Order Processing System For ALT Agrochemical Co., Ltd.

by

Mr. Jongkonkorn Rochanasmith

A Final Report of the Three-Credit Course
CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
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The Graduate School of Assumption University has approved this final report of the three-credit course, CS 6998 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

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ABSTRACT

Currently, computer technology has been widely utilized in every part of business. In this System Development Project, the concept of computerized system is applied to improve the existing order processing system operations. The principal purpose of using the new system design is to reduce redundant processes, to improve the working approach, to increase competitive advantages against rivals, to create better services, and to provide more accurate and up-to-date information for management. The system analysis phase covers several tasks such as studying the existing system functions, identifying the current problems and areas that have to be improved and organization planning. The system design phase includes the design of the new system that is presented by using data flow diagrams, structure chart, entity relationship diagram, data dictionary, database design, input form, output form, screen layout, process specification, and cost-benefit analysis to improve and solve the problem areas in the existing system. The scope of the project concerns customer order, customer information management, product information management, invoice document, generating reports, etc.

The new system also uses the concept of client/server computing that will store data in the file server to be shared among any parts of operations. Moreover, the relational database management concept is applied to design database and the software is built by using the concept of visual programming that can make user interface more friendly. Thus, this project intends to provide a better solution to the existing problems and increase the efficiency of operations by applying a computerized system.

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The writer is deeply indebted to many individuals who have contributed to the development of this System Development Project. Firstly, the writer wishes to thank Dr. Sattapong Malisuwan, the advisor of this project for her constructive suggestions, valuable guidance and advice during the period of writing the project.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

1.1 Background of the Project

According to the nature of any business, the order processing system is a key component for accomplishment. An appropriate response time and information about customers, products, and sales is very significant because the order processing system is a part of the business system in generating reports for management level to forecast the trend of business. Furthermore, sales analysis is also useful for Managing Director to make a decision in business. Consequently, a good information system is a strategic tool to accomplish competitive advantage against competitors in the market.

ALT Agrochemical Co., Ltd. is a formulator and distributor of agrochemical products. The mission of the company is to produce and to provide the products to the domestic wholesales. On account of the large number of customers, and product items, all operation staff in each department have to do a lot of transactions within the limited time in order to ship the products to customer on time with no error. In fact, the efficiency of company performance has become lower because this firm is categorized as a family business whose database is collected and operated manually. For instance, information recording of the customer, and products are done unsystematically on paper. Consequently, with the lack of systematic information, the existing system creates a lot of problems in redundancy of data, inaccuracy of information, duplication of task, sharing of information among departments, and it is time consuming.

As a result of existing problems, a computerized system for order processing system is designed to assist the company not only to manage the order procedures more systematically and with less error but also to reduce the operation cost. With the introduced computerized system, all information will be stored in the computer in a

more systematic way. Thus this computerized system design for order processing will replace the manual process in the existing system.

Obviously, order processing system plays a significant role in many companies since an effective order processing system would lead to a good business performance. This project mainly focuses on improving the order processing system.

1.2 Objectives of the Project

The objectives of Order Processing System for ALT Agrochemical Co., Ltd. strategically support the Sales and Marketing department, are as follows:

(1) To achieve quicker and more accurate processing of information.

(2) To create computer base information system that will enable the company to keep and retrieve accurate information promptly. Consequently, it results in better customer satisfaction and also leads to better business as a whole.

(3) To reduce errors and improve the accuracy of data input, customer information, and customer orders as well as to decrease the expenditure of paper based cost.

(4) To satisfy and urgently respond to customers' orders.

(5) To improve the performance, effectiveness and efficiency of company's system.

(6) To support management with efficient information that assists management level to make a good strategic decision and planning.

1.3 Scope of the Project

The objective of this project is to convert a purely manual system to a computerized system in order to improve performance of the company's activities. We decide to develop the order processing system as a prior project for increasing efficiency and productivity of the company. The scope of the project includes the following:

(1) Collect the user's requirements

(2) Investigate the problems of the current manual system

(3) Eliminate the errors of data entry

(4) Design a database to keep the necessary information that the other processes can share.

(5) Generate user friendly input screen.

(6) Generate reports for management level to utilize the information.

9. Deliverables

The deliverables of the project of Order Processing System are as follows:

(1) The context diagram of the existing and proposed systems

(2) Dataflow diagram

(3) Process specification

(4) Database Design

(5) Structure Chart

(6) Data Dictionary

(7) Input design

(8) Output design

(9) Required reports by using the following files:

(a) Customer order report

(b) Individual sale report

(c) Product by order report

(d) Customer payment report

(e) Over due report

(f) Monthly Summary of all report in graph report

10. Project Plan

The project plan consists of three main tasks:

(1) Analysis of the Existing System

(2) Analysis and Design of the Proposed System

(3) Implementation of the Proposed System

This project can be shown in term of Gantt Chart as in Figure 1.1.

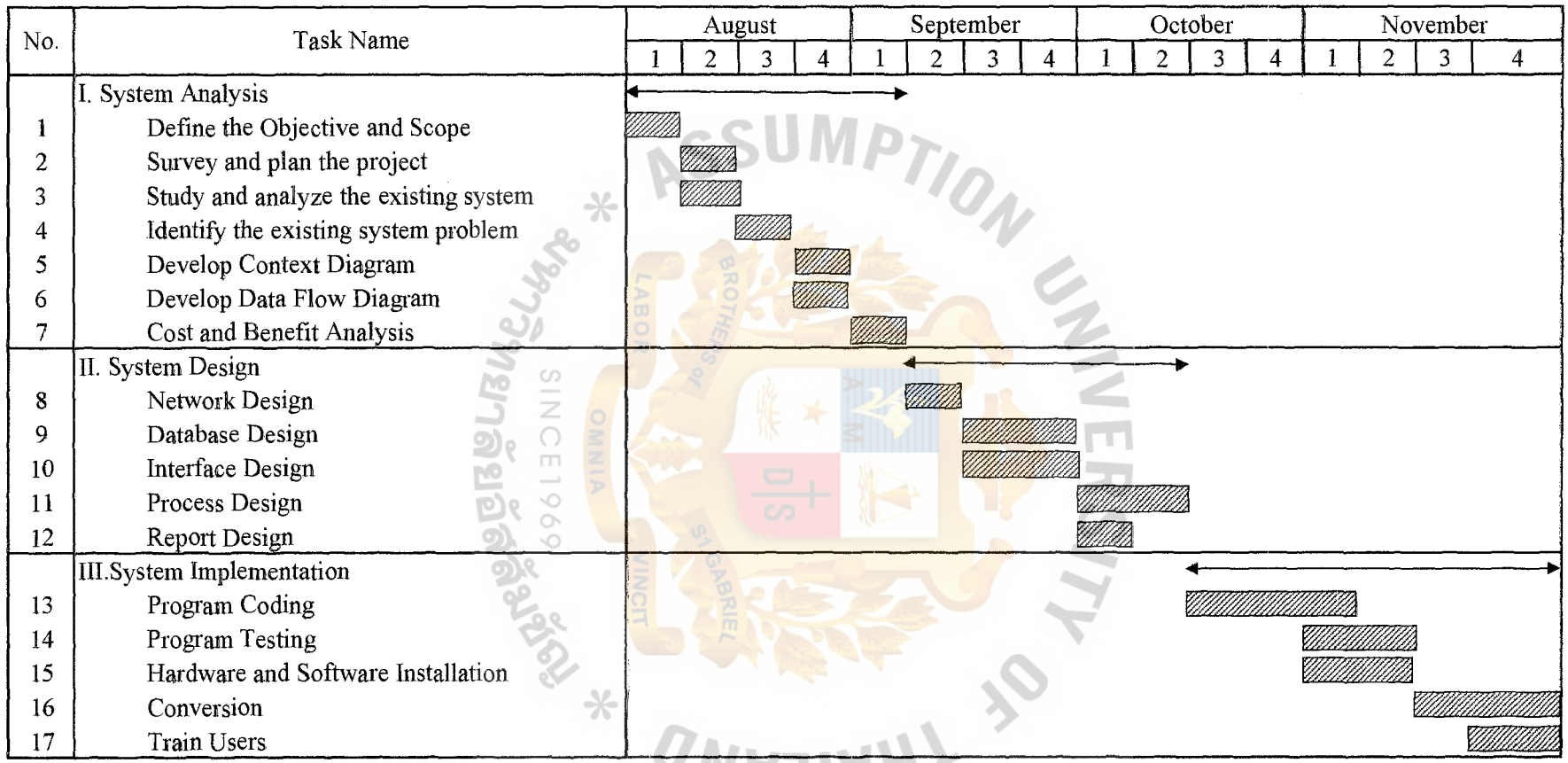

Figure 1.1. Project Plan of ALT Agrochemical Co., Ltd.

II. THE EXISTING SYSTEM

The existing system is analyzed in order to design the new system. System Analysis is done starting from background of the organization to existing business function, current problems and areas for improvement.

2.1 Background of the Organization

"ALT Agrochemical" was established approximately 18 years ago, in 1985. The company is a formulator and wholesaler dealing in agrochemical product, principally used for agriculture. It is a family oriented company, owned and operated by members of the family. It operates its business by ordering material (Tech of insecticide, fertilizer) directly from both domestic and international (Israel, Taiwan, China) suppliers and formulating these materials. Then products are distributed under its own brand name.

The company distributes its products principally through wholesaler around the country and vicinity. It conducts its marketing by giving out sample products to these wholesalers to try to use them. If they are satisfactory, the customer will order the products that they require. Major ALT Agrochemical product categories are as follows:

(1) Insecticide

(2) Fungicide

(3) Fertilizer

(4) Rodenticide

(5) Herbicide

(6) Hormone

2.2 Location

ALT Agrochemical Industry is located at 519 Group 4 Soi 9 Bangpoo Industrial Estate, Preaksa, Sumutprakran 10280. Thailand.

2.3 Existing Business Functions

The management style of the company is based on family business. The entire operation and work now uses manual operation. The company comprises 5 departments, which are shown in Figure 2.1.

Each department has different responsibilities.

(1) Sales and Marketing Department is responsible for maintaining the relationship with existing customers as well as approaching new customers. Its principal function is sales and distribution of sample products. This department also is responsible for supporting the customer's requirement.

(2) Accounting Department is responsible for accounting tasks, such as Account Receivable, Account Payable and Petty Cash. The company also hires an accounting company to handle more complicated work such as Value Added Tax, trial balance and annual closing balance.

Furthermore, this department is responsible for recording all business transactions, which comprises all accounting activities within and outside the organization. It is also responsible for distribution of salary to all employees.

(3) Purchasing Department is responsible for controlling the quantity of material in stock, and making purchase order for the required material when necessary. Moreover, this department is responsible for searching appropriate suppliers as well as doing all activities in purchasing

process.

(4) Inventory and Production Department is responsible for controlling all stock of products by checking the quantity in the warehouse to confirm customer order, updating stock, including inventory check at the warehouse at the end of three months. Stock checking is done for preparing the purchase order form to be sent to the purchasing department, and receiving material information from suppliers. In addition, it is responsible for scheduling list of production as well as producing products according to customer's order.

(2) Shipping Department is responsible for arranging the route to the same destination as well as assigning the delivery list to each route.

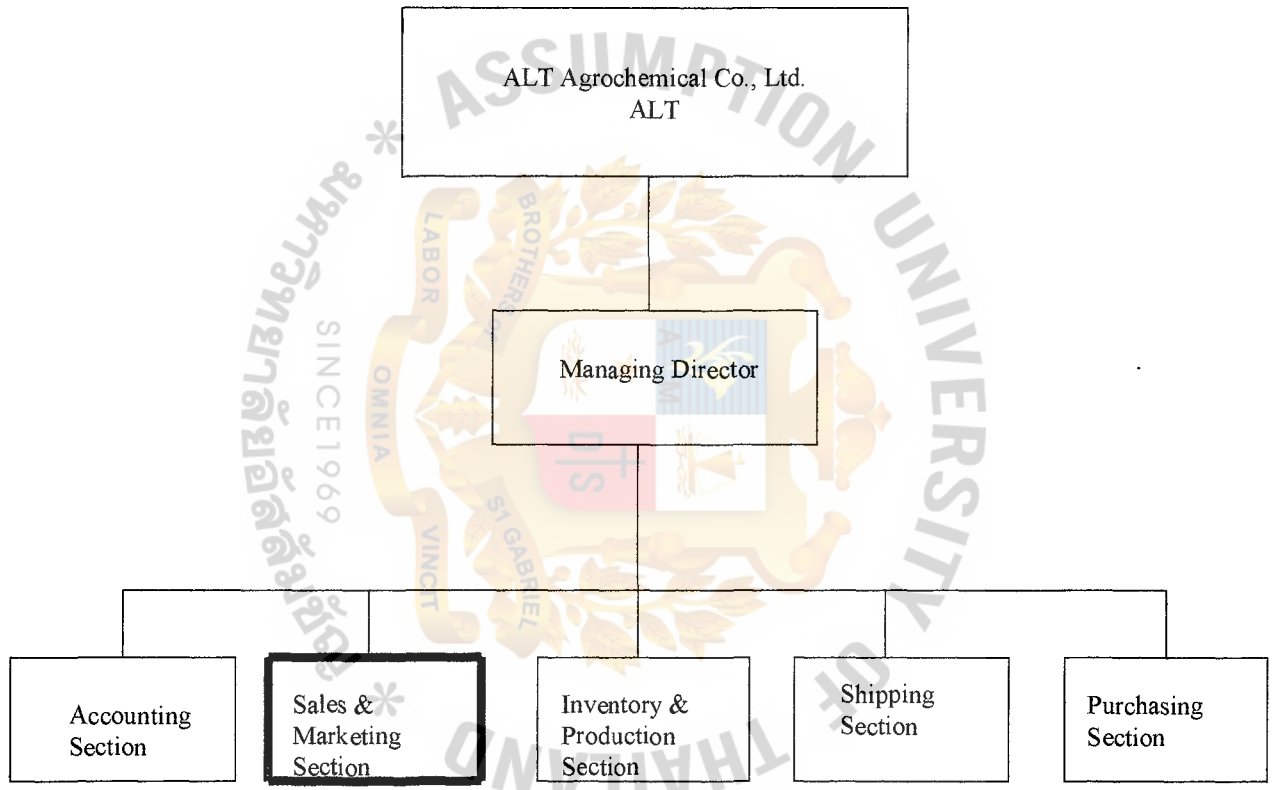

Figure 2.1. Organization Chart of ALT Agrochemical Co., Ltd.

2.4 Current Problems and Areas for Improvement

2.4.1 Current Problems

The existing system is manual. Many problems occur in order processing and they can be identified as follows:

(1) Lack of a good method of data keeping

(2) The process is slow, such as when finding out customer purchase order for in filling out documents.

(3) Finding the information of purchase order that matches with shipment is time consuming.

(4) There are a lot of duplicated documents.

(5) Performing re-entry data has to be done many times in the process.

(6) Order processing data cannot generate a report for management.

(7) The process in order information inquiry is too slow.

(8) Lack of statistical report to support the decision making process to improve the business.

(9) Stock control is difficult.

(10) The existing data cannot cover the order process operation completely.

2.4.2 Areas for Improvements

The areas for improvement will cover the existing problems and solving them based on the understanding of operation and business requirement, so that the system will be more efficient and provide a better operation. The following are the criteria which need to be developed.

(1) The staff can use the order number to retrieve all information concerned with the order such as order details or customer data.

(2) Avoid re-entry data by using related data

(3) Retrieve the information requested by staff using a few minutes for productive time management.

(4) Reduce the staff workload by using computer-based system for processing data instead of keeping data only

(5) Retain the information concerning order processing in database file and using relation of database to generate the report or information concerning business requirement.

(6) Collect statistical information using computer-based system to produce new information for decision making or forecasting

(7) Reduce operation time

(8) Protect error entry due to human error because the computer-base system can provide error checking system.

This areas of improvement cover the problems of the existing system that cause the staff to spend a lot of time to complete their tasks. The proposed system to be developed will make the task easier, faster and more productive than the existing manual system as well as reduce the operation cost. It will provide many significant reports to management level to utilize them in the business.

2.5 Existing Order Processing System

ALT Agrochemical Co., Ltd. is one of the leaders of agricultural industry. The company has been established for more than 20 years, so it has many customers. Previously, the company was small and the task was not complicated. But at present, the company has grown and extended its market share to other neighboring countries. Nevertheless, the company still uses a manual system to handle the company's activities. Frequently, problems occur because of duplicated order, lost customer information, wrongly identified unit price of product, inaccurately requested product detail, etc. Because of this, it brings about mistaken requested specification of product or customer(the same customer name but different address or location) and late delivery. The company may lose its customers and profit. Furthermore, the existing system cannot generate reports for the management level in time and cannot support required information for management and sales manager .

The context diagram of the existing system is illustrated in Figure 2.2

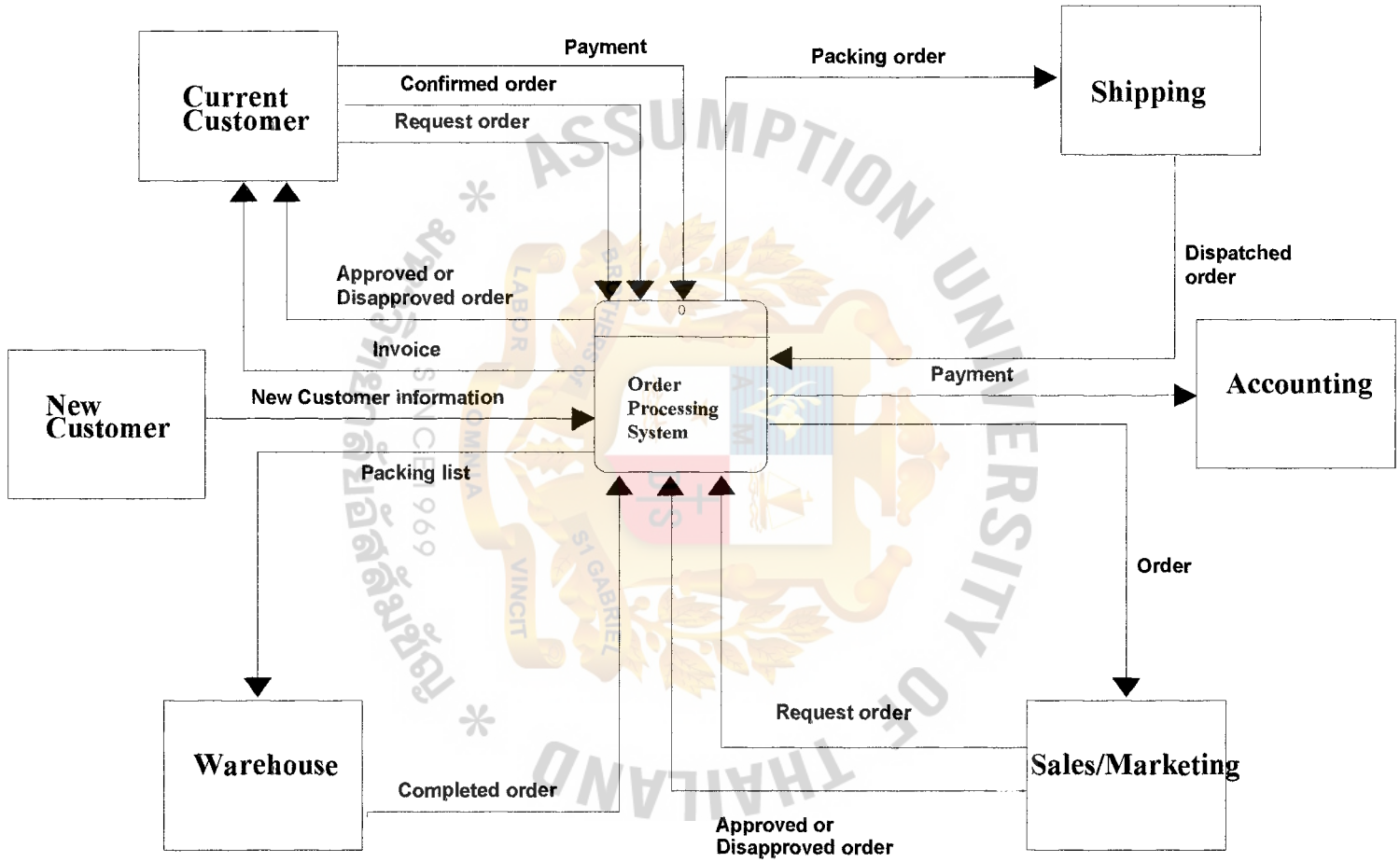

Figure 2.2. Context Diagram (Existing System).

III. THE PROPOSED SYSTEM

The objective of the proposed system for ALT Agrochemical Co., Ltd. is to design a new computerized system to solve critical problems of the existing system. The existing system was analyzed and it was found that the most critical problems occur in order processing system. Thus, an in-depth presentation and system development will be done for order processing system as the first priority.

The proposed system will provide the firm with computerized information system instead of manual system. The computerized information system provides several benefits over the manual system. The computerized information system will:

(1) Provide more accurate information to sales, purchasing and management of each department.

(2) Provide up-to-date inventory information in the form of reports, which supports management in decision and planning as well as supports purchasing to decide when to order the new products.

(3) Provide accurate information to assist sales in accessing the inventory data more efficiently.

3.1 System Specification

User requirement is very significant in system design. The requirements for this proposed system are the result of interviews with the executives and staff who are involved in the existing system. All requirements aim to improve operation procedure and solve the existing problems.

3.1.1 Business Requirements

(1) More up-to-date and accurate information.

(2) Security and operator control should be provided for protecting data

(4) Back up and recovery should be designed.

(5) More reliable and easy to understand reports

(6) To retrieve information faster and easier.

(7) To eliminate all errors in order processing

(8) More user friendly system.

(9) Information that can be shared among several systems simultaneously.

3.1.2 Input Requirements

(1) The customer information contains all details , which are customer code, customer name, customer address, telephone number, tax identification, name of contact person, customer grade, credit type, credit term and discount rate for which approval from authority is required.

(2) The sale order contains all details of order approved and confirmed to customer. It includes sale order number, customer information, payment term, delivery date, product description, unit price and amount of sales.

3.1.3 Proposed Process

(1) Process order

(a) Submit order

(b) Check credit

(c) Update customer status

(2) Process add new customer

(a) Get Customer Record

(b) Create customer record

(c) Update current customer

(3) Process check stock

(a) Match Order

(b) Label Allocation Order

(4) Process delivery order

(a) Shipping Order

(b) Generate shipping order report at end of the day

(5) Process invoice and payment

(a) Prepare Invoice

(b) Customer payment

(6) Process generate report

(a) Request report

(b) Customer order report

(c) Individual sale report

(d) Product by order report

(e) Customer payment report

(f) Overdue report

(g) Monthly Summary report

3.1.4 Output Requirements (shown in Appendix H)

The output reports for the system are designed according to the user requirements, which are listed below:

(1) Invoice register

(a) Details of tax invoice issued on a specified date

(b) Tax invoice controlling to help accounting department

(2) Customer order report

(a) To summarize, each order contains customer number, customer

name, and the amount of each order

(b) To show sales and marketing department on request transaction.

(3) Individual sale report

(a) To summarize total amount of each sale

(b) To show sale activities on request period

(4) Product by order report

(a) To summarize total product quantity of each product

(b) To show the total order quantity of each item during request period.

(5) Customer payment report

(a) To summarize each payment receipt on each day. Reconcile cheque received on cheque receipt.

(b) To summarize each payment receipt on each day. Reconcile cash received on cheque receipt.

(c) To assist accounting department settle the balance.

(6) Overdue report

(a) To report details of account receivable overdue for each customer, consisting of customer information, invoice overdue information, and summarize the total overdue amount.

(b) To facilitate the accounting department in following up overdue debts.

(7) Monthly Summary report by graph

(a) To show and summarize all the reports at the end of the month by graph.

(b) To facilitate sales forecasting and marketing planning.

3.2 System Design

To understand the logical movement of data throughout the system, the system analyst draws the data flow diagram (DFDs) as in Figure B.1. Data flow diagrams are structured analysis and designed tools that allow the analyst to comprehend the system and subsystem visually as a set of interrelated data flows.

The proposed logical data flow diagram will indicate the flow of the requirement and the data type to develop the program to support the new system. With DFD, the analyst can design the file to cover the requirements of the users and support the report design of the system.

The details of system analysis and design of Order Processing System is presented in graphical form which includes:

(1) Context Diagram (see Appendix B)

(2) Function Decomposition Diagram (see Figure 3.1)

(3) Level 0, Level 1 and Level 2 Data Flow Diagram (see Appendix B)

3.3 Database Design

In database designing process, we must realize that the design process has to generate both database and a set of program that can be used to access database in the way which users prefer. On this account, the relational model has been selected to design the database of Order Processing System because Relational Database Management System (RDBMS) is being increasingly used to develop computer-based information system. A relational database is a database which is perceived by its users as a collection of relations or tables. The entire values in a relation are atomic or scalar (there are no repeating groups).

Appendix C shows the database design of Order Processing System.

