recorded in CreatePurchaseOrder and Sheet 4 files as shown in Figures 1.8 and 1.9.

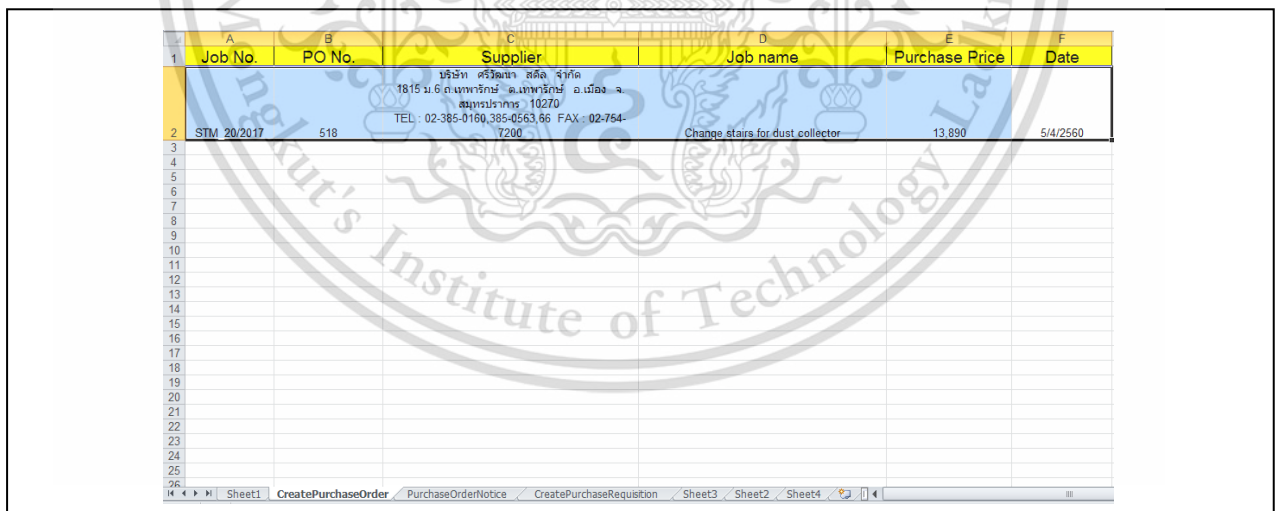


Figure 1.8 All Data will be Record in Sheet Create Purchase Order's Document

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 บริษัท สหภาพ วิศวกรรม จำกัด SAHA THONGKAM ENGINEERING CO., LTD. 28/2 Moo 2 T.Klongbapho A.Banpho Chachoengsao 24140 Tel.038-587425 Fax 038-587407.E-mail: saha_purchase@hotmail.com โทรสาร: 034554800789																																																									
ใบสั่งซื้อ PURCHASE ORDER		เลขที่ / NO: S11/2017: 518	วันที่ / DATE: 5/4/2560																																																						
ผู้ซื้อ: บริษัท ศรีวิบูลย์ เซลล์ จำกัด 1815 ม.6 ต.พนาภิรักษ์ อ. พนาภิรักษ์ อ.เมือง ข. อ.พนาภิรักษ์ อ.เมือง ข. โทร. 02-385-6160,385-6563,66 FAX: 02-754-7200	เลขที่ใบขอซื้อ Purchase Requisition:	แผนกที่ขอซื้อ Section: Marketing	ผู้ขอซื้อ Requisition: คุณบุษยาภิรักษ์																																																						
ใบขอซื้อ / Question No.	เงื่อนไขการชำระเงิน / Terms Of Payment ภายใน 60 วัน	JOB NO : STM_28/2017	JOB TITLE : Change status for dust collector																																																						
<table border="1"> <thead> <tr> <th>ลำดับ</th> <th>รายการ</th> <th>จำนวน</th> <th>หน่วย</th> <th>ราคาต่อหน่วย</th> <th>จำนวนรวม</th> <th>การส่งมอบ</th> </tr> <tr> <th>Item</th> <th>Description</th> <th>Quantity</th> <th>Unit</th> <th>Unit Price</th> <th>Amount</th> <th>Delivery</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>พัดลม 30" x 2 ใบ</td> <td>10</td> <td>ใบ</td> <td>165.00</td> <td>1,650.00</td> <td>5/4/2560</td> </tr> <tr> <td>2</td> <td>พัดลม 50 x 3 ใบ</td> <td>3</td> <td>ใบ</td> <td>280.00</td> <td>840.00</td> <td>5/4/2560</td> </tr> <tr> <td>3</td> <td>พัดลม 100 x 50 x 7 ใบ</td> <td>10</td> <td>ใบ</td> <td>10.00</td> <td>11,400.00</td> <td>5/4/2560</td> </tr> <tr> <td