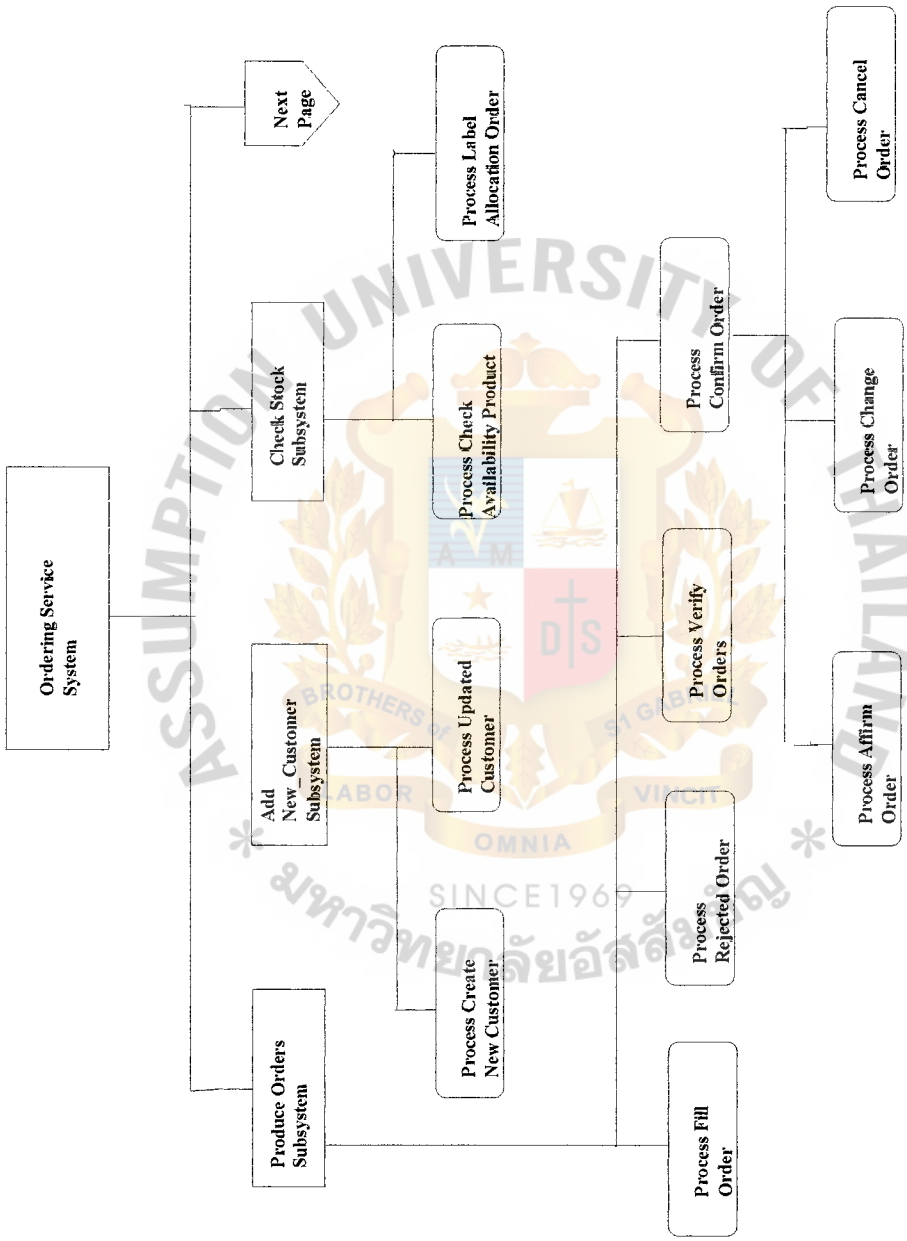

Figure 3.1. Function Decomposition Diagram.

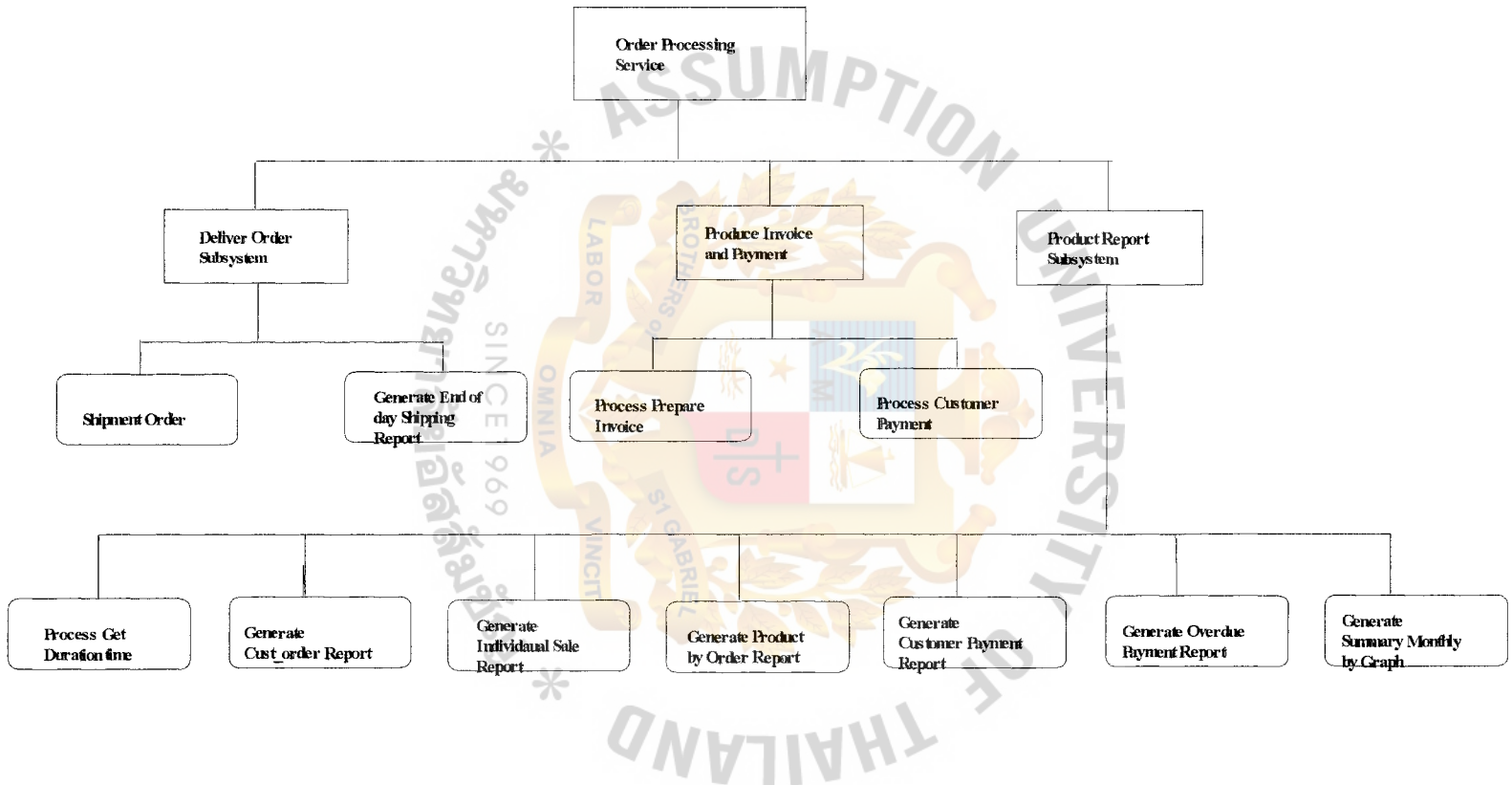

Figure 3.2. Function Decomposition Diagram (Continued).

3.4 Structure Chart

Structure Charts are the top down systems that are used to graphically depict a modular design of a program. They show how the program has been partitioned into smaller more manageable modules, the hierarchy and organization of those modules, and the communication interfaces between modules. The diagram comprises of modules and connecting arrows that indicate the data or something that passes through either down the lower module or back up to the upper one. The structure chart of the proposed system is shown in Appendix F.

3.5 Application Architecture

In application architecture, it defines the technologies to be used by one, more or all information systems in term of its data, process interface, and network components.

(1) Network Architecture

ALT Agrochemical utilizes Distributed Data that is sometimes called "Two-Tiered Client/Server". The database will be kept on the server and the business logic as well as user interface on the client machines. Then, the SQL commands are executed on this database server. The clients only send their SQL commands to the database server and it will return only the result. This will reduce the network traffic.

The proposed system is using LAN network with star topology that links all client machines through a central computer or server via hub which located in the computer room. Therefore, all information will be shared among departments. It enhanced the use of information. Network architecture of the proposed system is shown in Figure 3.3.

Since all existing systems are manual systems, the new computerized system for the order processing system will interface with other systems by

means of hard-copy reports only.

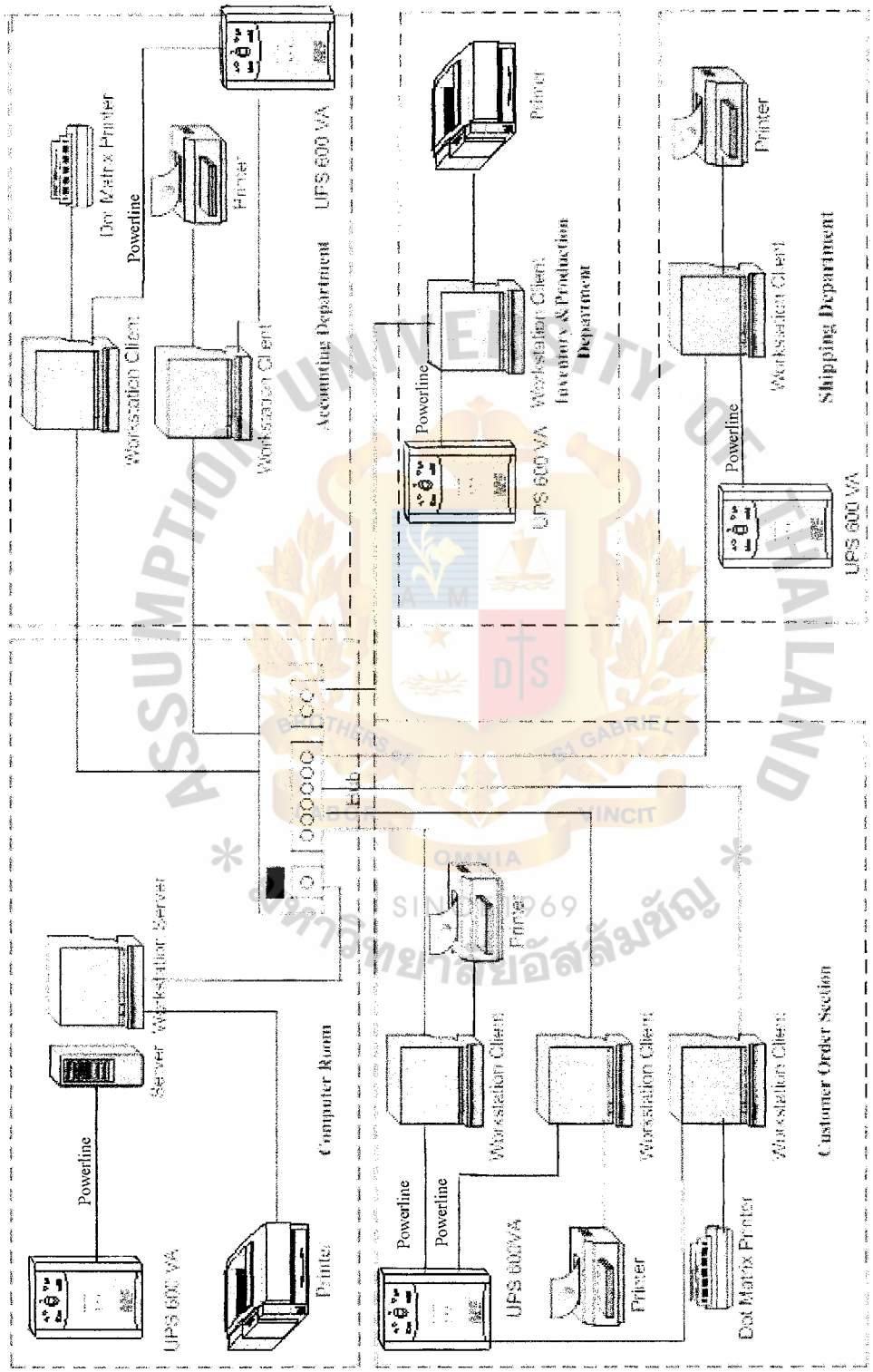

Figure 3.3. Network Configuration of Proposed System.

(2) Data Architecture

The company designates MS SQL Server 2000 distributed relational database management system (distributed RDBMS). It is a software program to implement distributed relational database. Distributed RDBMS can control access to and maintenance of the stored data. This also provides more sophisticated backup, recovery, security, integrity and processing.

(3) Interface Architecture

Users will interact with the system via Windows standard graphical user interface (GUIs) which is user friendly. By using keyboard, and mouse users can interact with the system. By custom designs, the GUIs would be easy to learn and can be used efficiently. It contains such standard and user-friendly interface components as text boxes, list-boxes, combo-boxes, checkboxes, radio-button groups, etc.

The outputs can be generated in two forms; namely, on-screen reports and hard-copy reports. Users can also retrieve data with unprepared ad hoc queries. They can choose whether the results will be displayed on screen or printed via printer.

(4) Process Architecture

At this stage, the architecture of and application will be defined in term of software languages and tools that we will be used for developing business logic and application programs. For our proposed system, as we use Two-Tiered Client/Server application, the company chooses the Software Development Environment (SDEs) Two-Tiered Client/Server application. It consists of a client-based programming language with

built-in SQL connectivity to database server of the company.

3.6 Screen Design

Any computer systems would be meaningless if they cannot interact with the outside world. Input and output design is a significant issue in system design activities. They must be designed in such a way that data are correctly input into the system and that output data are properly generated.

As for the user interface design, user-friendliness is a principal concern and interfaces must be easily understood and used. Standard interface components such as text-boxes, check-boxes, ect., are preferable for the user. In addition, the user interface should provide user alert of exception so that the user is aware of the errors and can correct them right away.

Sample input and output design prototypes are displayed on the following pages. For the input design, there are data entry forms, some as a single field form, others as a grid-oriented form.

As for the output design prototypes, the screen display output is a demonstration of paperless output. The result of a procedure can be exported into other file formats or just viewed on-screen and disposed. Nevertheless, not all output can be displayed on-screen.

See Appendix G, the screen design for Order Processing System

3.7 Report Design

Report design presents the information to system user and any related people who need information. Report, the most visible component of a working information system, is the justification for the system. During system analysis, the researcher has to design effective outputs for system users.

There are several reports designed for Order Processing System of ALT. See Appendix H, the report design for Order Processing System.

3.8 Hardware and Software Requirements

3.8.1 Candidate Solutions

(a) Candidate System Matrix

Table 3.1. Partially Completed Candidate Matrix.

Characteristic	Candidate I	Candidate II	Candidate III
Portion of System Computerized Brief description of portion of the system that would be computerized in this candidate	Customer service and some warehouse operations in relation to order fulfillment	Same as candidate I, but more powerful to expand the portion of system to support other operation.	Same as Candidate I
Benefit Brief description of the business benefits that would be realized for this candidate	This solution fully supports all user requirements currently, and it is not too expensive.	Fully supports all users requirements, plus more efficient interaction with other operation.	This solution partially supports user requirement, but it is very cheap.
Server and Workstation A description of the server and workstations needed to support this candidate.	Technically Architecture dictates PentiumIII, Ms Windows 2000 class server and workstations(client).	PentiumIII for server in UNIX AIX. Pentium Celeron with Windows 2000 professional for workstations(client)	PentiumIII for server with MS. Windows 2000 Server Family. Pentium Celeron for workstations(client).
Software Tools Needed Software tools needed to design and build the candidate. Not generally applicable if applications software packages are to be purchased.	SQL 2000 Server, MS Visual Basic.Net	Oracle, Visual Basic 6.0 Professional Edition	MS Front Page 2000 MS Internet Explorer 5.0
Application Software A description software to be purchased, built, accessed or some combination of these techniques.	Custom Solution	Same as Candidate I	Same as Candidate I

Table 3.1. Partially Completed Candidate Matrix (Continued).

Characteristic	Candidate I	Candidate II	Candidate III
Method of Data Processing Generally some combination of on-line, batch, differed batch, remote batch and real-time.	Client/Server	Same as candidate I	Same as candidate I
Output Devices and Implementation A description of output devices that would be used ,special output requirement and output considerations.	(3) Laser Printer (1) Dot Matrix Printer 15 inches SVGA monitor	Same as candidate I	Same as candidate I
Input Devices and Implementation A description of input method to be used,input devices,special input requirements, and input considerations.	Keyboard & Mouse	Same as candidate I	Same as candidate I
Storage Devices and Implementation A description of what data would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized.	MS SQL Server DBMS.	Oracle 8i Enterprise Edition Release 8.1.5	MS Access 2000

b. Feasibility Analysis Matrix

Table 3.2. Feasibility Analysis Matrix.

Feasibility Criteria	Weight	Candidate I	Candidate II	Candidate III
Operational Feasibility Functionality. A description of to what degree the candidate would benefit the organization and how well the system would work. **Political.** A description of how well received this solution would be from both user management user, and organization perspective.	30%	Completely supports user required functionality. Most users and management highly accept this solution. They are convinced that this solution will meet all their requirements by using not too much time in construction. It can also be expanded easily to support other functions in the future. Score: 100	Fully supports the required functionality. Many users and management accept this candidate, as it fully supports their requirements,and can be expanded to support other functions in the future. Score: 100	Supports the required functionality. Most users and management accept this solution , as it supports all their requirements. But they are afraid that the system may not be able to support the growth of database. Score: 70
Technical Feasibility Technology.An assessment of the maturity, availability and desirability of the computer technology needed to support this candidate. **Expertise.** An assessment of the technical expertise needed to develop,operate and maintain the candidate system.	30%	All hardware is available in the market and reliable. SQL 2000server is good at supporting large database. It is very stable and provides very fast access to large database, it is not complex and not hard to learn. MS Visual Basic.Net can be used to design and build system effectively and easily. Required to hire or train Visual Basic.Net expertise to perform modification for integration requirement Score: 95	All hardware is powerful and reliable. Oracle can effectively be used to design and build system. Oracle is very good at supporting large database, but it may be complex and hard to learn. Required to hire a computer company to construct all system and recruit one system engineer to take care of the system. Score: 80	All hardware is available in the market. MS Access is easy to use. It can be used to manage database very well, but the size of database must not be large. If database becomes larger, MS Access will not be able to work effectively. Expertise in MS Access is required. Training for technical user is also required. Score: 70

Table 3.2. Feasibility Analysis Matrix (Continued).

Feasibility Criteria	Weight	Candidate I	Candidate II	Candidate III
Economic Feasibility Cost to develop: Payback period: Break-even point: Detailed Calculation	30%	Approximately 432,250 baht 2 years and 1 months 1 years and 5 months See page 48-51 Score: 90	Approximately 511,000 baht 2 years and 6 months 2 years See page 52-55 Score: 85	Approximately 366,000 baht 1 years and 7 months 10 months See page 56-59 Score: 95
Schedule Feasibility An assessment of how long the solution will take to design and implement.	10%	Less than 3 months Score: 90	3-5 months Score: 85	About 1 month Score: 95
Ranking	100%	93.75	87.50	82.50

c. Candidate Solution

Candidate I is considered to be the most beneficial approach. In the feasibility analysis, the weight of first candidate has the most value, as well as the most technically feasible technology but it is not the most economically feasible. In this regard, candidate III has the most value because it is the lowest in development cost. For technically feasible technology, candidate III cannot support the growth of company database in the future. Thus, candidate I is expected to be suitable for the company's environment, fulfill all requirements of the company as well as support the growth of company's database.

The proposed system requires the following hardware components (Figure 3.3)

Table 3.3. Hardware Specification for Computer Server (1 set).

Hardware	Specification
CPU	Intel Pentium IV1.2 GHz
Memory	512 MB or higher
Hard Disk	20.5 GB
CD-ROM Drive	50 X
Floppy Drive	1.44 MB
Display	17" Super VGA monitor
Keyboard	104 keys

Table 3.4. Software Specification for the Computer Server.

Software	Specification
Operating system	Microsoft Windows 2000 Professional
Database Server	SQL 2000 Server

Table 3.5. Hardware Specification for Each PC Workstation (3 set).

Hardware	Specification
CPU	Intel Pentium III 866 MHz
Memory	256 KB
Hard Disk	10.2 GB
CD-ROM Drive	50 X
Floppy Drive	1.44 MB
Display	15" SVGA
Keyboard	104 keys
Mouse	Mouse
Printer Dot-matrix	Epson LQ2180i (2 set)
Printer Laser	Hewlett Packard LaserJet (1 set)

Table 3.6. Software Specification for PC Workstation.

Hardware	Specification
Operation System	Microsoft Windows Millennium Edition
System Development Software	Microsoft Visual Basic. NET
Document Preparation Software	Microsoft Word 2000

Table 3.7. Hardware Specification for the Network.

Hardware	Specification
Hub	8 ports 10/100
Modem	Diamond Supra Express 56K External USB port
UPS	600 VA

3.9 Security and Control

The information in Order Processing System is significant to many departments. The data in database must always be available to users when needed. A satisfactory level of shareability must be achieved and unauthorized access must be prevented. The following security and controls should be attained by the proposed computerized system.

(1) The user's password is a must for login security control in order to prevent unauthorized users from accessing the system.

(2) There must be security checking for each menu and program by using the password authority file.

(3) There must be backup diskettes or CD-ROM for data and programs. Data correction must be done immediately when errors are found in the data listing report.

(4) Data must be input, created, updated, and deleted during working hours only.

3.10 Cost/Benefit Analysis

The cost and benefit analysis is used to determine whether the project is worthwhile. The average inflation rate is forecasted to be 10% throughout the next five years. Following are details of cost for the new computerized system compared to the existing manual system.

(1) Cost of Manual System

In manual system, there are only a few equipments used in the work in process. Most of the spending is on operating cost spent on hiring more people, using a large quantity of paper work and stationary, etc. The cost of manual system is shown below.

The cost of operation expense which includes salary cost, office supply cost, and utility cost is expected to increase approximately 10% per year.

Table 3.8. Manual System Cost Analysis, Baht.

Cost Items	Year				
	1	2	3	4	5
Fixed Cost					
Type Writer	17,000.00	17,000.00	17,000.00	17,000.00	17,000.00
Calculator	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
Total Fixed Cost	22,000.00	22,000.00	22,000.00	22,000.00	22,000.00
Operating Cost					
Salary Cost:					
Operating Manager 1 person@40,000	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Operating Staff 6 persons@19,000	114,000.00	125,000.00	137,940.00	151,734.00	166,907.40
Sales Staff 10 persons@15,000	150,000.00	165,000.00	181,500.00	199,650.00	219,615.00
Total Monthly Salary Cost	304,000.00	334,400.00	367,840.00	404,624.00	445,086.40
Total Annual Salary Cost	3,648,000.00	4,012,800.00	4,414,080.00	4,855,488.00	5,341,036.00
Office Supplies & Miscellaneous Cost:					
Stationery 17,000 per month	20,400.00	22,440.00	24,684.00	27,152.40	29,867.64
Paper 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Miscellaneous 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Total Annual Office Supplies & Miscellaneous Cost	116,400.00	128,040.00	140,844.00	154,928.00	170,421.24
Utility Cost:					
Electricity 40,000 per month	480,000.00	528,000.00	580,800.00	638,880.00	702,768.00
Water 6,000 per month	72,000.00	79,200.00	87,120.00	95,853.00	105,415.20
Telephone 20,000 per month	240,000.00	264,000.00	290,400.00	319,440.00	351,384.00
Total Utility Cost	792,000.00	871,200.00	958,320.00	1,054,152.00	1,159,567.20
Total Operating Cost	4,556,400.00	5,012,040.00	5,513,244.00	6,064,568.00	6,671,025.24
Total Manual System Cost	4,578,400.00	5,034,040.00	5,535,244.00	6,086,568.40	6,693,025.24

Table 3.9. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	4,578,400.00	4,578,400.00
2	5,034,040.00	9,612,440.00
3	5,535,244.00	15,147,768.00
4	6,086,568.40	21,234,252.40
5	6,693,025.24	27,927,277.64
Total	27,927,277.64	

In computerized system, the company invests a large amount on developing the system, such as investing in system engineer, hardware and software, system construction, maintenance of the system, and training staff. The spending of operation expense is much lower than in the manual system since the system can rely on computer. Thus, the number of workers and use of stationary can be reduced.

Nevertheless, in operation of computerized system; the cost tends to increase at a reducing rate. The costs of hiring staff and using office supply are increased at 10% annually. The cost is shown in the following table.

Table 3.10. Computerized System Cost Analyst, Baht.

Cost Items	Year				
	1	2	3	4	5
Fixed Cost (Development Cost					
Hardware Cost					
Computer Server Cost	80,000.00	-	-	-	-
Personal Computer 3 units@20,000	60,000.00	-	-	-	-
Laser Printer 3 units@21,000	63,000.00	-	-	-	-
Dot Matrix Printer 1 units@25,000	25,000.00	-	-	-	-
UPS	8,000.00	-	-	-	-
Total Hardware Cost	236,000.00	-	-	-	-
Software Cost	61,250.00	-	-	-	-
Network	5,000.00	-	-	-	-
System Construction	100,000.00	-	-	-	-
Training Cost	30,000.00	-	-	-	-
Maintenance Cost					
		30,000.00	30,000.00	30,000.00	30,000.00
Total Fixed Cost	432,250.00	30,000.00	30,000.00	30,000.00	30,000.00
Operating Cost					
Salary Cost:					
Operating Managerperson@40,000	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Operating Staff 3 persons@19,000	57,000.00	62,700.00	68,970.00	75,867.00	92,238.30
Sales Staff 10 persons@15,000	150,000.00	165,000.00	181,500.00	199,650.00	219,615.00
System Engineer 1 person@35,000	35,000.00	38,500.00	42,350.00	46,585.00	51,243.50
Total Monthly Salary Cost	282,000.00	310,200.00	341,220.00	375,342.00	421,660.80
Total Annual Salary Cost	3,384,000.00	3,722,400.00	4,094,640.00	4,504,104.00	50591,929.60
Office Supplies & Miscellaneous Cost:					
Stationery 1,500 per month					
Paper 2,500 per month					
Miscellaneous 2,500 per month	18,000.00	19,800.00	17,424.00	19,166.40	21,083.04
Total Annual Office Supplies &	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
Miscellaneous Cost	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
	78,000.00	85,800.00	87,120.00	95,832.00	105,415.20
Utility Cost:					
Electricity 55,000 per month					
Water 5,000 per month	660,000.00	726,000.00	798,600.00	878,460.00	966,306.00
Telephone 18,000 per month	60,000.00	66,000.00	72,600.00	79,860.00	87,846.00
Total Utility Cost	216,000.00	237,600.00	261,360.00	287,496.00	316,245.60
	936,000.00	1,029,600.00	1,132,560.00	1,245,816.00	1,370,397.60
Total Operating Cost	4,398,000.00	4,837,800.00	5,321,580.00	5,853,738.00	6,349,111.80
Total Computerized System Cost	4,830,250.00	4,867,800.00	5,351,580.00	5,883,738.00	6,469,111.80

Table 3.11. Five Year Accumulated Computerized Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	4,830,250.00	4,830,250.00
2	4,867,800.00	9,698,050.00
3	5,351,580.00	15,049,630.00
4	5,883,738.00	20,401,210.00
5	6,469,111.80	26,284,948.00
Total	26,284,948.00	

(2) Comparison of the System Costs between Computerized System and Manual System

The cost of implementing manual system and computerized system can be compared as follows:

Table 3.12. Comparison of the System Cost, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	4,578,400.00	4,830,250.00
2	9,612,440.00	9,698,050.00
3	15,147,768.00	15,049,630.00
4	21,234,252.40	20,401,210.00
5	27,927,277.64	26,284,948.00

3.10.1Benefit Analysis

The benefit of new system is not only to increase the efficiency the operation but also decrease cost. However, the benefit can be classified as tangible and intangible benefits. Tangible benefit can be measured in term of money value. It's the deduction of salary cost, office supplies and miscellaneous cost, as well as utility cost.

In the opposite way, intangible benefit is the belief that the new system will increase the capacity and reduce problems such as human error. Generally, the benefits can be easily shown and indicated in tangible benefit.

The benefit of proposed system can be categorized as follows:

(1) Tangible Benefit

Benefit for the first year = (3,648,000 – 3,384,000) + (116,400 – 72,000)
+ (792,000 – 786,000)
= 314,400 Baht/year

Benefit for the second year = (4,012,800 – 3,722,400) + (128,040 -79,200)
+ (871,200 – 864,600)
= 345,840 Baht/year

Benefit for the third year = (4,414,080 – 4,094,640) + (140,844 – 87,120)
+ (958,320 – 951,060)
= 380,424 Baht/year

Benefit for the fourth year = (4,855,488 – 4,504,104) + (154,928.40 –
95,832) + (1,054,152 – 1,046,166)
= 418,466.40 Baht/year

Benefit for the fifth year = (5,341,036.80 – 5,059,929.60) + (170,421.24 –
105,415.20) + (1,159,567.20 – 1,150,782.60)

= 495,451.60 Baht/year

Furthermore, outstanding tangible benefit that we can derive after implementation of order processing system is measured in term of increased throughput. When our system can increase throughput, that means we can support customer orders increasingly and profits will be increased. Therefore, customers will be satisfied with our service.

Current net income of the manual system is 3,296,615 baht; therefore, we can estimate the benefit of the proposed system will increase net income by approximately 30% (4,285,600 baht for the first year after implementation). For the next four years, it will be increased 10%.

(2) Intangible Benefits

(a) Providing more accurate information than the existing system.

(b) Reducing work processing time and improving efficiency of the operation.

(c) Reducing human error in documentation.

(d) Providing fast and efficient service to customers.

(e) Providing up-to-date information and reports to support management's decision making.

(f) Making it easier and faster to retrieve required information.

(g) Making it easier and faster to produce reports.

3.10.2 Breakeven Analysis

Breakeven Analysis can be used to indicate the estimated period that the investment of computerized system cost will be equal to manual system cost.

Basically, the area before reaching the breakeven point will be the period when the company will lose in investment. It means the cost of computerized system is overthe cost of manual system. After the point of breakeven point is the starting period when the company will obtain the benefit and the cost of computerized system is less than the cost of manual system.

Regarding the proposed system, it will take 2 years and 5 months operation before obtaining the benefit.

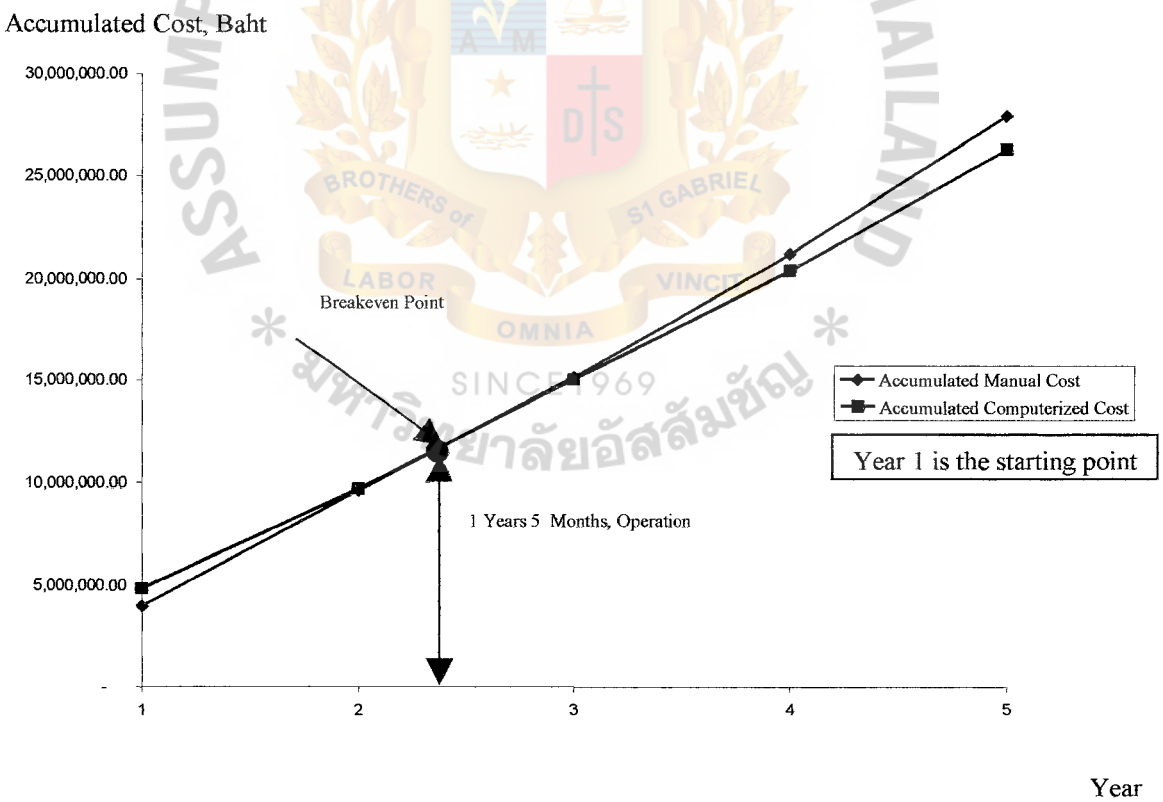

Figure 3.4. Breakeven Point of Proposed System.

3.10.3Payback Period Analysis

The payback period method determines the length of time of operation that the proposed system needs to payback the cost of investing before it is profitable.

Table 3.13. Cost and Benefit Analysis for the Computerized System, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-432,250.00					
Operation & Maintenance cost	0	-4,398,000.00	-4,837,800.00	-5,321,580.00	-5,853,738.00	-6,439,111.80
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	-422,250.00	-4,312,040.00	-4,649,125.80	-5,012,928.36	-5,408,853.91	-5,833,835.29
Cumulative time-adjusted cost over lifetime	-422,2500.0	-4,742,290.00	-9,391,415.80	-14,404,344.16	-19,813,198.07	-25,647,033.36
Benefit derived from Operation of new system	0	4,600,000.00	5,060,000.00	5,566,000.00	6,122,600.00	6,734,860.00
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	0	4,508,000.00	4,862,660.00	5,243,172.00	5,657,282.40	6,101,783.16
Cumulative time-Adjusted benefits over Lifetime	0	4,508,000.00	9,370,660.00	14,613,832.00	20,271,114.40	26,372,897.56

Table 3.14. Comparison of the Accumulated Cost and Accumulate Benefit from the Proposed System, Baht.

Year	Accumulated Cost	Accumulated Benefit	Accumulated(Benefit – Cost)
0	432,250.00	0	-432,250.00
1	4,742,290.00	4,508,000.00	-234,290.00
2	9,391,415.80	9,370,660.00	-20,755.80
3	14,404,344.16	14,613,832.00	209,487.84
4	19,813,198.07	20,271,114.40	457,916.33
5	25,647,033.36	26,372,897.56	725,864.20

The payback period is between the second and third year. Thus, the payback period is :

= 2 + (20,755.80 / 20,755.80 + 209,487.84)

= 2 + (20,755.80 / 230,243.64)

= 2 + 0.0901 year

0.0901 x12 = 1.08 (approximately 1 month)

Therefore, the payback period is 2 years and 1 month.

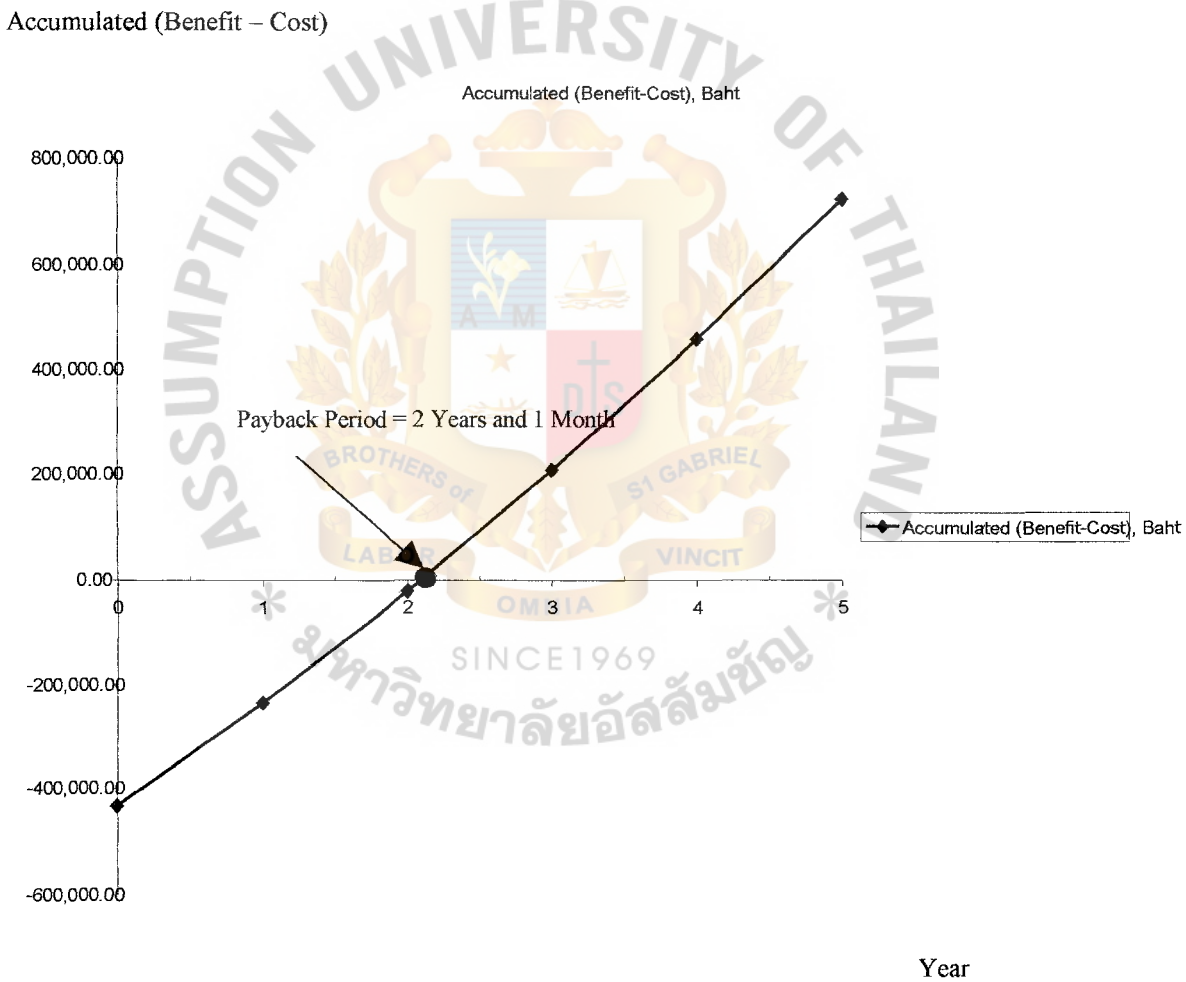

Figure 3.5. Payback Analysis of the Proposed System.

IV. PROJECT IMPLEMENTATION

4.1 Overview of the Project Implementation

The implementation process is set up by utilizing parallel run concept. Parallel system is the most secure approach of converting by running the existing system along with the proposed system. The existing system can take over if errors are found in the proposed system. Nevertheless, the new process is designed and programming based on the routing task of the users which take a short time for users to comprehend the process and operate it correctly.

4.2 Stages of Implementation

The implementation comprises four stages and obvious tasks must be performed in respective order.

(1) Programming

In this stage, the application programs are written in order to form whatever business is being computerized.

(2) Conversion

Converting from the existing system to the proposed system will be operated in parallel. The users will continue to operate the old team in the accustomed manner, but they also will use the new system.

(3) Testing

It involves testing of the program, a full system test, and documentation of the programs. A complete schedule of testing involves the following features.

(a) Testing individual program

(b) Creating test data

(c) System testing

(d) Backup and restart testing

(4) Installation

Installation of the proposed system consists of two major parts, hardware installation and software installation. First is hardware installation in which the proposed system has to install some new hardware that does not exist in the existing system. Hardware installation has to be concerned in various aspects, such as compatibility between each hardware component, suitable location of hardware component and security of the hardware component Second is software installation in which the proposed system has to install new software, which is designed for solving the current problems and increasing the ability of the system.

4.3 Training

Training the staff is an essential task in this section so that the user can use the system correctly when they comprehend it well. The training process is provided by the responsible department. We categorize the group of users into two groups. The first group is the user group. They will be trained how to use the application program. The other group is the manager. They will relate all of the system in the program and it flows in one course. Therefore, the manager group must be trained to know the flow of the system.

4.4 Documentation

Documentation of the system is separated into two parts. The first part is the user-guide which describes the method of how to use the program in each process. The other document is the programming guide which describes the flow of the system and data dictionary.

Furthermore, this document will assist the programmer to develop and maintain the system. Thus, all tests should also be documented so that the staff can keep track of the problem that occurs. When some problems happen again in the future, they can come back to check the record and figure out the problem immediately.

4.5 Project Time Requirement

The development of this project will take four months. See Figure 1.1 Project plan of the proposed system.

4.6 Result of the Implementation

Initially, we encountered problems of users because we must try to make them comprehend the system and convince them to alter from the manual process to the new computerized process. There are a lot of staff members dealing with this system, so it must meet the needs of process separated by departments.

Another problem of this project is the programming which takes a long time to match the system requirement of the users.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Currently, there are several factors that influence the business world and those factors change everyday. Moreover, there are many competitors, so a business should manage a dynamic system in order to survive and be stable.

In ALT Agrochemical Co., Ltd., the existing manual system cannot serve the growth of number of customer in the future with effectiveness and efficiency. The existing system has problems in operation such as redundancy of customer, error of customer information and customer order, out of stock items, etc. The proposed computerized system can substitute the existing system to work with high performance. The significant advantage provides just in time to support management in making decisions and planning for strategies among many competitors.

The proposed system procedure and database system will assist in inventory control and customer information instead of manual system. Furthermore, it provides several benefits such as saves all over time expenditures, provides timely reorder point information, provides slow moving stock information to cease the purchase and push selling, increase the efficiency and effectiveness in inventory control, customer information and up-to-date and accurate information of inventory for the management. Payback period for proposed system is approximately two years and 1 month and breakeven point is approximately one year and five months which is an appropriate period to develop a system.

Eventually, the proposed system has advantages for management in planning, making decision, and controlling the organization. The proposed system is more efficient and effective than the existing system, see Table 5.1

Table 5.1. Comparison of Degree of Achievement between the Proposed System and the Existing System.

Process	Existing System	Proposed System
Record Input Data Process	20 mins	5 mins
Order Process	40 mins	5 mins
Check Product Availability	30 mins	2 mins
Invoice Process	20 mins	3 mins
Payment Process	20 mins	5 mins
Shipment Process	20 mins	5 mins
Update Stock Process	1 hrs.	10 mins
Total	3 hrs.30 mins	35 mins

The proposed system also accomplishes the business solution that manages operation system and customer service. As seen in Table 5.1, the proposed system can save about two hours and fifty five minutes. For record Input Data process, the proposed system can save seventy five percent of the time because it is not only easy to insert and update master file by computerized system but also it is easy to manage master file database. Order Process time is reduced by eighty seven point five percent because the existing system manually operates in checking customer credit, customer order history whereas the proposed system uses computerized operation. Check Product Availability process is reduced by ninety three percent of faster retrieving stock. Invoice Process is reduced by eighty five percent of time because of facilitated information. Payment Process is reduced by seventy five percent of time because it is easy to generate receipt and update the payment of each invoice. Shipment Process is reduced

by the same time as Payment process because it is easy to arrange the route to deliver order. Update Stock Process is reduced eighty tree percent of time because the proposed system is easy to add or update inventory by computer. Furthermore, it is easy to manage product stock database.

Therefore, in proposed system, it can save the operation time, make the result more accurate, and also assist the staff work efficiently.

5.2 Recommendations

Since ALT Agrochemical Co., Ltd. has never used a computerized system before, most staff lack computer experience. Therefore, after implementation, training is required to provide computer knowledge and train the operational staff on job procedures of the computerized system. Some of them are even against new technology because they are not familiar with this kind of change. Thus, the company should encourage and train the staff to comprehend the needs of the new system and realize the significance of information.

In addition, the order processing system still requires correct and up-to-date information. In this regard, the company should assign database administrator to handle the new centralized database of the proposed system.

Further enhancement of the company should be done step by step starting from identifying the necessity and problems that occur in another system such as inventory system. From identifying the problems of the existing system, inventory system should be the next one to be computerized. ALT Agrochemical Co., Ltd. also plans to set RFID (Radio Frequency Identification) used for all products of organization in the future. Later, the accounting system should be developed because this department manages cash and credit transaction, which is very important for forecasting and decision-making. The purchasing and delivery system are the next

systems that the company should develop as well. Afterward, all system will be integrated them in order to share the data and resources for most effective and productive performance of the company.

Ultimately, with regard to the security, modification or creating all data can be done only by authorized people or in authorized ways. In addition, computer room must be securely locked with security access control.

APPENDIX A

FEASIBILITY ANALYSIS

Table A.1. Cost of Alternative Candidate I, Baht.

Cost Items	Year				
	1	2	3	4	5
Fixed Cost (Development Cost					
Hardware Cost					
Computer Server Cost	80,000.00	-	-	-	-
Personal Computer 3 units@20,000	60,000.00	-	-	-	-
Laser Printer 3 units@21,000	63,000.00	-	-	-	-
Dot Matrix Printer 1 units@25,000	25,000.00	-	-	-	-
UPS	8,000.00	-	-	-	-
Total Hardware Cost	236,000.00	-	-	-	-
Software Cost	61,250.00	-	-	-	-
Network	5,000.00	-	-	-	-
System Construction	100,000.00	-	-	-	-
Training Cost	30,000.00	-	-	-	-
Maintenance Cost					
		30,000.00	30,000.00	30,000.00	30,000.00
Total Fixed Cost	432,250.00	30,000.00	30,000.00	30,000.00	30,000.00
Operating Cost					
Salary Cost:					
Operating Managerperson@40,000	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Operating Staff 3 persons@19,000	57,000.00	62,700.00	68,970.00	75,867.00	92,238.30
Sales Staff 10 persons@15,000	150,000.00	165,000.00	181,500.00	199,650.00	219,615.00
System Engineer 1 person@35,000	35,000.00	38,500.00	42,350.00	46,585.00	51,243.50
Total Monthly Salary Cost	282,000.00	310,200.00	341,220.00	375,342.00	421,660.80
Total Annual Salary Cost	3,384,000.00	3,722,400.00	4,094,640.00	4,504,104.00	50591,929.60
Office Supplies & Miscellaneous Cost:					
Stationery 1,500 per month					
Paper 2,500 per month	18,000.00	19,800.00	17,424.00	19,166.40	21,083.04
Miscellaneous 2,500 per month	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
Total Annual Office Supplies &	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
Miscellaneous Cost	78,000.00	85,800.00	87,120.00	95,832.00	105,415.20
Utility Cost:					
Electricity 55,000 per month	660,000.00	726,000.00	798,600.00	878,460.00	966,306.00
Water 5,000 per month	60,000.00	66,000.00	72,600.00	79,860.00	87,846.00
Telephone 18,000 per month	216,000.00	237,600.00	261,360.00	287,496.00	316,245.60
Total Utility Cost	936,000.00	1,029,600.00	1,132,560.00	1,245,816.00	1,370,397.60
Total Operating Cost	4,398,000.00	4,837,800.00	5,321,580.00	5,853,738.00	6,349,111.80
Total Computerized System Cost	4,830,250.00	4,867,800.00	5,351,580.00	5,883,738.00	6,469,111.80

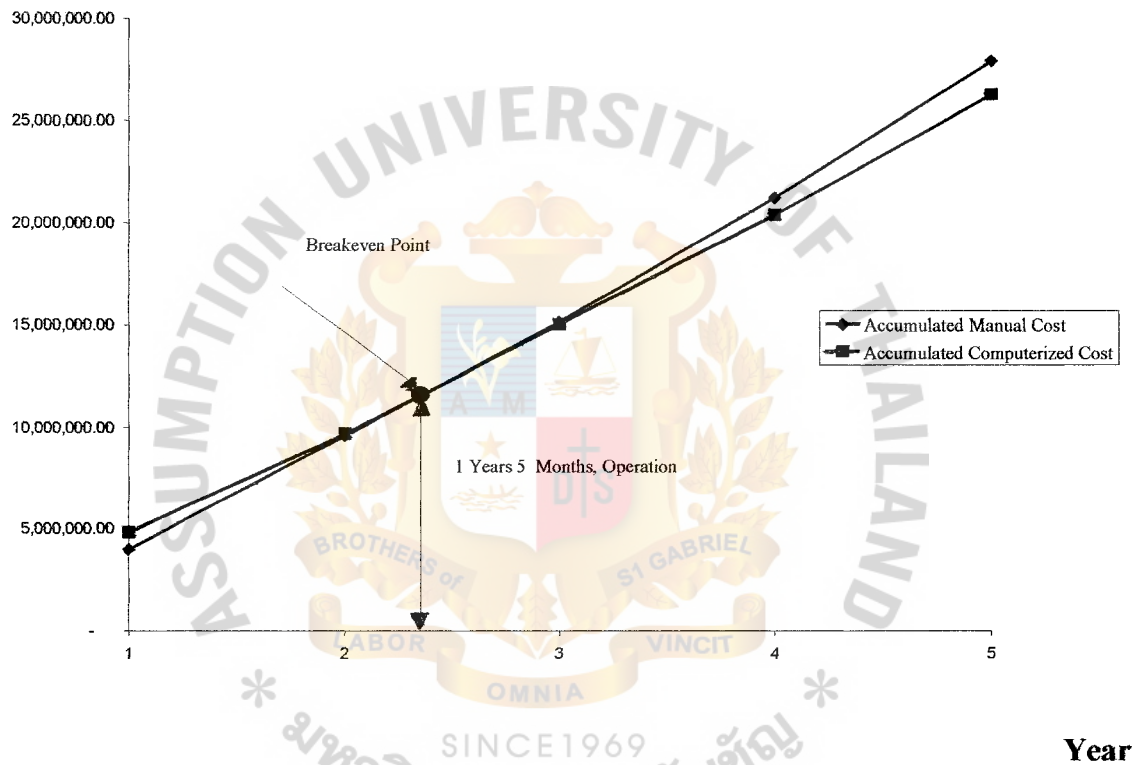

Figure A.1. Breakeven Analysis Chart of the Proposed System (Candidate I).