colspan="5">รวมเงิน</td> <td>13,890.00</td> <td>รวม / Total</td> </tr> <tr> <td colspan="5">Amount</td> <td>972.30</td> <td>Delivery</td> </tr> <tr> <td colspan="5"></td> <td>14,862.30</td> <td>รวม / ITEM</td> </tr> </tbody> </table>	ลำดับ	รายการ	จำนวน	หน่วย	ราคาต่อหน่วย	จำนวนรวม	การส่งมอบ	Item	Description	Quantity	Unit	Unit Price	Amount	Delivery	1	พัดลม 30" x 2 ใบ	10	ใบ	165.00	1,650.00	5/4/2560	2	พัดลม 50 x 3 ใบ	3	ใบ	280.00	840.00	5/4/2560	3	พัดลม 100 x 50 x 7 ใบ	10	ใบ	10.00	11,400.00	5/4/2560	รวมเงิน					13,890.00	รวม / Total	Amount					972.30	Delivery						14,862.30	รวม / ITEM	หมายเหตุ / REMARKS 1. ผู้ซื้อไม่รับส่งคืน (รวม) ของคืนจากผู้ซื้อ หรือ ผู้รับส่งคืน ให้ FAX กลับถึงผู้ซื้อ / Please sign in this order and return by fax 2. ผู้ซื้อขอสงวนสิทธิ์ในการตรวจสอบคุณภาพของสินค้าก่อนการชำระเงิน โดยผู้ซื้อขอสงวนสิทธิ์ในการคืนสินค้าหากไม่พอใจคุณภาพสินค้า Please include copy purchase order every shipment indicating P.O Number and PR No. on your invoice and fax invoice. 3. กรุณาใส่ที่อยู่ที่จัดส่งสินค้าให้ผู้ซื้อด้วย / Please put address of office in your fax invoice.
ลำดับ	รายการ	จำนวน	หน่วย	ราคาต่อหน่วย	จำนวนรวม	การส่งมอบ																																																			
Item	Description	Quantity	Unit	Unit Price	Amount	Delivery																																																			
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2	พัดลม 50 x 3 ใบ	3	ใบ	280.00	840.00	5/4/2560																																																			
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Figure 1.9 All Data Will be Recorded in Sheet 4

5.) PurchaseOrderNotice is a sheet for recording purchased order and receive dates. The user can check historical data. When the user clicks this sheet, the purchase order interface will be displayed as shown in Figure 1.10. The user can fill all data in the blank space as shown in Figure 1.11 and then click save.