Table A.2. Payback Analysis for the Proposed System (Candidate I), Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-432,250.00					
Operation & Maintenance cost	0	-4,398,000.00	-4,837,800.00	-5,321,580.00	-5,853,738.00	-6,439,111.80
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	-422,250.00	-4,310,040.00	-4,649,125.80	-5,012,928.36	-5,408,853.91	-5,833,835.29
Cumulative time-adjusted cost over lifetime	-422,2500.0	-4,742,290.00	-9,391,415.80	-14,404,344.16	-19,813,198.07	-25,647,033.36
Benefit derived from Operation of new system	0	4,600,000.00	5,060,000.00	5,566,000.00	6,122,600.00	6,734,860.00
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	0	4,508,000.00	4,862,660.00	5,243,172.00	5,657,282.40	6,101,783.16
Cumulative time-Adjusted benefits over lifetime	0	4,508,000.00	9,370,660.00	14,613,832.00	20,271,114.40	26,372,897.56
Cumulative lifetime time-adjusted cost+benefits	-432,250.00	-234,290.00	-20,755.80	209,487.84	457,916.33	725,864.20

Cumulative Cost, Baht

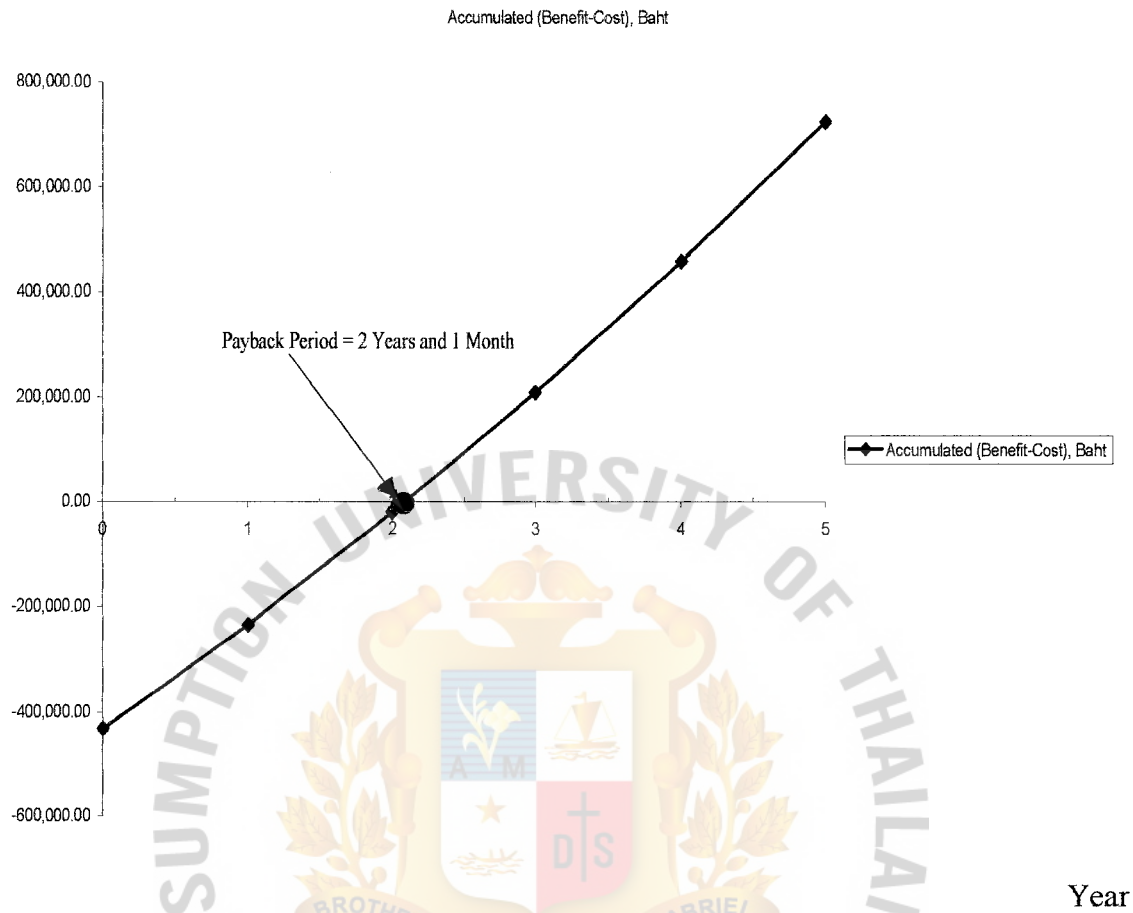

Figure A.2. Payback Analysis Chart of the Proposed System (Candidate I).

According to, Figure A.1.illustrates the system of Candidate I with a payback period of 2 years and 1 month. This identifies the company will get a return from this within 2 years.

Net Present Value (NPV) = Total present value of lifetime benefits – Total present value of lifetime costs

= 26,372,897.56 – 25,647,033.36

= 725,864.20 baht

Net Present Value of this alternative is 725,864.20

Table A.3. Cost of Alternative Candidate II, Baht.

Cost Items	Year				
	1	2	3	4	5
Fixed Cost (Development Cost					
Hardware Cost					
Computer Server Cost	80,000.00	-	-	-	-
Personal Computer 3units@20,000	60,000.00	-	-	-	-
Laser Printer 3units@21,000	63,000.00	-	-	-	-
Dot Matrix Printer 1units@25,000	25,000.00	-	-	-	-
UPS	8,000.00	-	-	-	-
Total Hardware Cost	236,000.00	-	-	-	-
Software Cost	75,000.00	-	-	-	-
Network	5,000.00	-	-	-	-
System Construction	150,000.00	-	-	-	-
Training Cost	50,000.00	-	-	-	-
Maintenance Cost		40,000.00	40,000.00	40,000.00	40,000.00
Total Fixed Cost	516,000.00	40,000.00	40,000.00	40,000.00	40,000.00
Operating Cost					
Salary Cost:					
Operating Managerperson@40,000	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Operating Staff 3 persons@19,000	57,000.00	62,700.00	68,970.00	75,867.00	92,238.30
Sales Staff 10 persons@15,000	150,000.00	165,000.00	181,500.00	199,650.00	219,615.00
System Engineer 1 person@35,000	35,000.00	38,500.00	42,350.00	46,585.00	51,243.50
Total Monthly Salary Cost	282,000.00	310,200.00	341,220.00	375,342.00	421,660.80
Total Annual Salary Cost	3,384,000.00	3,722,400.00	4,094,640.00	4,504,104.00	50591,929.60
Office Supplies & Miscellaneous Cost:					
Stationery 1,500 per month					
Paper 2,500 per month	18,000.00	19,800.00	17,424.00	19,166.40	21,083.04
Miscellaneous 2,500 per month	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
Total Annual Office Supplies &	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
Miscellaneous Cost	78,000.00	85,800.00	87,120.00	95,832.00	105,415.20
Utility Cost:					
Electricity 55,000 per month	660,000.00	726,000.00	798,600.00	878,460.00	966,306.00
Water 5,000 per month	60,000.00	66,000.00	72,600.00	79,860.00	87,846.00
Telephone 18,000 per month	216,000.00	237,600.00	261,360.00	287,496.00	316,245.60
Total Utility Cost	936,000.00	1,029,600.00	1,132,560.00	1,245,816.00	1,370,397.60
Total Operating Cost	4,398,000.00	4,837,800.00	5,321,580.00	5,853,738.00	6,349,111.80
Total Computerized System Cost	4,914,000.00	4,877,800.00	5,361,580.00	5,893,738.00	6,479,111.80

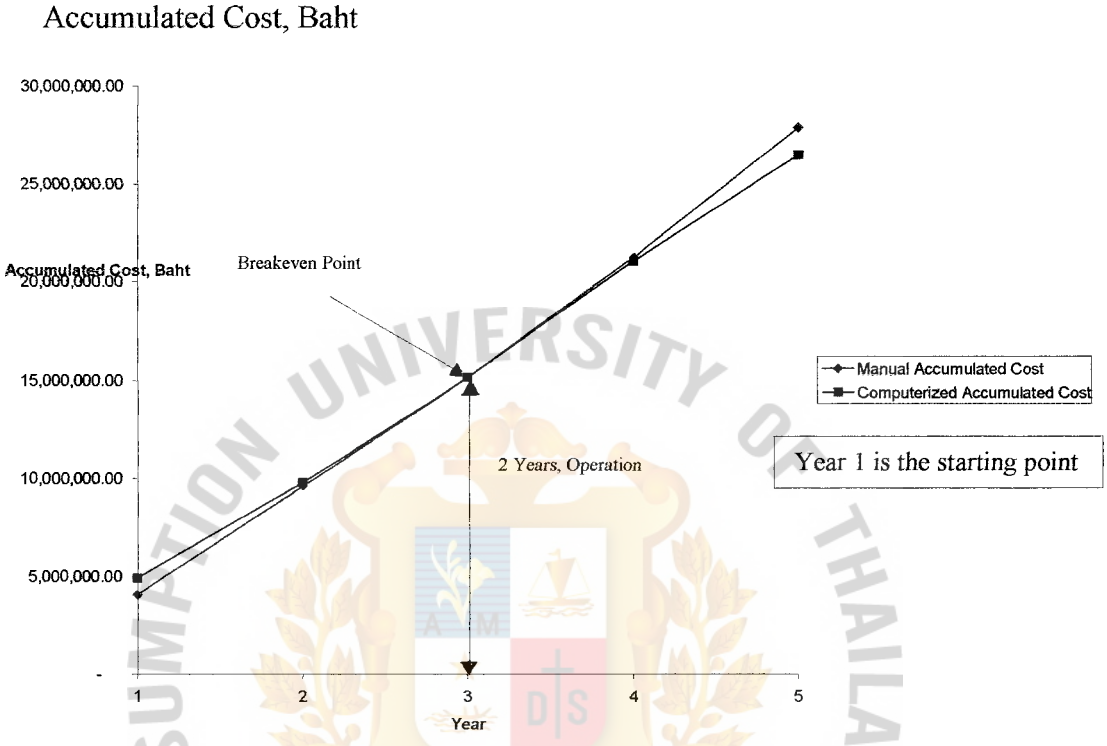

Figure A.3. Breakeven Analysis Chart of Candidate II.

Table A.4. Payback Analysis for Candidate II, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-516,000.00					
Operation & Maintenance cost	0	-4,398,000.00	-4,837,800.00	-5,321,580.00	-5,853,738.00	-6,439,111.80
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	-516,000.00	-4,310,040.00	-4,649,125.80	-5,012,928.36	-5,408,853.91	-5,833,835.29
Cumulative time-adjusted cost over lifetime	-516,0000.0	-4,826,040.00	-9,475,165.80	-14,488,094.16	-19,896,948.07	-25,730,783.36
Benefit derived from Operation of new system	0	4,600,000.00	5,060,000.00	5,566,000.00	6,122,600.00	6,734,860.00
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	0	4,508,000.00	4,862,660.00	5,243,172.00	5,657,282.40	6,101,783.16
Cumulative time-Adjusted benefits over lifetime	0	4,508,000.00	9,370,660.00	14,613,832.00	20,271,114.40	26,372,897.56
Cumulative lifetime time-adjusted cost+benefits	-516,000.00	-318,040.00	-104,505.80	125,737.84	374,166.33	642,114.20

Cumulative Cost, Baht

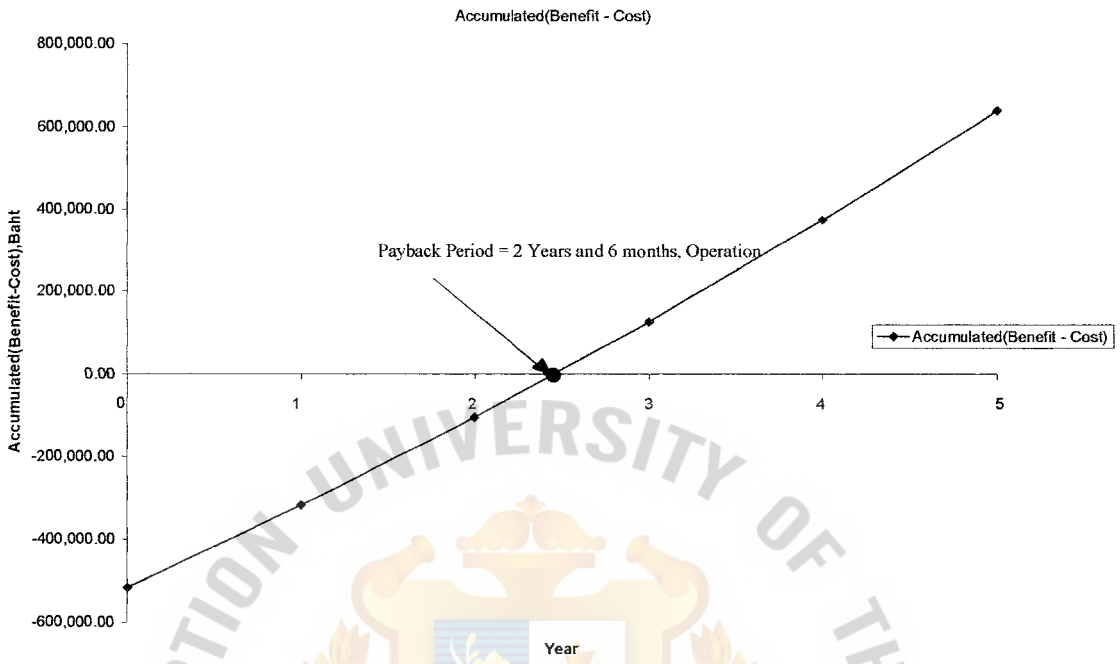

Figure A.4. Payback Analysis Chart of Candidate II.

Figure A.4 illustrates system of candidate II with a payback period of 2 years and 6 months. This identifies the company will get a return from this within almost three years.

Net Present Value (NPV) = Total present value of lifetime benefits – Total present value of lifetime costs

= 26,372,897.56 – 25,730,783.36

= 642,114.20 baht.

Net Present Value of this alternative is 642,114.20 baht

Table A.5. Cost of Alternative Candidate III, Baht.

Cost Items	Year				
	1	2	3	4	5
Fixed Cost (Development Cost					
Hardware Cost					
Computer Server Cost	80,000.00	-	-	-	-
Personal Computer 3units@20,000	60,000.00	-	-	-	-
Laser Printer 3units@21,000	63,000.00	-	-	-	-
Dot Matrix Printer 1units@25,000	25,000.00	-	-	-	-
UPS	8,000.00	-	-	-	-
Total Hardware Cost	236,000.00	-	-	-	-
Software Cost	25,000.00	-	-	-	-
Network	5,000.00	-	-	-	-
System Construction	50,000.00	-	-	-	-
Training Cost	15,000.00	-	-	-	-
Maintenance Cost		20,000.00	20,000.00	20,000.00	20,000.00
Total Fixed Cost	326,000.00	20,000.00	20,000.00	20,000.00	20,000.00
Operating Cost					
Salary Cost:					
Operating Managerperson@40,000	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Operating Staff 3 persons@19,000	57,000.00	62,700.00	68,970.00	75,867.00	92,238.30
Sales Staff 10 persons@15,000	150,000.00	165,000.00	181,500.00	199,650.00	219,615.00
System Engineer 1 person@35,000	35,000.00	38,500.00	42,350.00	46,585.00	51,243.50
Total Monthly Salary Cost	282,000.00	310,200.00	341,220.00	375,342.00	421,660.80
Total Annual Salary Cost	3,384,000.00	3,722,400.00	4,094,640.00	4,504,104.00	50591,929.60
Office Supplies & Miscellaneous Cost:					
Stationery 1,500 per month					
Paper 2,500 per month	18,000.00	19,800.00	17,424.00	19,166.40	21,083.04
Miscellaneous 2,500 per month	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
Total Annual Office Supplies &	30,000.00	33,000.00	34,848.00	38,322.80	42,166.08
Miscellaneous Cost	78,000.00	85,800.00	87,120.00	95,832.00	105,415.20
Utility Cost:					
Electricity 55,000 per month	660,000.00	726,000.00	798,600.00	878,460.00	966,306.00
Water 5,000 per month	60,000.00	66,000.00	72,600.00	79,860.00	87,846.00
Telephone 18,000 per month	216,000.00	237,600.00	261,360.00	287,496.00	316,245.60
Total Utility Cost	936,000.00	1,029,600.00	1,132,560.00	1,245,816.00	1,370,397.60
Total Operating Cost	4,398,000.00	4,837,800.00	5,321,580.00	5,853,738.00	6,349,111.80
Total Computerized System Cost	4,724,000.00	4,877,800.00	5,341,580.00	5,873,738.00	6,459,111.80

Accumulated Cost, Baht

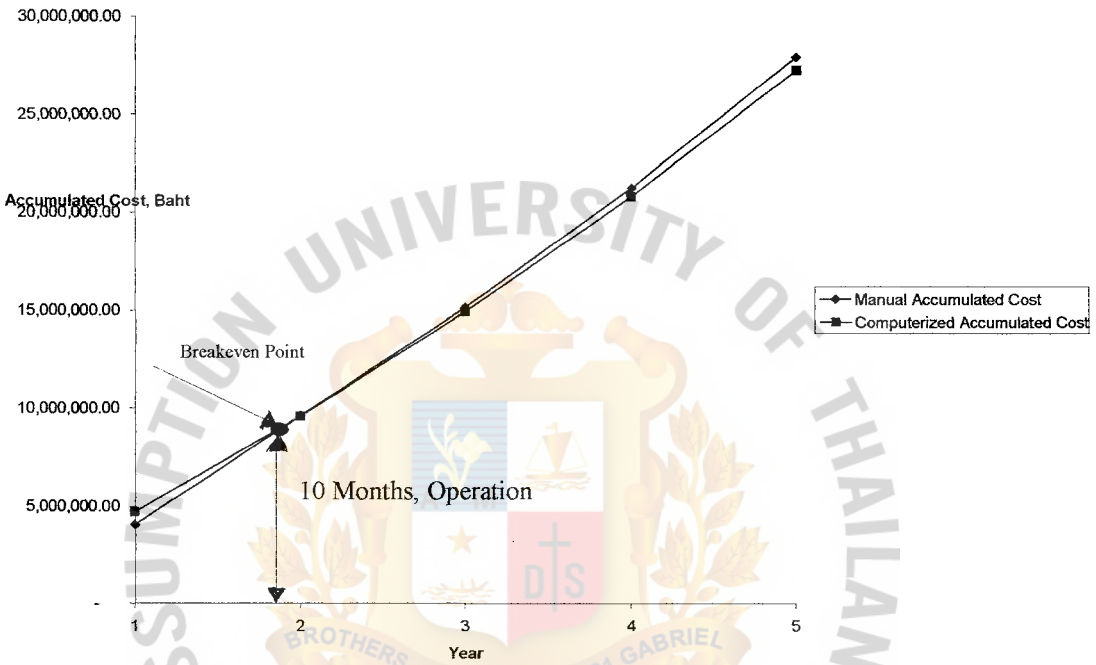

Figure A.5. Breakeven Analysis Chart of Candidate III.

Table A.6. Payback Analysis for Candidate III, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-326,000.00					
Operation & Maintenance cost	0	-4,398,000.00	-4,837,800.00	-5,321,580.00	-5,853,738.00	-6,439,111.80
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	-326,000.00	-4,310,040.00	-4,649,125.80	-5,012,928.36	-5,408,853.91	-5,833,835.29
Cumulative time-adjusted cost over lifetime	-516,0000.0	-4,636,040.00	-9,285,165.80	-14,298,094.16	-19,706,948.07	-25,540,783.36
Benefit derived from Operation of new system	0	4,600,000.00	5,060,000.00	5,566,000.00	6,122,600.00	6,734,860.00
Discount factor for 2%	1.000	0.980	0.961	0.942	0.924	0.906
Time-adjusted costs (adjusted to present value)	0	4,508,000.00	4,862,660.00	5,243,172.00	5,657,282.40	6,101,783.16
Cumulative time-Adjusted benefits over lifetime	0	4,508,000.00	9,370,660.00	14,613,832.00	20,271,114.40	26,372,897.56
Cumulative lifetime time-adjusted cost+benefits	-326,000.00	-128,040.00	-85,494.20	315,737.84	564,166.33	832,114.20

Cumulative Cost, Baht

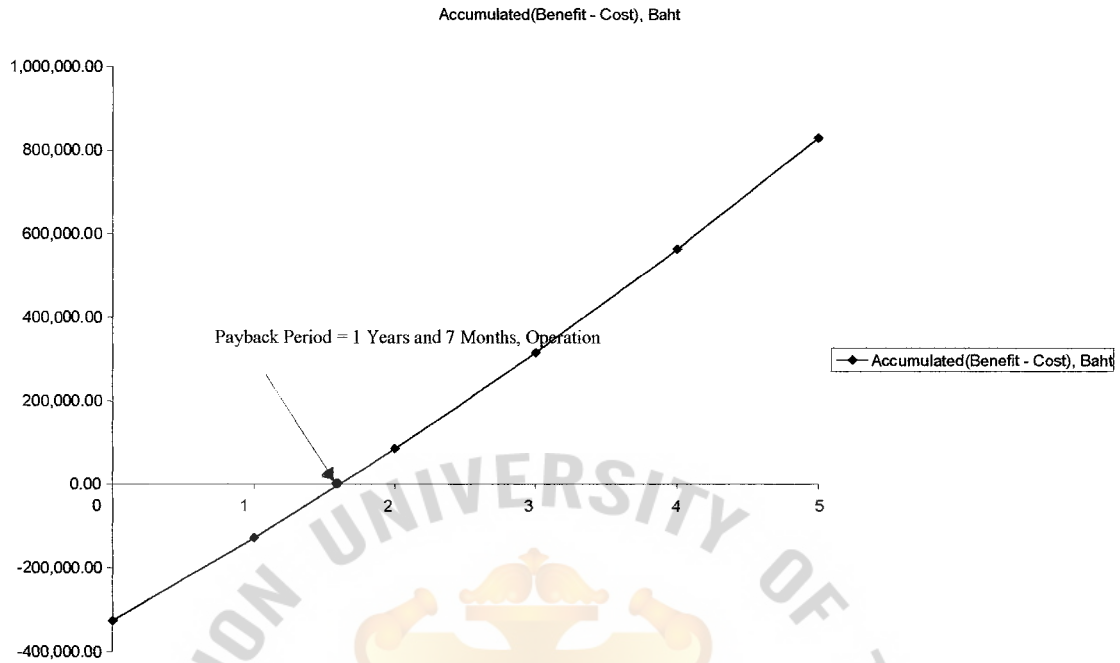

Figure A.6. Payback Analysis Chart of Candidate III.

Figure A.6 illustrates the system of candidate III with a payback of 1 year and seven months. This identifies the company will get a return from this within two years.

Net Present Value (NPV) = Total present value of lifetime benefits – Total present value of lifetime costs

= 26,372,897.56 – 25,549,783.36

= 832,114.20 baht

Net Present Value of this alternative is 832,114.20

APPENDIX B

DATA FLOW DIAGRAM

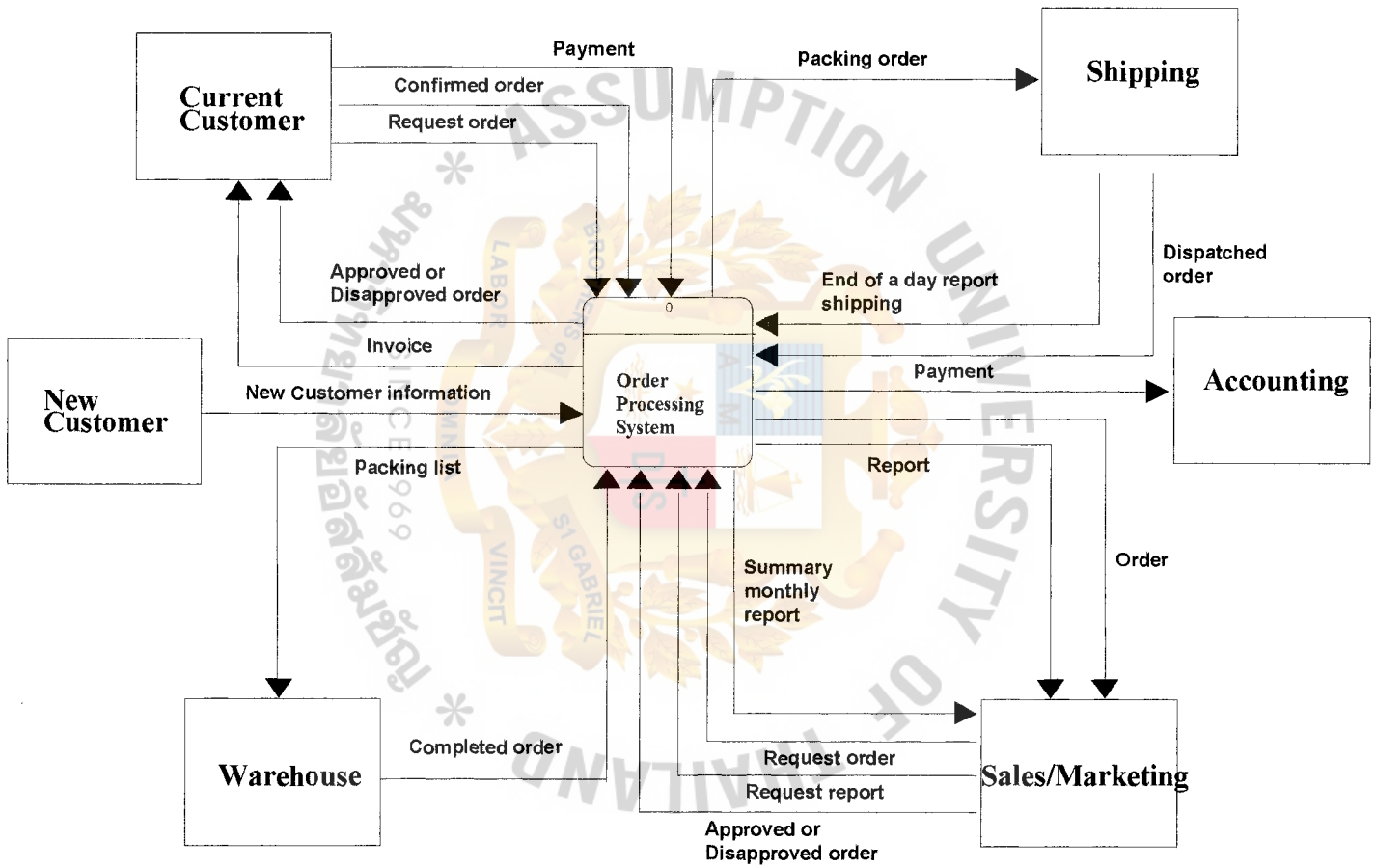

Figure A.2. Context Diagram (Proposed System).

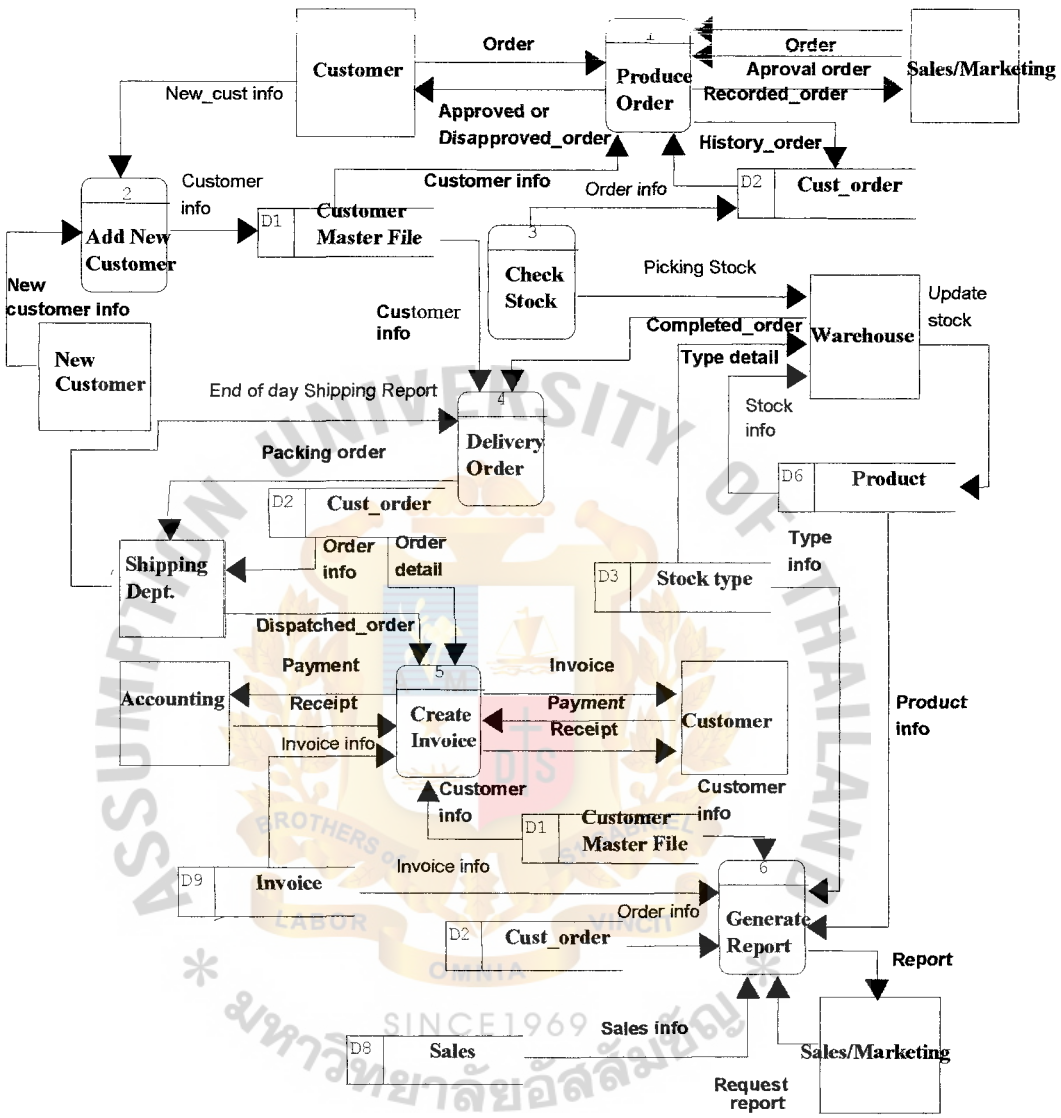

Figure B.2. Data Flow Diagram Level 0 of Proposed System.

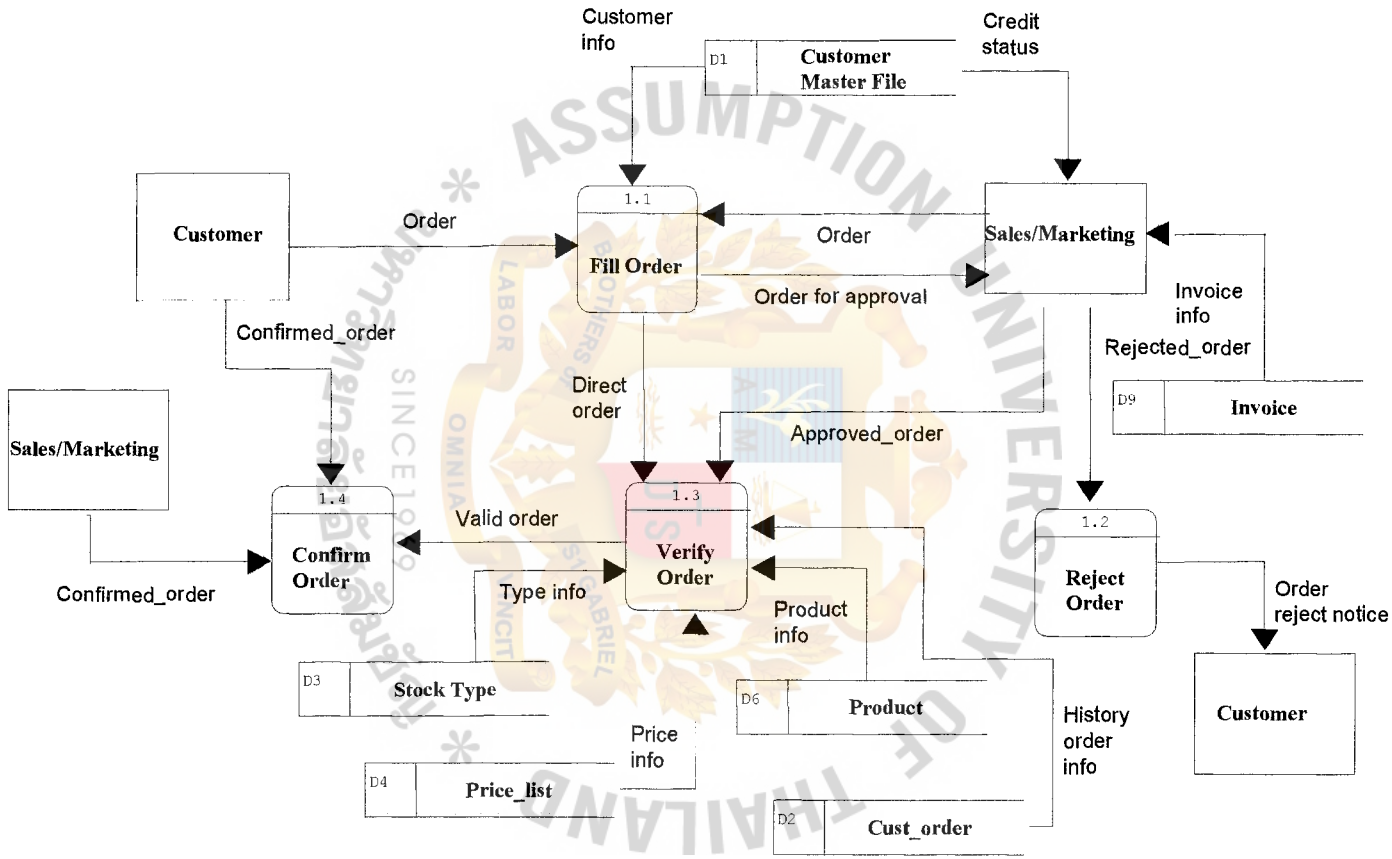

Figure B.3. Data Flow Diagram Level 1 of Fill Order.

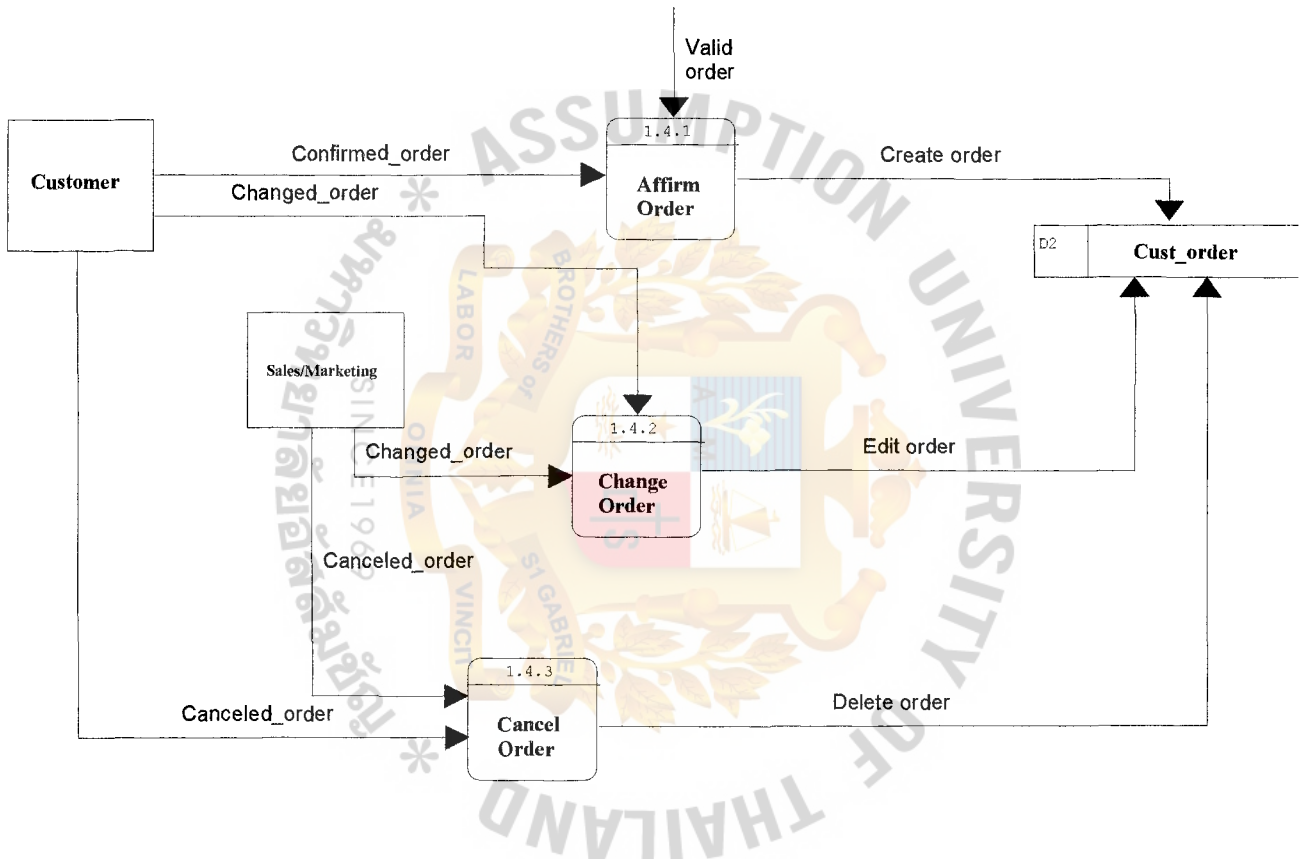

Figure B.4. Data Flow Diagram Level 2 of Affirm Order.

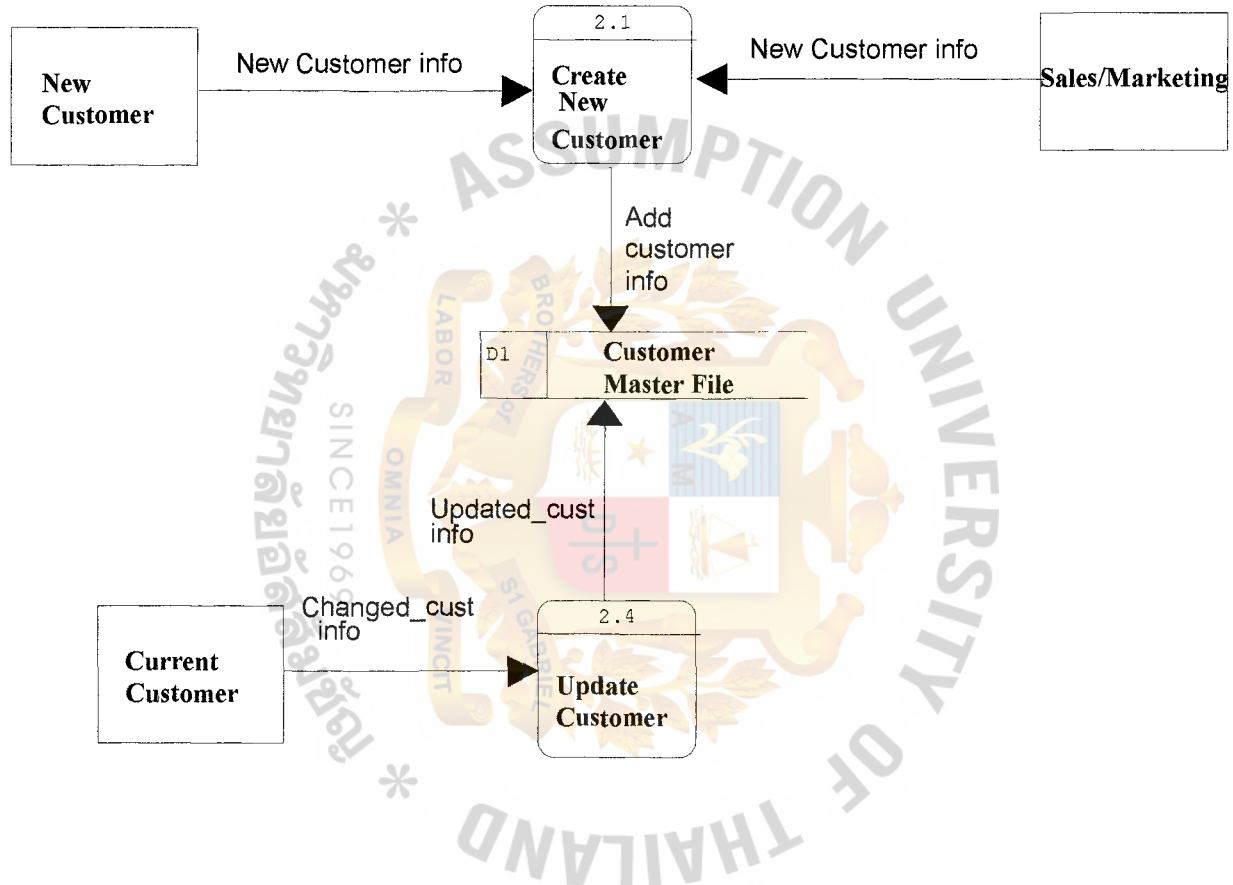

Figure B.5. Data Flow Diagram Level 1 of Create New Customer

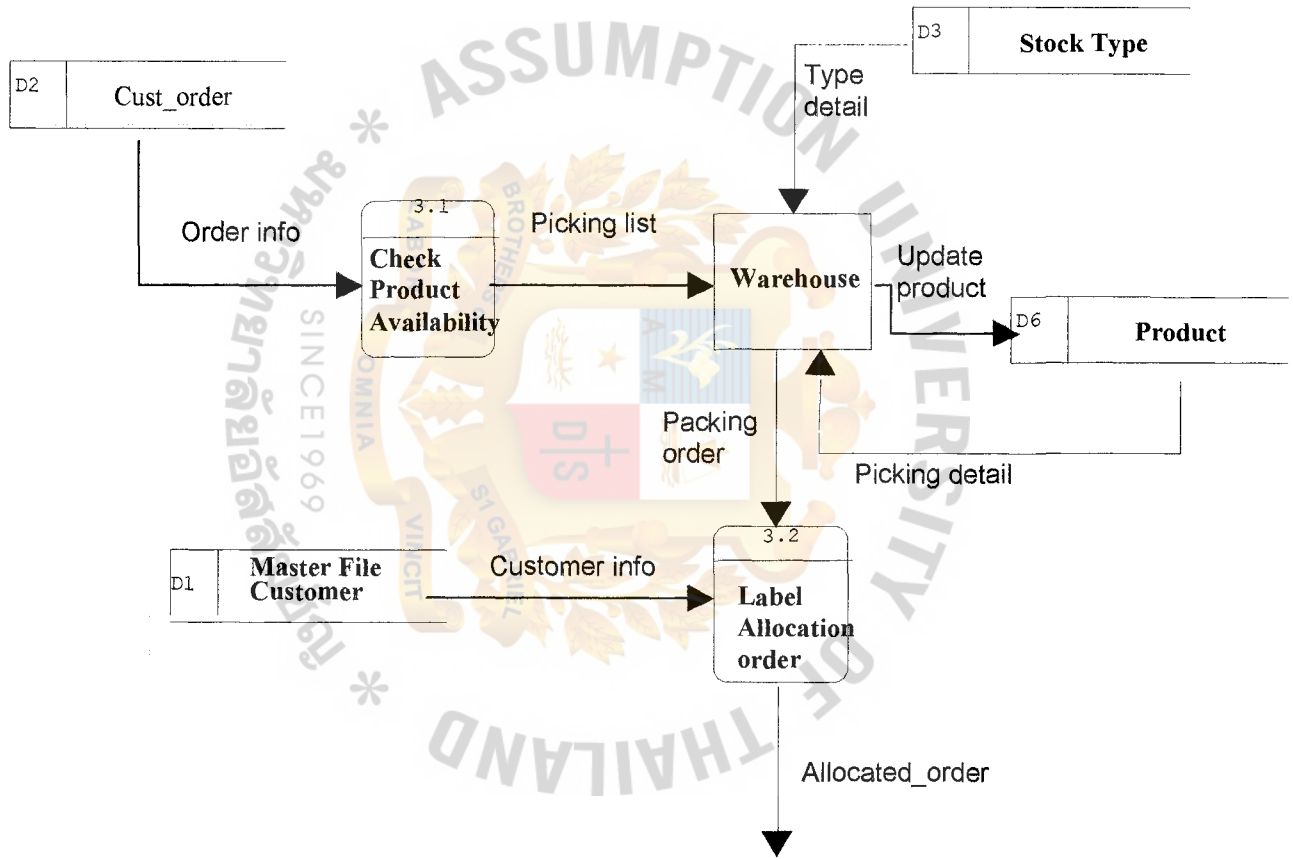

Figure B.6. Data Flow Diagram Level 1 of Check Product Availability.

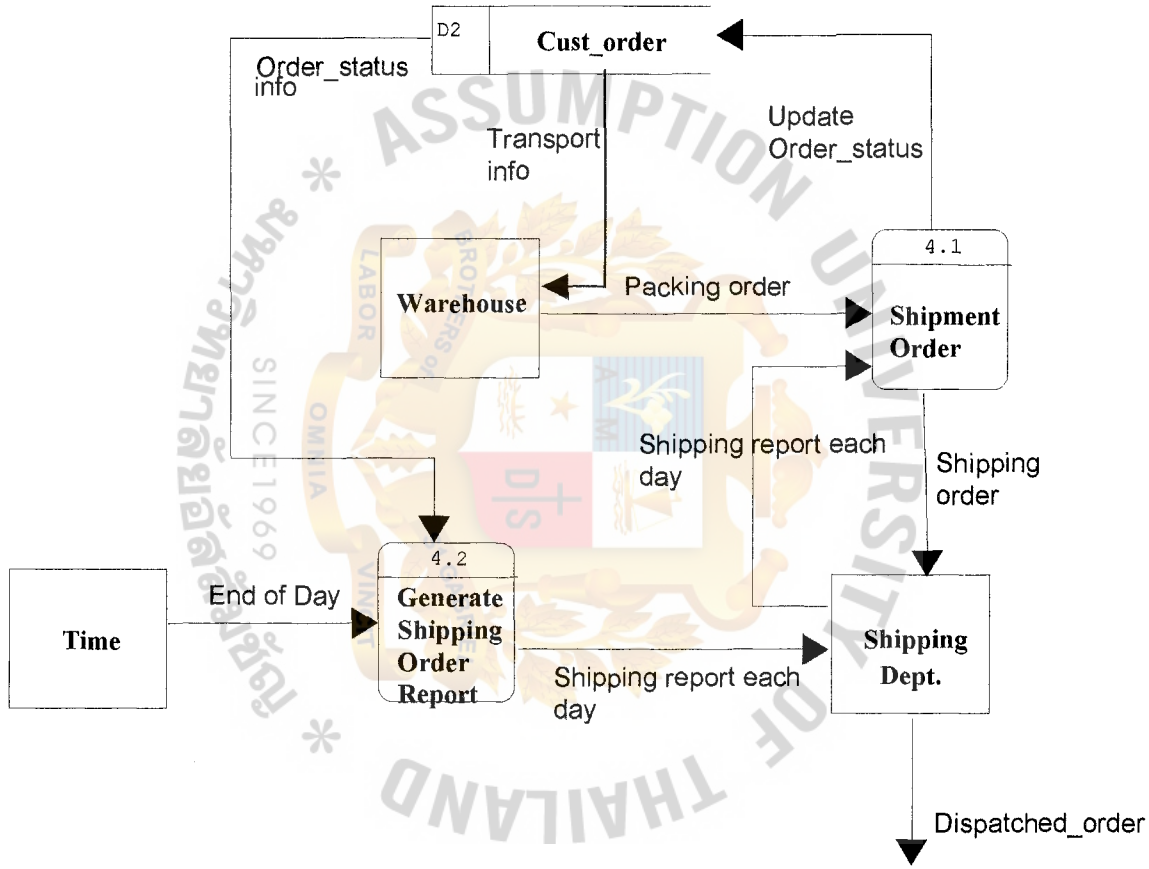

Figure B.7. Data Flow Diagram Level 1 of Shipping Order.

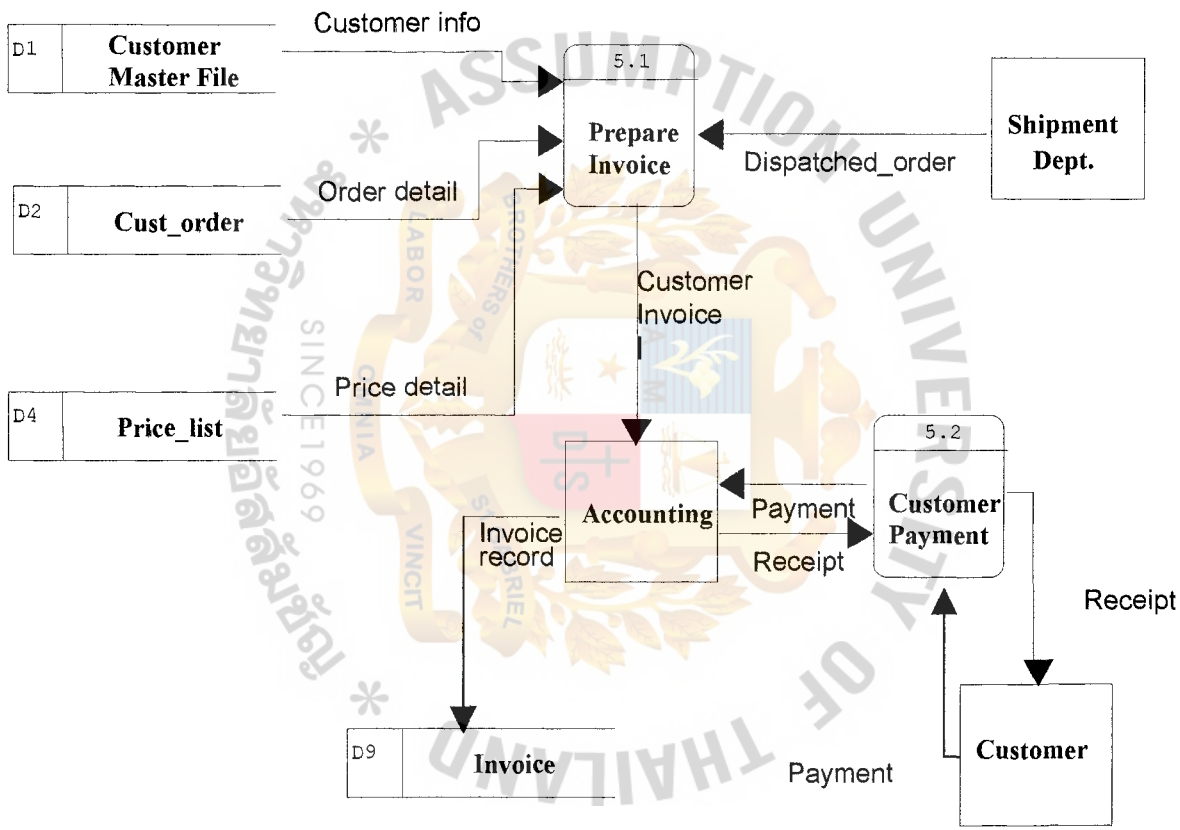

Figure B.8. Data Flow Diagram Level 1 of Prepare Invoice.