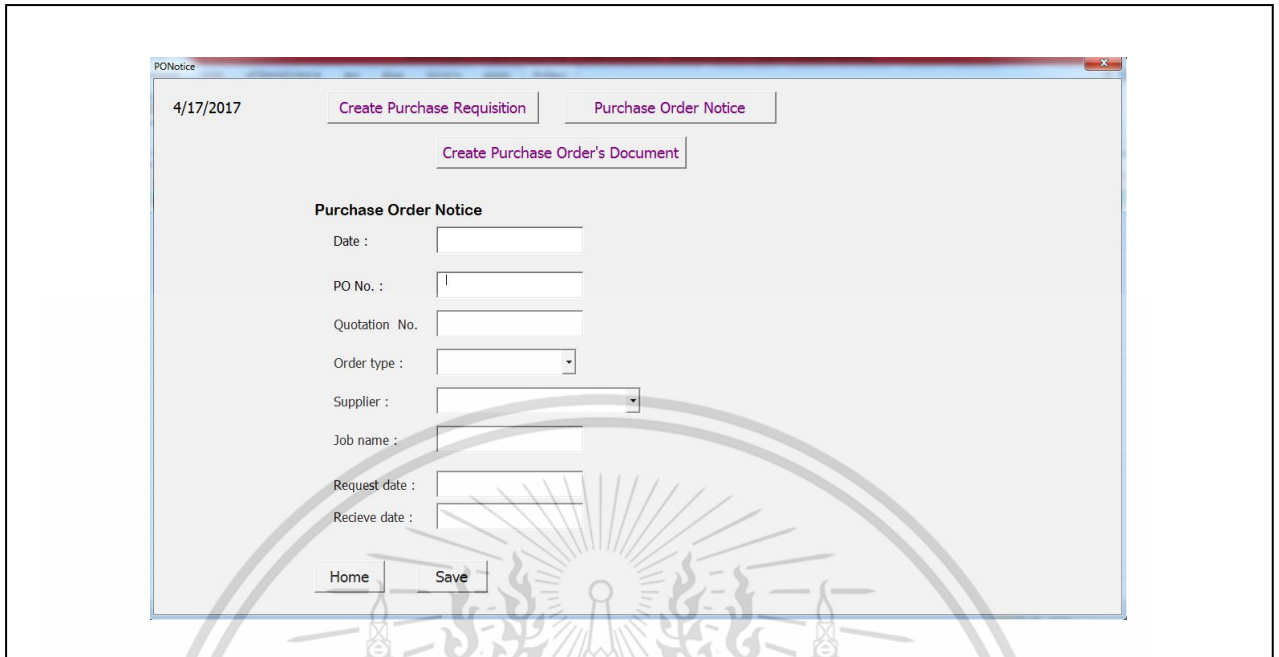


Figure 1.10 Purchase Order Notice Interface



Figure 1.11 Example of How to Fill Data in Purchase Order Notice

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A	B	C	D	E	F	G
Date	Type	Supplier	Item name	Quotation no.	Quantity	Price
5/4/2560	Raw material	บริษัท ศรีวัฒนา สตีล จำกัด 1815 ม.6 ต.เทพารักษ์ อ.เมือง จ. สมุทรปราการ 10270 TEL : 02-385-0160 385- 0563.66 FAX : 02-754-7200	ท่อดำ 3/4" x 2 มม.	11290	10	1650
5/4/2560	Raw material	บริษัท ศรีวัฒนา สตีล จำกัด 1815 ม.6 ต.เทพารักษ์ อ.เมือง จ. สมุทรปราการ 10270 TEL : 02-385-0160 385- 0563.66 FAX : 02-754-7200	ฉาก 50 x 3 มม.	11290	3	840
5/4/2560	Raw material	บริษัท ศรีวัฒนา สตีล จำกัด 1815 ม.6 ต.เทพารักษ์ อ.เมือง จ. สมุทรปราการ 10270 TEL : 02-385-0160 385- 0563.66 FAX : 02-754-7200	ฉีกราง 100 x 50 x 5 x 7 มม.	11290	10	1140

Figure 3.20 All Data will be Recorded in CreatePurchaseRequisition Sheet

7.) Sheet3 [Sheet3](#) is database for selecting in others. The item has two types. The first type is equipment. The second type is raw material.

8.) Sheet2 [Sheet2](#) is sheet for selecting in others. It contains supplier's name lists that include telephone number and address.

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