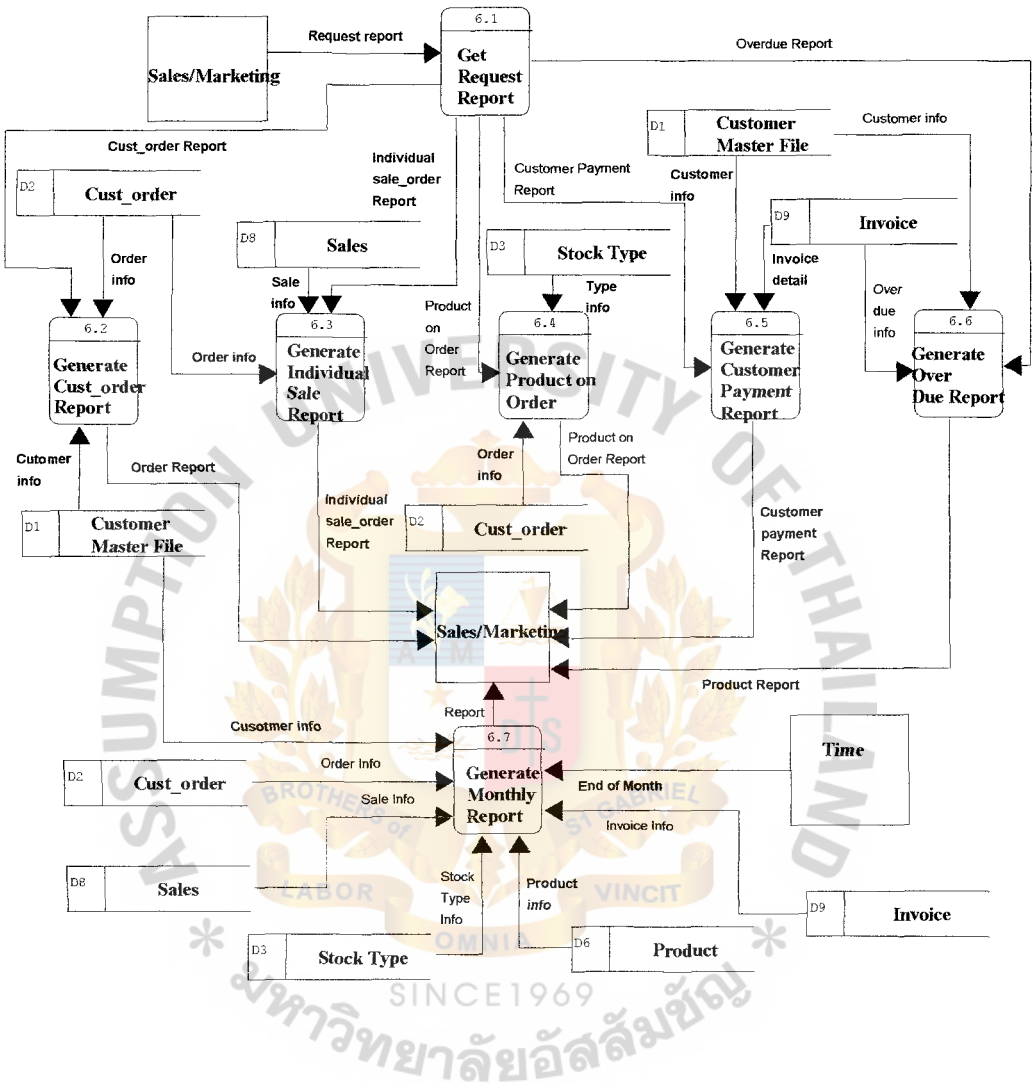

Figure B.9. Data Flow Diagram Level 1 of Requested Report.

APPENDIX C

DATABASE DESIGN

Table C.1. Structure of Customer Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Cust_ID	Varchar	Y	Y	8	xxxx....
2	Cust_Name	Varchar			30	xxxx....
3	Sale_ID	Varchar	Y		5	xxxxx
4	Cust_Status	Varchar			2	xx
5	Cust_Addr1	Varchar			50	xxxx....
6	Cust_Addr2	Varchar			50	xxxx....
7	Cust_Province	Varchar			20	xxxx...
8	Cust_Zip	Varchar			5	xxxxx
9	Cust_Tel1	Varchar			20	xxxx...
10	Cust_Tel2	Varchar			20	xxxx...
11	Cust_Fax	Varchar			20	xxxx...
12	Cust_memo	Varchar			40	xxxx...

Table C.2. Structure of Sales Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Sale_ID	Varchar	Y	Y	5	xxxxx
2	Sale_Name	Varchar			30	xxxx...
3	Sale_Title	Varchar			10	xxxx...
4	Sale_Addr	Varchar			40	xxxx...
5	Sale_Tel	Varchar			20	xxxx....

Table C.3. Structure of Invoice Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Inv_No.	Integer	Y	Y	6	999999
2	Order_No.	Integer	Y		5	99999
3	Inv_Date	Date			Short date	dd/mm/yy
4	Ship_to	Varchar			30	xxxx....
5	Cust_ID	Varchar	Y		8	xxxxxxxx
7	Order_Date	Date			Short date	dd/mm/yy
8	Schd_Date	Date			Short date	dd/mm/yy
9	Term	Integer			3	999
10	Due_Date	Date			Short date	dd/mm/yy
11	Paid_Date	Date			Short date	dd/mm/yy
12	Sale_ID	Varchar	Y		5	xxxxx
13	Discount	Float			6	999..
14	Transport_No.	Varchar			20	xxxx....
15	Transport_Name	Varchar			10	xxxx...
16	Note	Varchar			40	xxxx...

Table C.4. Structure of Customer Order Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Order_No	Integer	Y	Y	5	99999
2	Cust_Id	Varchar	Y		8	xxxx…
3	Ship_to	Varchar			30	xxxx…
4	Ship_to1	Varchar			30	xxxx…
5	Schd_Date	Date			Short date	dd/mm/yy
6	Term	Integer			3	999
7	Sale_ID	Varchar	Y		5	xxxxx
8	Transport	Varchar			20	xxxx…
9	Note	Varchar			40	xxxx…

Table C.5. Structure of Customer Order Detail Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Order_No	Integer	Y	Y	5	99999
2	Product_No	Varchar	Y		9	xxxx…
3	Quantity	Integer			5	99999
4	Price	Float			10	9999..
5	Order_status	Integer			1	9
6	Order_Note	Varchar			25	xxxx…

Table C.6. Structure of Product Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Product_No	Varchar	Y	Y	9	xxxx...
2	Type_ID	Varchar	Y		2	xx
3	Product_Name	Varchar			15	xxxx...
4	Product_Price	Float			10	9999...
5	Product_Cost	Float			10	9999...
6	Product_Quantity	Integer			8	9999...
7	Product_Sub	Integer			4	9999
8	Product_size	Varchar			15	xxxx..
9	Date_Receive	Date			Short date	dd/mm/yy

Table C.7. Structure of Product Type Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Type_ID	Varchar	Y	Y	2	xx
2	Type_Name	Varchar			15	xxxx...
3	Type_Note	Varchar			40	xxxx...

Table C.8. Structure of Invoice Detail Table.

No.	Field Name	Field Type	Index	Unique	Length	Format
1	Inv_No	Integer	Y	Y	6	999999
2	Product_No	Varchar	Y		9	xxxx…
3	Product_Name	Varchar			15	xxxx…
4	Product_Size	Varchar			15	xxxx..
5	Quantity	Integer			8	9999…
6	Total_line	Float			10	9999…
7	Total_Amount	Float			12	9999…

APPENDIX D

PROCESS SPECIFICATION

Table D.1. Process Specification of Process 1.1.

Items	Description
Process Name :	Fill Order
Data In :	Requested Order
Data Out :	Customer Order Order for approval
Process :	(1) Get requested order (2) Send to Sales and Marketing for approving
Attachment :	(1) Sales and Marketing (2) Process 1.3

Table D.2. Process Specification of Process 1.2.

Items	Description
Process Name :	Rejected Order
Data In :	Rejected Order
Data Out :	Order reject notice
Process :	(1) Inform customer for rejected order
Attachment :	(1) Customer

Table D.3. Process Specification 0f Process 1.3.

Items	Description
Process Name :	Verify Order
Data In :	Direct Order Approved Order History customer order information Product information Price information Type of product
Data Out :	Valid Order
Process :	(1) Get Order information (2) Check history order, product detail, price detail, and type of product detail.
Attachment :	(1) Process 1.4

Table D.4. Process Specification of Process 1.4.1.

Items	Description
Process Name :	Affirm Order
Data In :	Valid Order Confirmed Order
Data Out :	Create Order
Process :	(1) Get confirmed order (2) Record the requested order into customer order database.
Attachment :	(1) Data Store D2

Table D.5. Process Specification of Process 1.4.2.

Items	**Description**
Process Name :	Change Order
Data In :	Changed order
Data Out :	Edit order
Process :	(1) Update the requested order (2) Record final customer order into customer order database.
Attachment :	(1) Data Store D2

Table D.6. Process Specification of Process 1.4.3.

Items	Description
Process Name :	Cancel Order
Data In :	Canceled Order
Data Out :	Delete order
Process :	(1) Get canceled order (2) Delete the requested order from customer order database.
Attachment :	(1) Data Store D2

Table D.7. Process Specification of Process 2.1.

Items	Description
Process Name :	Create New Customer
Data In :	New customer information
Data Out :	Add customer information
Process :	(1) Get new customer information (2) Record new customer detail into customer database
Attachment :	(1) Data Store D1 (2) New customer (3) Sales and Marketing

Table D.8. Process Specification of Process 2.2.

Items	Description
Process Name :	Update Customer
Data In :	Changed customer information
Data Out :	Updated customer information
Process :	(1) Get changed customer detail (2) Update changed customer detail into customer database
Attachment :	(1) Data Store D1 (2) Current customer

Table D.9. Process Specification of Process 3.1.

Items	Description
Process Name :	Check Product Availability
Data In :	Order information
Data Out :	Packing list
Process :	(1) Get customer order detail (2) Send order to warehouse to check available product
Attachment :	(1) Warehouse

Table D.10. Process Specification of Process 3.2.

Items	Description
Process Name :	Label Allocation Order
Data In :	Packing list Customer information
Data Out :	Allocation order
Process :	(1) Get the packing order (2) Allocate product for shipping
Attachment :	(1) Data Store D1

Table D.11. Process Specification of Process 4.1.

Items	Description
Process Name :	Shipment Order
Data In :	Packing order
Data Out :	Update order status Shipping order
Process :	(1) Get the packing order (2) Send packing order to shipping department for shipping
Attachment :	(1) Warehouse (2) Data Store D2

Table D.12. Process Specification of Process 4.2.

Items	Description
Process Name :	Generate Shipping Order Report
Data In :	End of day Order status information
Data Out :	Shipping report at the end of the day
Process :	(1) Get order detail which order status is "0" from customer order database (2) Print out the shipping report at the end of the day
Attachment :	(1) Time (2) Shipping department

Table D.13. Process Specification of Process 5.1.

Items	Description
Process Name :	Prepare Invoice
Data In :	Dispatched Order Customer information Order detail Price detail
Data Out :	Customer Invoice
Process :	(1) Get dispatched order from shipping department (2) Create Invoice
Attachment :	(1) Shipping Department (2) Accounting (3) Data Store D1 (4) Data Store D2 (5) Data Store D4

Table D 14. Process Specification of Process 5.2.

Items	Description
Process Name :	Customer Payment
Data In :	Payment Receipt
Data Out :	Receipt
Process :	(1) Get receipt form Accounting (2) Send receipt to customer
Attachment :	(1) Accounting (2) Customer

Table D.15. Process Specification of Process 6.1.

Items	Description
Process Name :	Get Request Report
Data In :	Request Report
Data Out :	Customer order Report Individual sale Report Product by Order Report Customer Payment Report Over Due Report
Process :	(1) Get requested report and duration period (2) Print out report (3) Send report to Sales and Marketing
Attachment :	(1) Sales and Marketing

Table D.16. Process Specification of Process 6.2.

Items	Description
Process Name :	Generate Customer Order Report
Data In :	Order information Customer detail
Data Out :	Customer order report
Process :	(1) Get duration time (2) Read order record from customer order database where order date = duration period (3) Print out customer order report (4) Send report to Sales and Marketing
Attachment :	(1) Process 6.1 (2) Sales and Marketing (3) Data Store D2

Table D.17. Process Specification of Process 6.3.

Items	Description
Process Name :	Generate Individual Sale Report
Data In :	Sale information Customer detail Customer order detail
Data Out :	Individual Sale report
Process :	(1) Get duration time (2) Read order record from customer order database where order date = duration time (3) Print out individual sale report (4) Repeat step 2 until equal the actual sales (5) Send report to Sales and Marketing
Attachment :	(1) Process 6.1 (2) Sales and Marketing (3) Data Store D2 (4) Data Store D8

Table D.18. Process Specification of Process 6.4.

Items	Description
Process Name :	Generate Product by Order Report
Data In :	Stock type information Customer order detail
Data Out :	Product by Order report
Process :	(1) Get duration time (2) Read order record from customer order database where order date = duration period (3) Read product record form product database (4) Read stock type record from stock type database (5) Print out product by order report (6) Send report to Sales and Marketing
Attachment :	(1) Process 6.1 (2) Sales and Marketing (3) Data Store D2 (4) Data Store D3

Table D.19. Process Specification of Process 6.5

Items	Description
Process Name :	Generate Customer Payment Report
Data In :	Customer detail Invoice detail
Data Out :	Customer Payment Report
Process :	(1) Get duration time (2) Read Invoice record where paid date = duration time (3) Read customer record from customer database (4) Repeat step 2 until paid date = end date (5) Print out customer payment report (6) Send report to sales and marketing
Attachment :	(1) Process 6.1 (2) Data Store D1 (3) Data Store D9

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Table D.20. Process Specification of Process 6.6.

Items	Description
Process Name :	Generate Overdue Report
Data In :	Invoice detail Customer detail
Data Out :	Overdue Report
Process :	(1) Get duration time (2) Read Invoice record where due date = duration time And paid date = “” (3) Read customer record from customer database (4) Repeat step 2 until due date = end date (5) Print out overdue report (6) Send report to sales and marketing
Attachment :	(1) Process 6.1 (2) Data Store D1 (3) Data Store D9

Table D.21. Process Specification of Process 6.7.

Items	Description
Process Name :	Generate Monthly Report by Graph
Data In :	Customer Order Customer detail Sale information Stock type detail Product information Invoice detail End of month
Data Out :	Summary report by graph
Process :	(1) Read customer order record form customer order database (2) Read customer record form customer database (3) Read sale record from sale database (4) Read stock type record from stock type database (5) Read product record from product database (6) Read invoice record from invoice database (7) Repeat step 1 until date = duration time (8) Print out graph report (9) Send graph report to sales and marketing
Attachment :	(1) Time (2) Sales and Marketing (3) Data Store D1 (4) Data Store D2 (5) Data Store D3 (6) Data Store D6 (7) Data Store D8 (8) Data Store D9

APPENDIX E

ENTITY RELATIONSHIP DIAGRAM

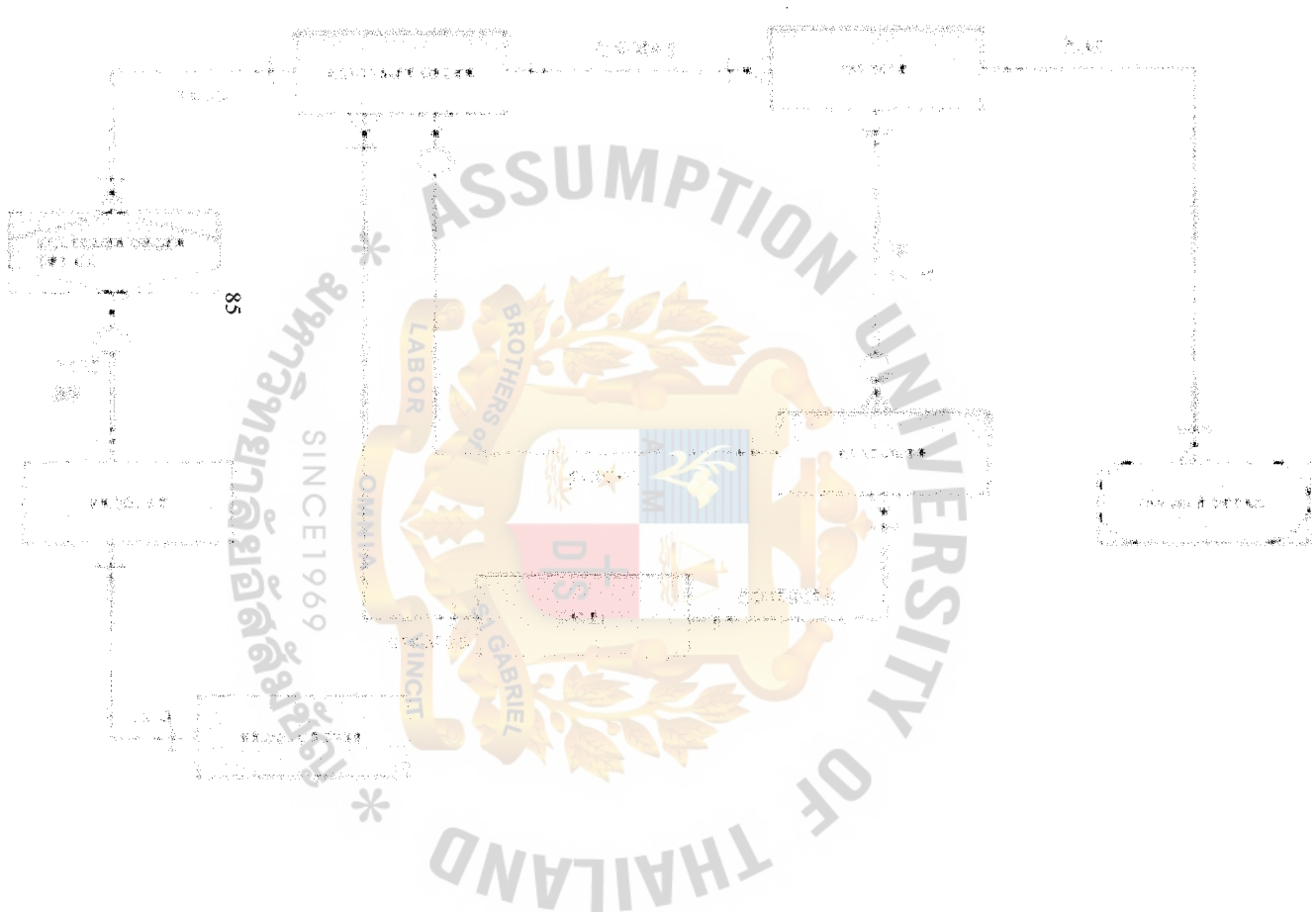

Figure E.1. Context Data Model Diagram.

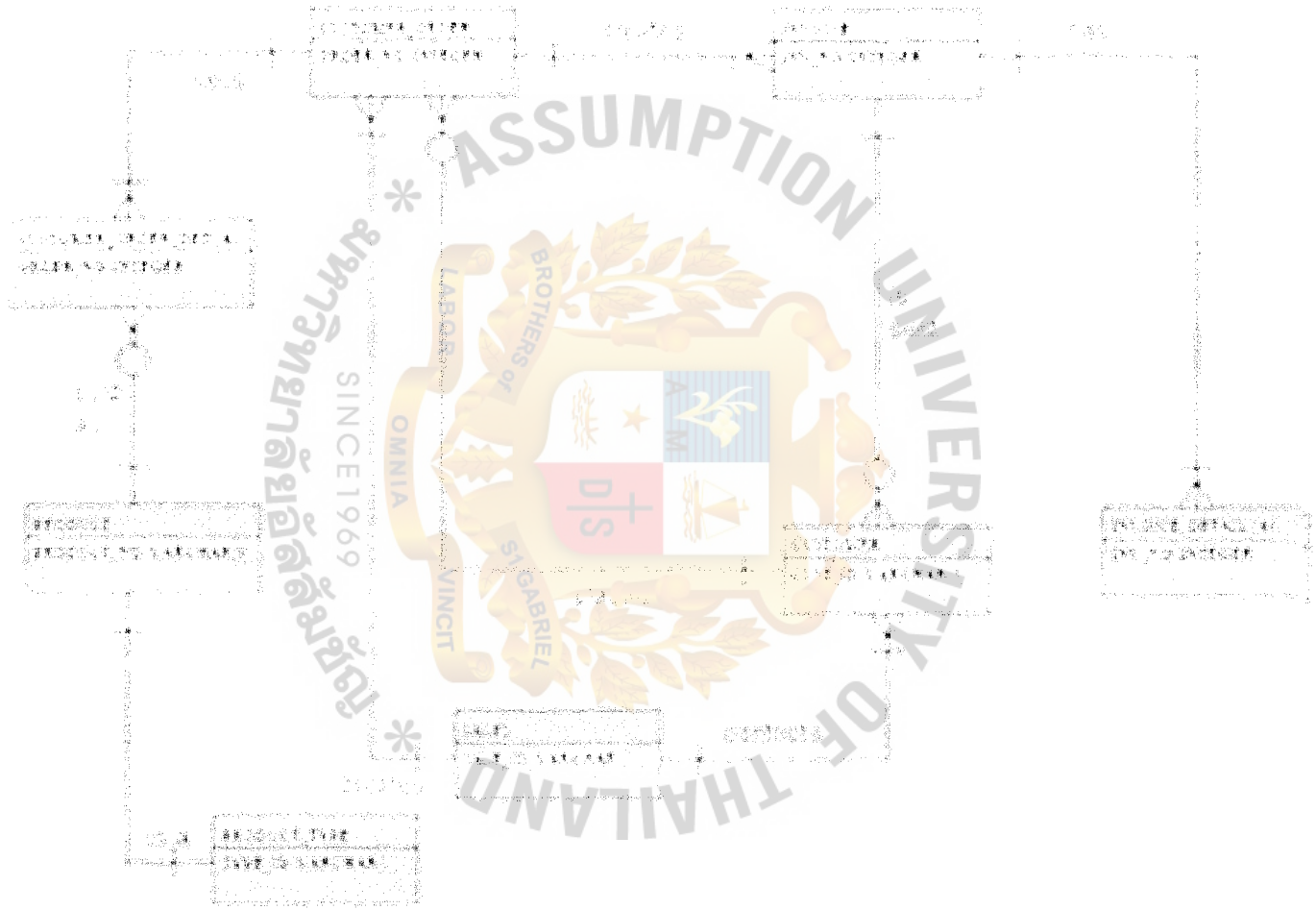

Figure E.2. Key-Based Data Model Diagram.

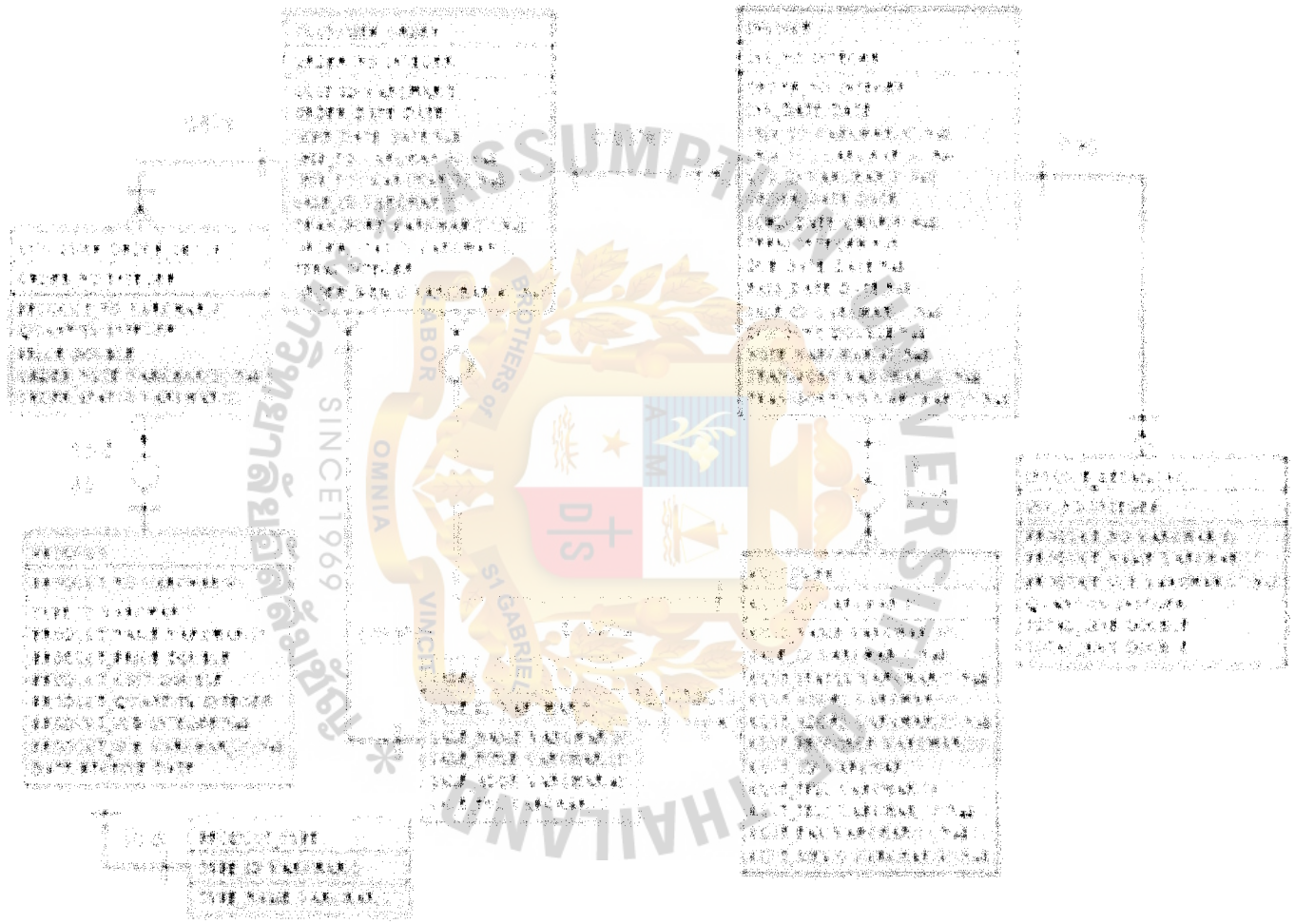

Figure E.3. Fully Attributed Data Model Diagram.

APPENDIX F

STRUCTURE CHART

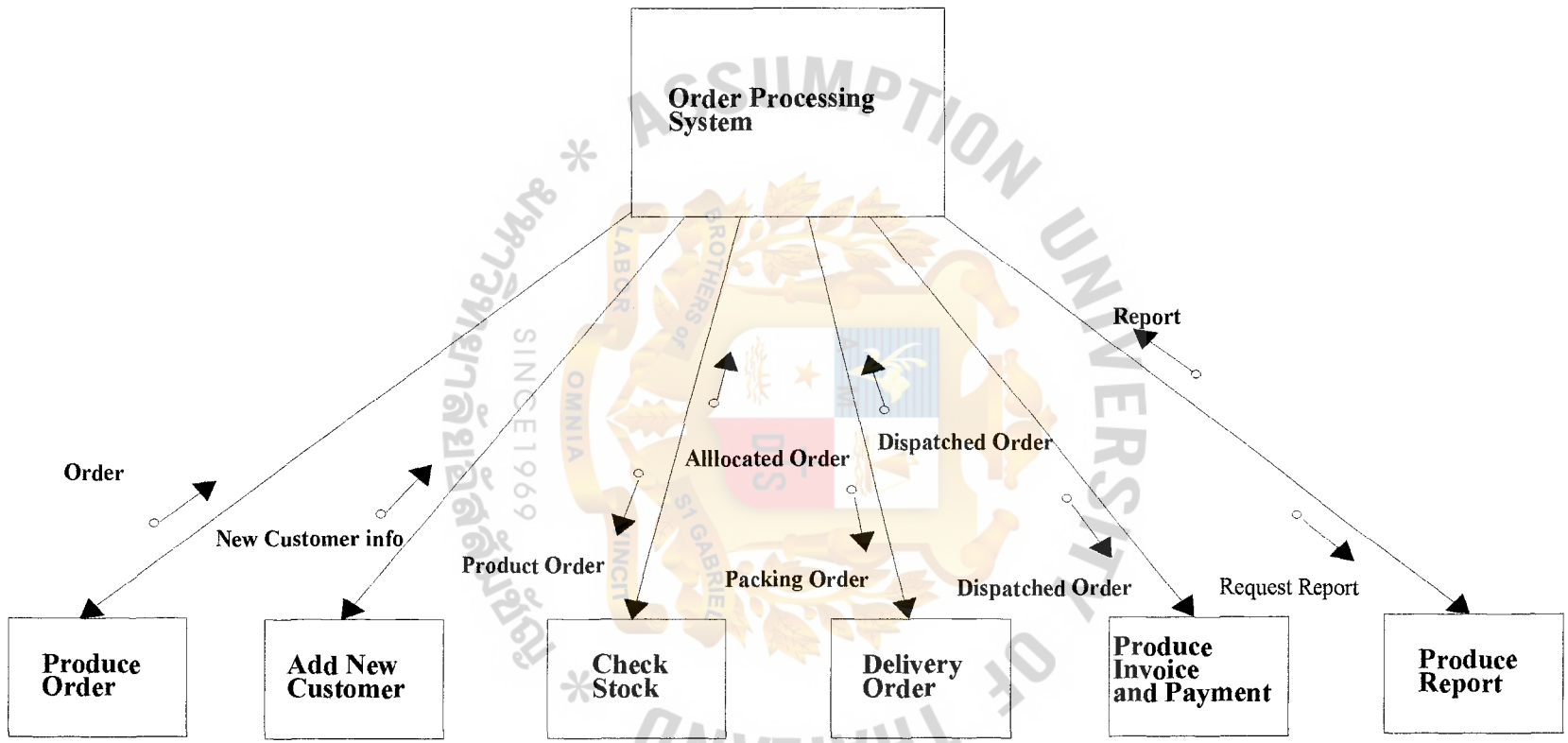

Figure F.1. Structure Design of Order Processing System.

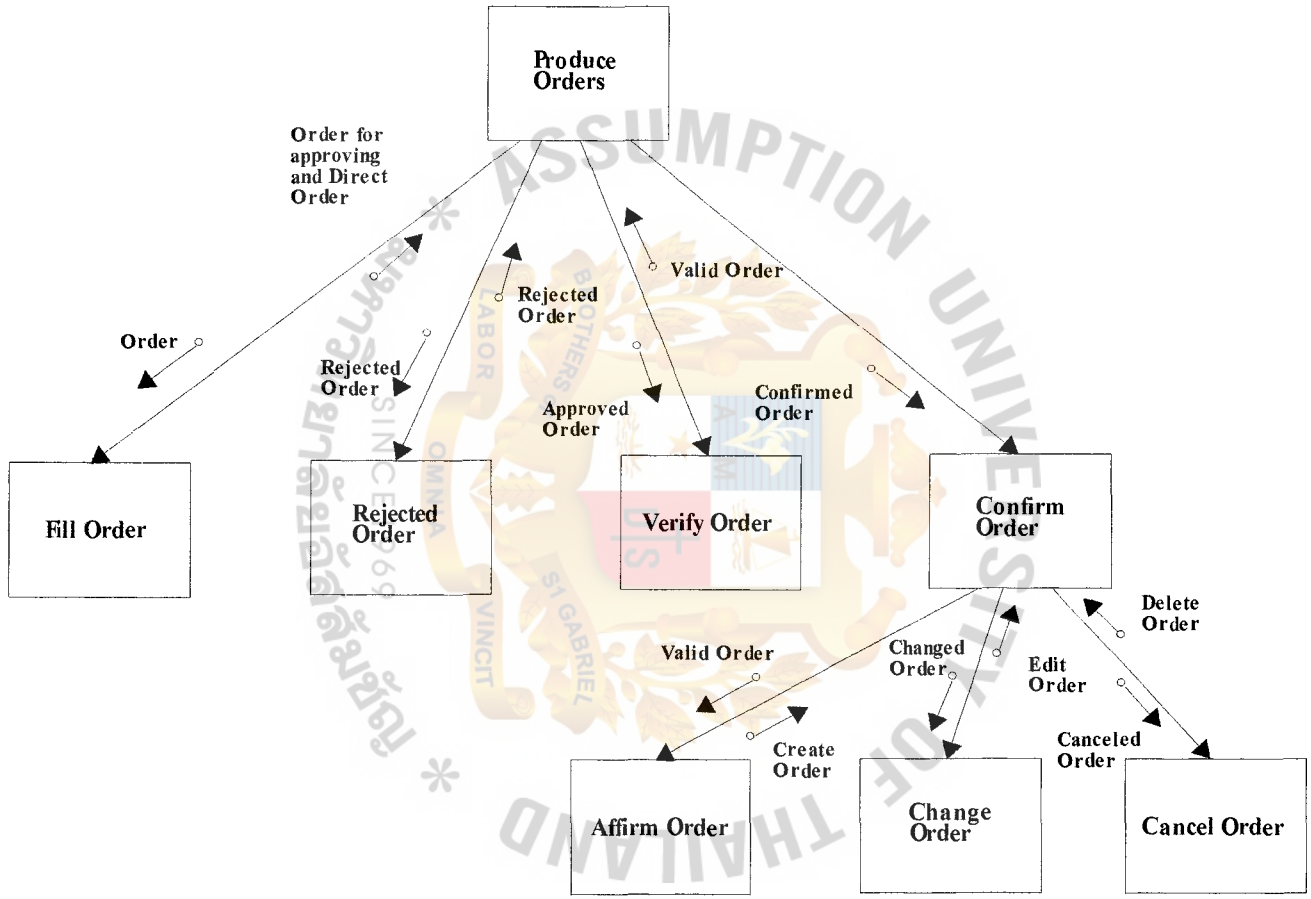

Figure F.2. Structure Design of Produce Order Process.

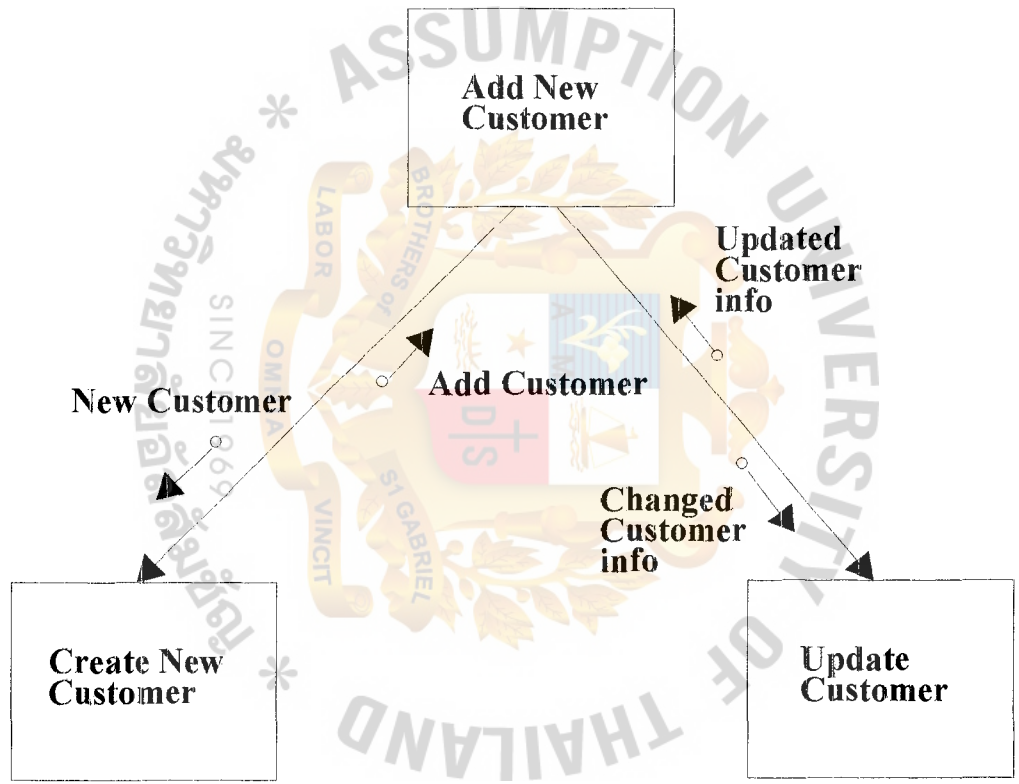

Figure F.3. Structure Design of Add New Customer.

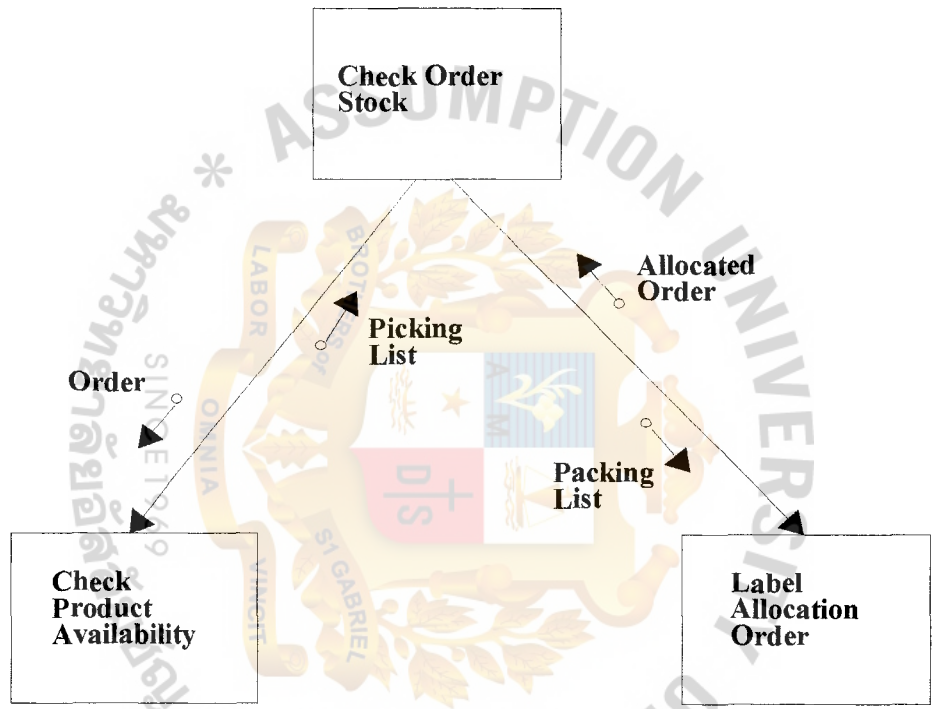

Figure F.4. Structure Design of Check Order Stock.

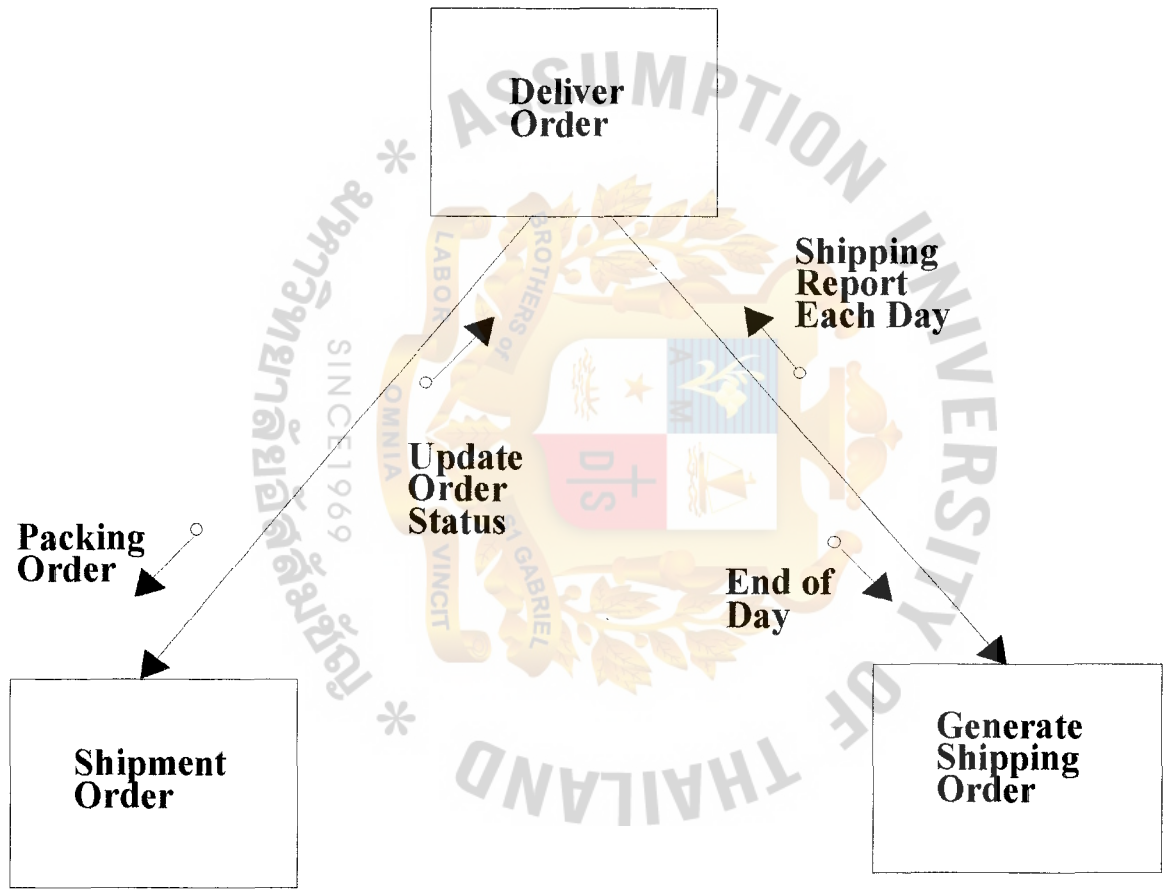

Figure F.5. Structure Design of Delivery Order Process.

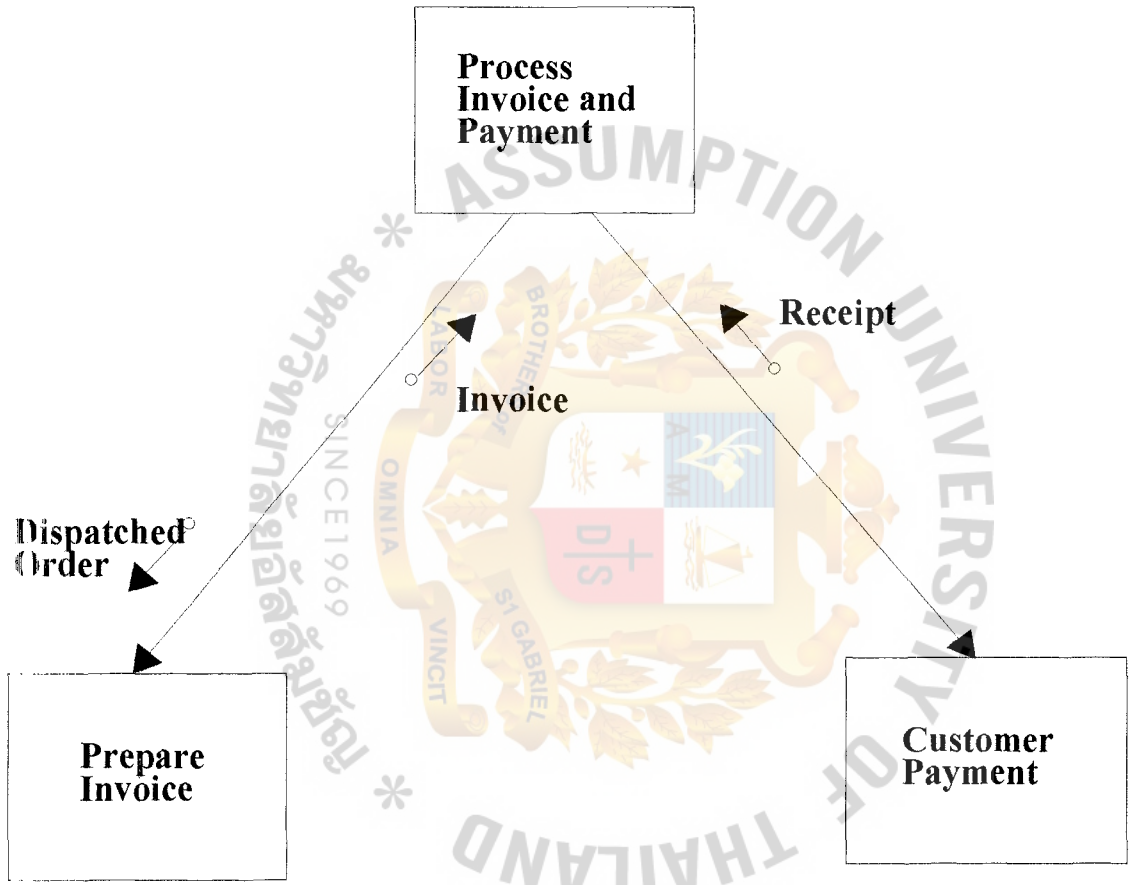

Figure F.6. Structure Design of Process Invoice and Payment.

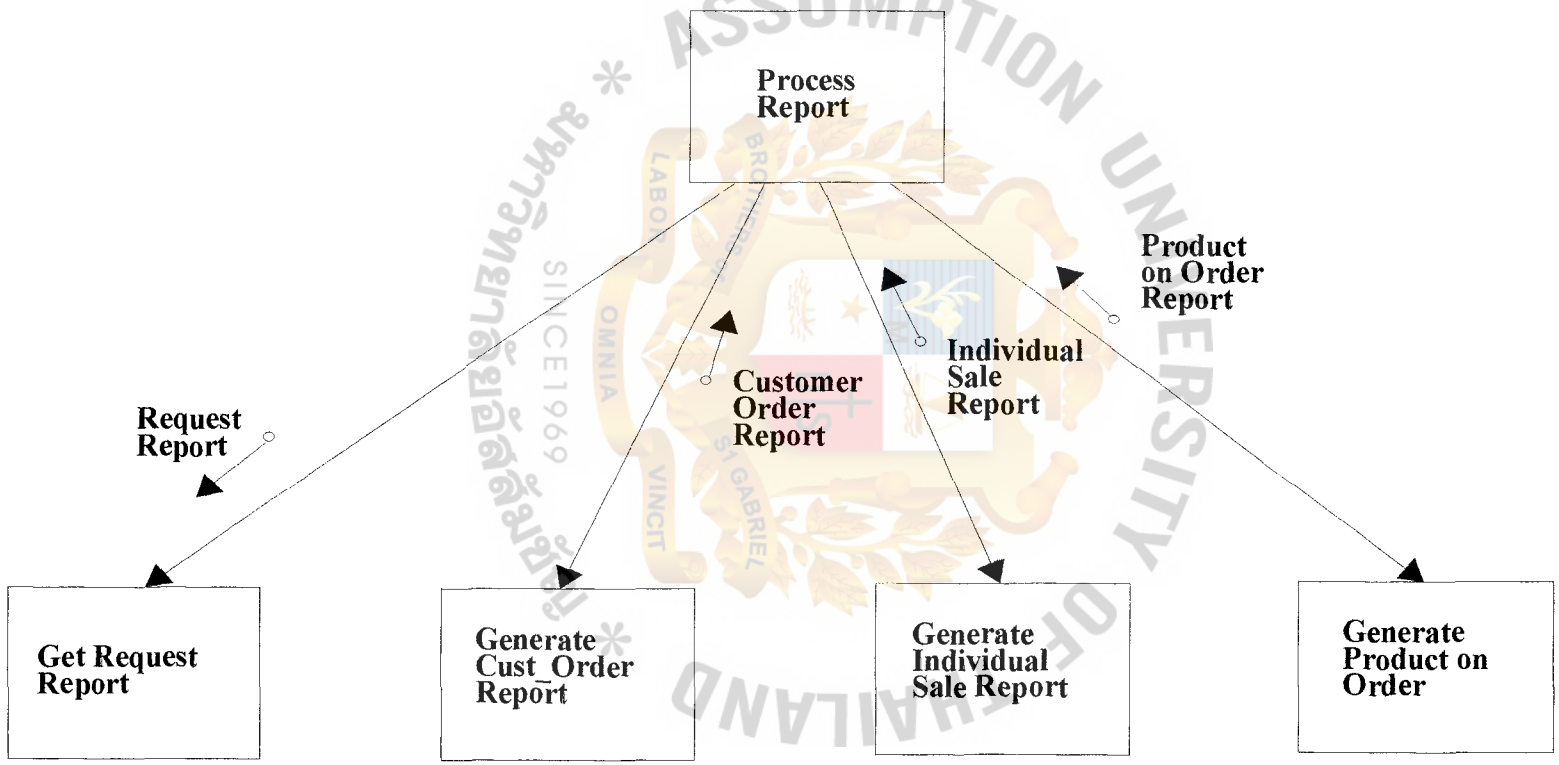

Figure F.7. Structure Design of Process Report.

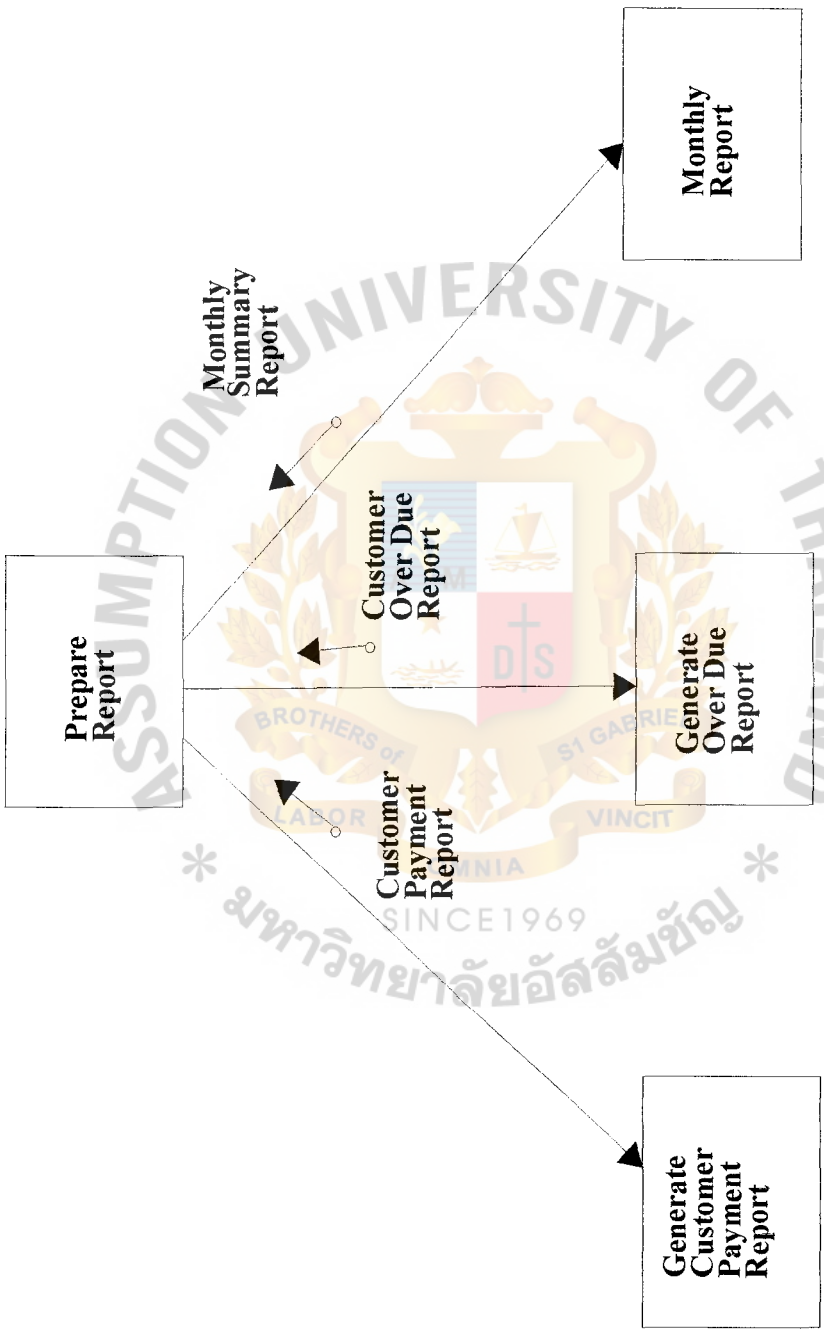

Figure F.8. Structure Design of Process Report (Continued).

APPENDIX G

USER INTERFACE DESIGN

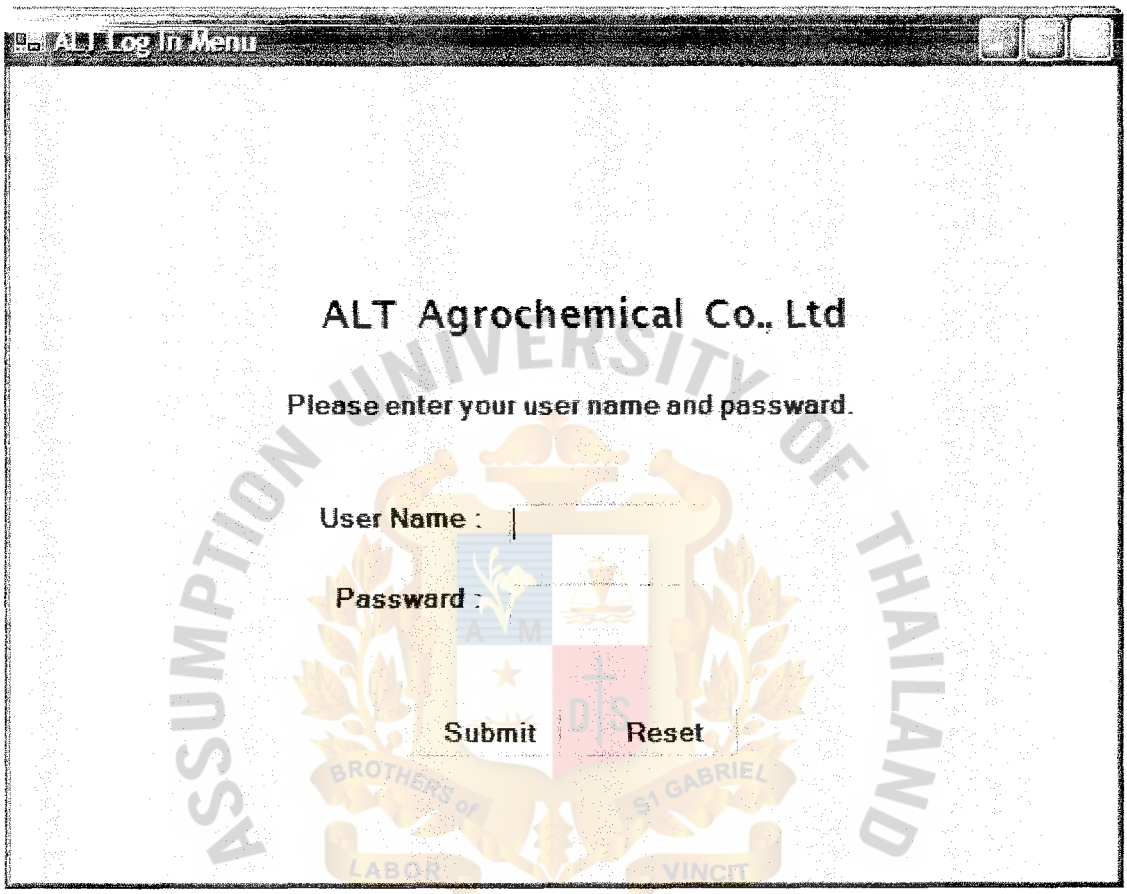

Figure G.1. Screen of Computerized System of ALT Agrochemical Co., Ltd.

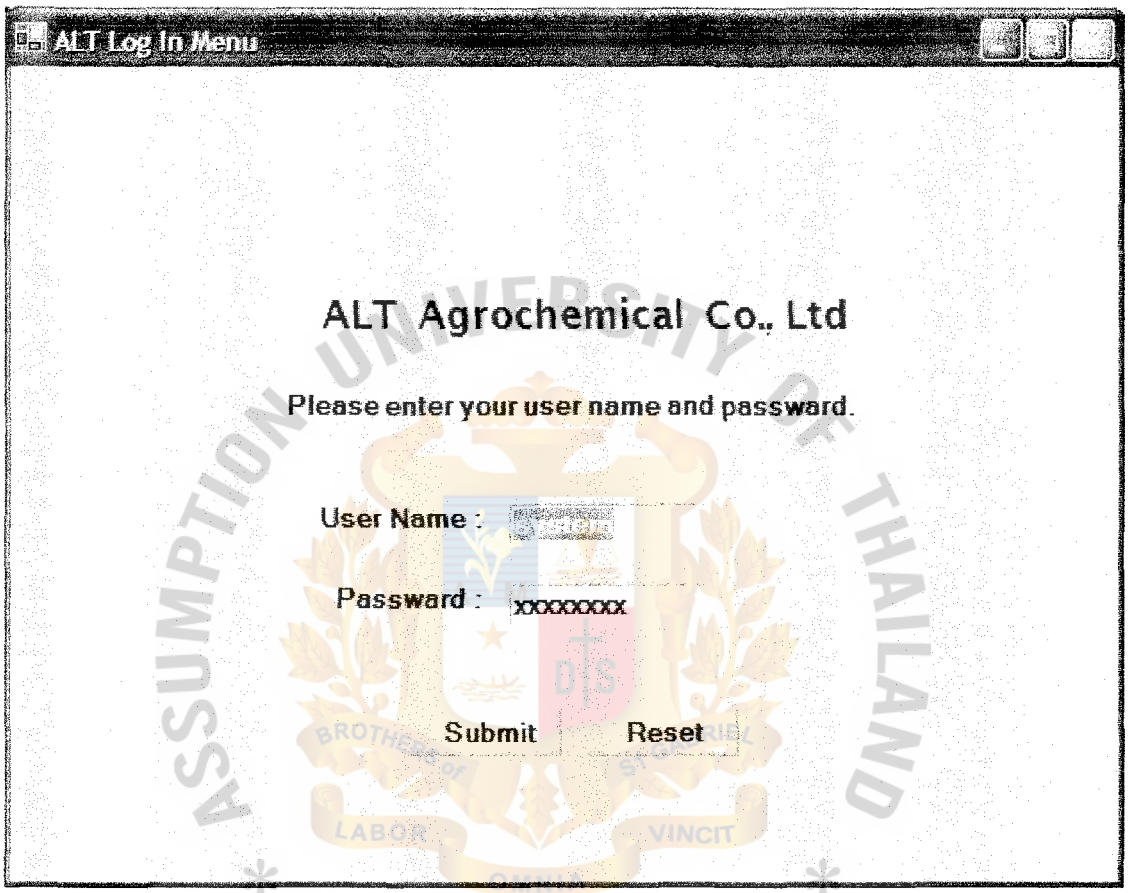

Figure G.2. Input User Name and Password into the Proposed System.

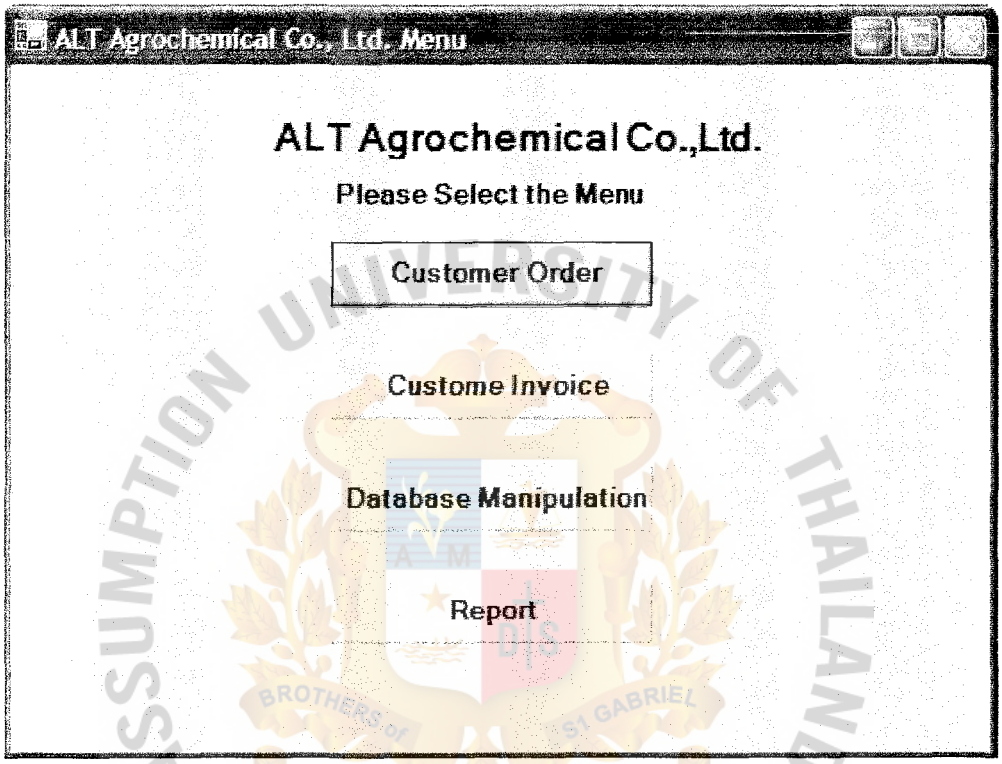

Figure G.3. Main Menu of ALT Order Processing System.

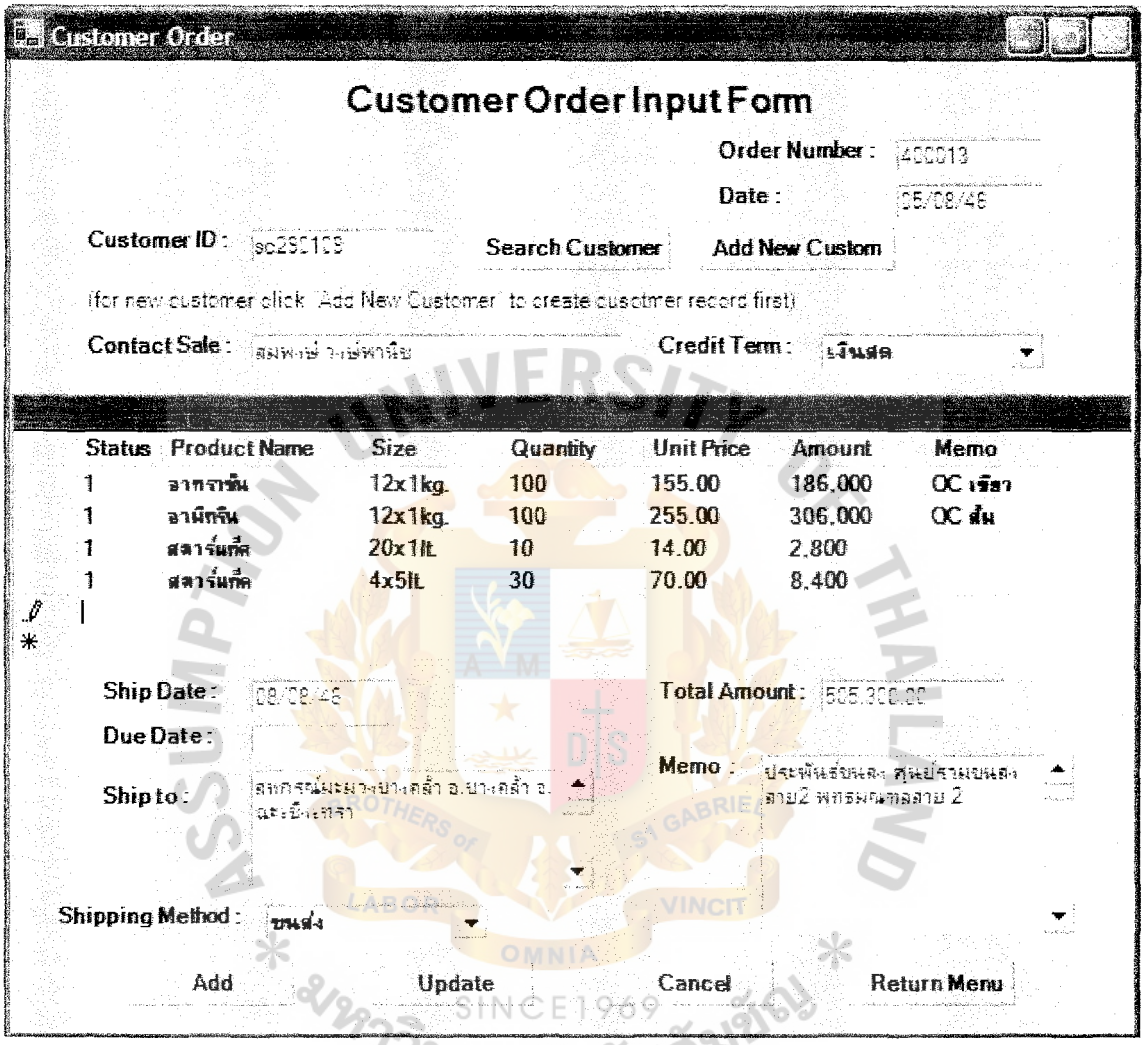

Figure G.4. Customer Order Form of ALT.

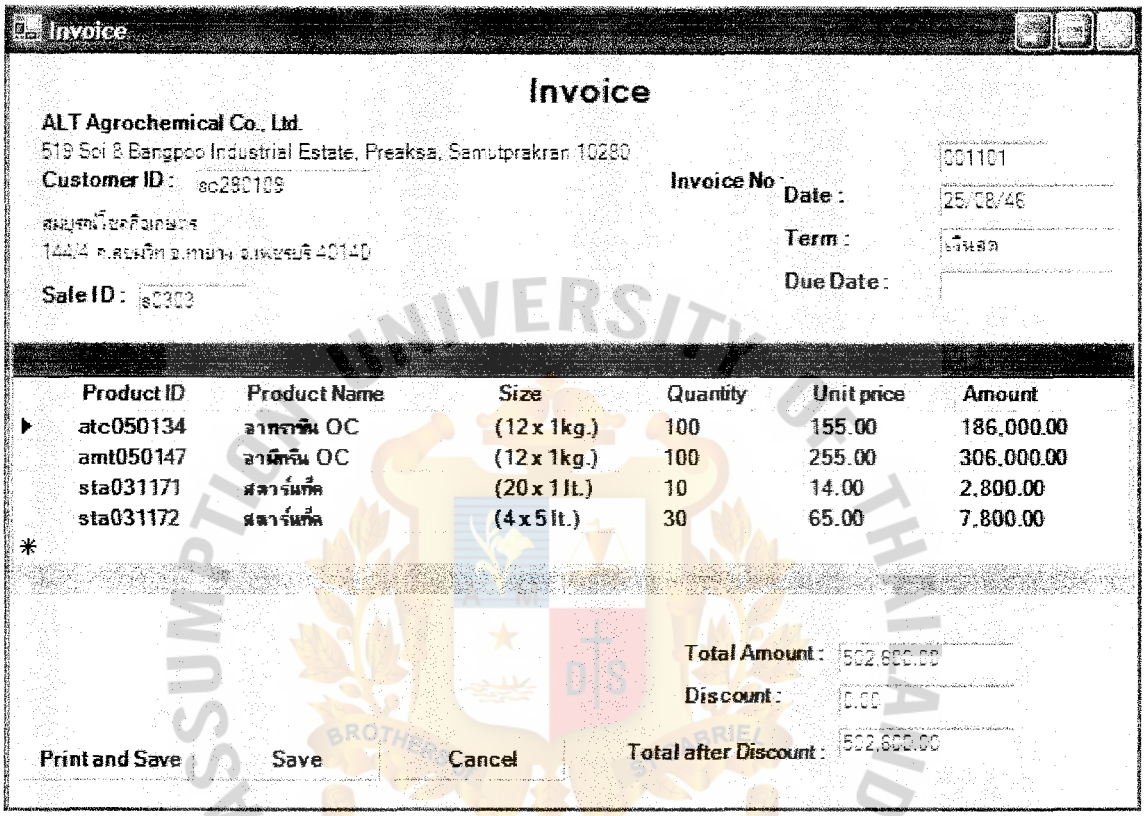

Figure G.5. Customer Invoice of ALT.

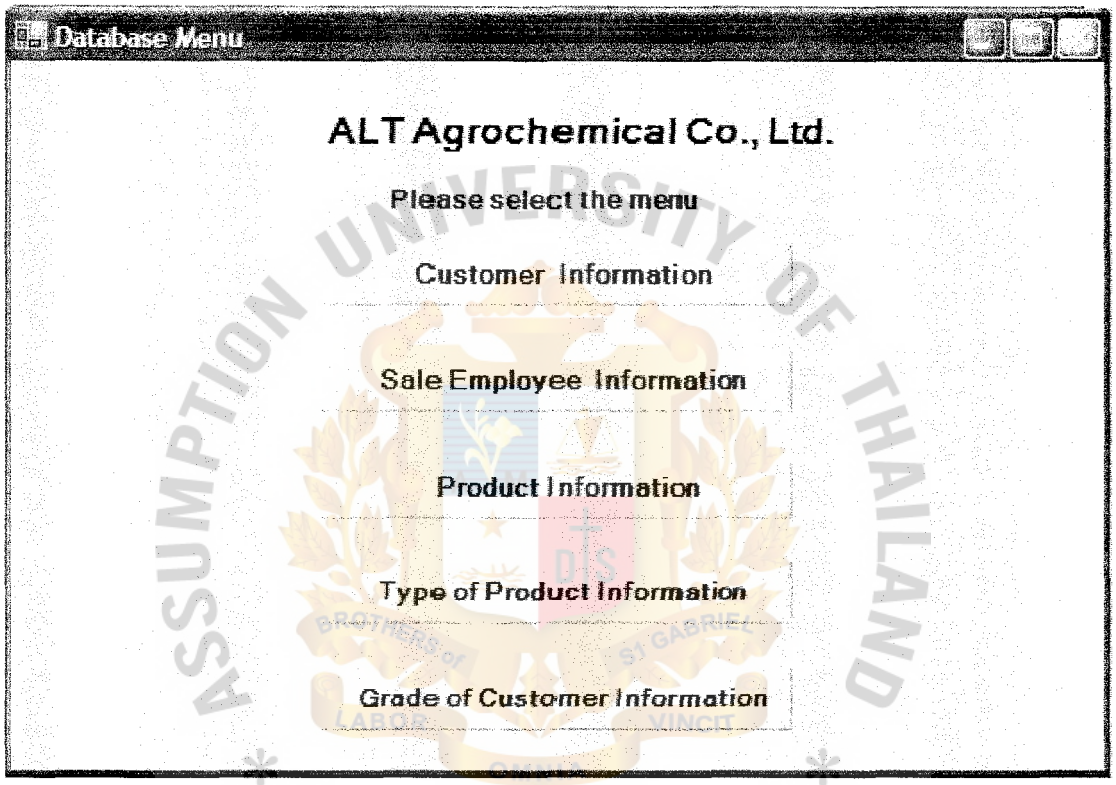

Figure G.6. Database Menu of ALT.

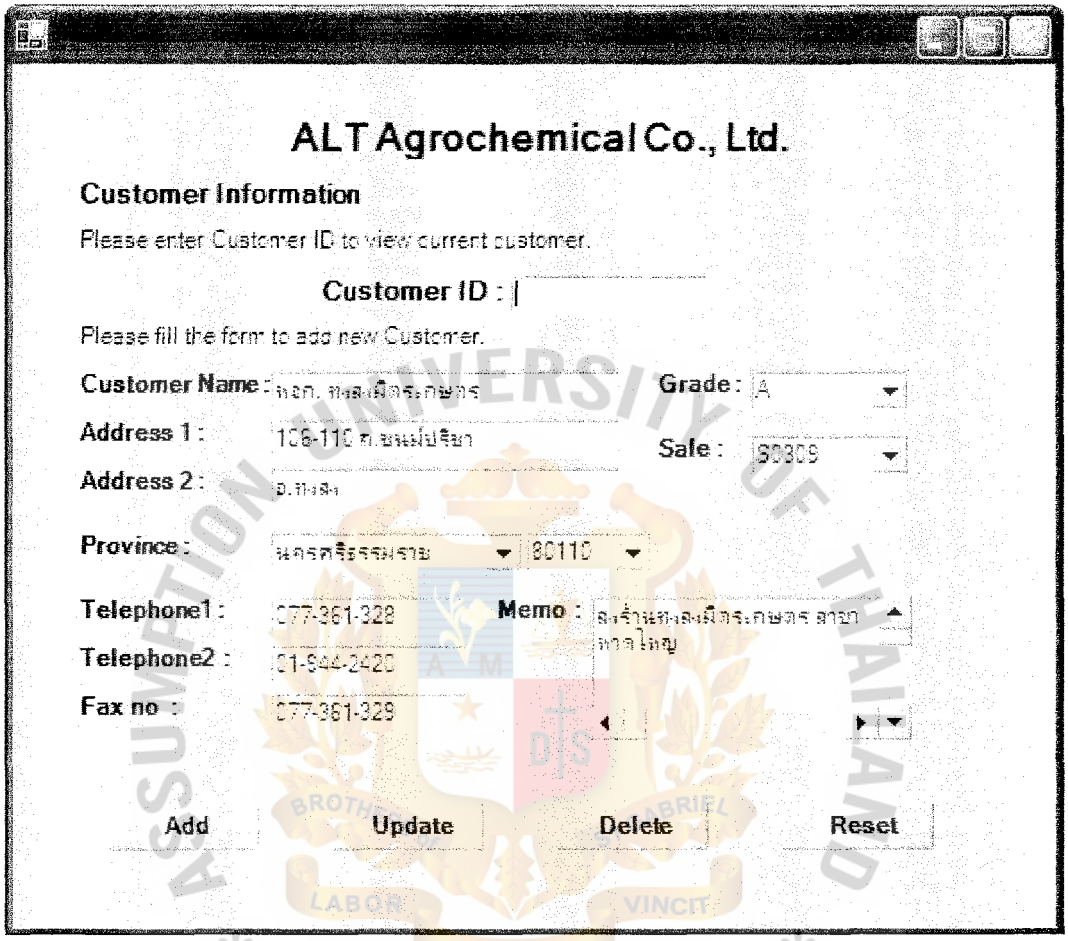

Figure G.7. Customer Information Screen of ALT.

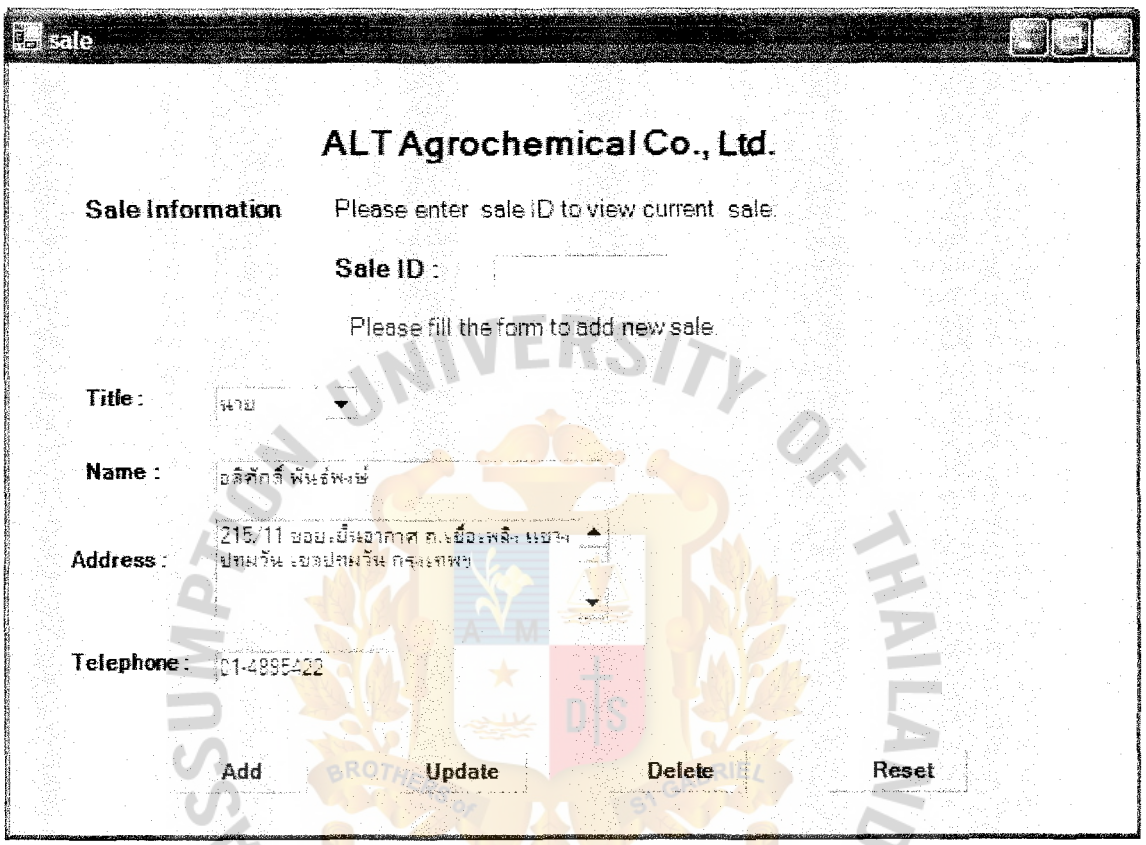

Figure G.8. Sale Employee Information of ALT.

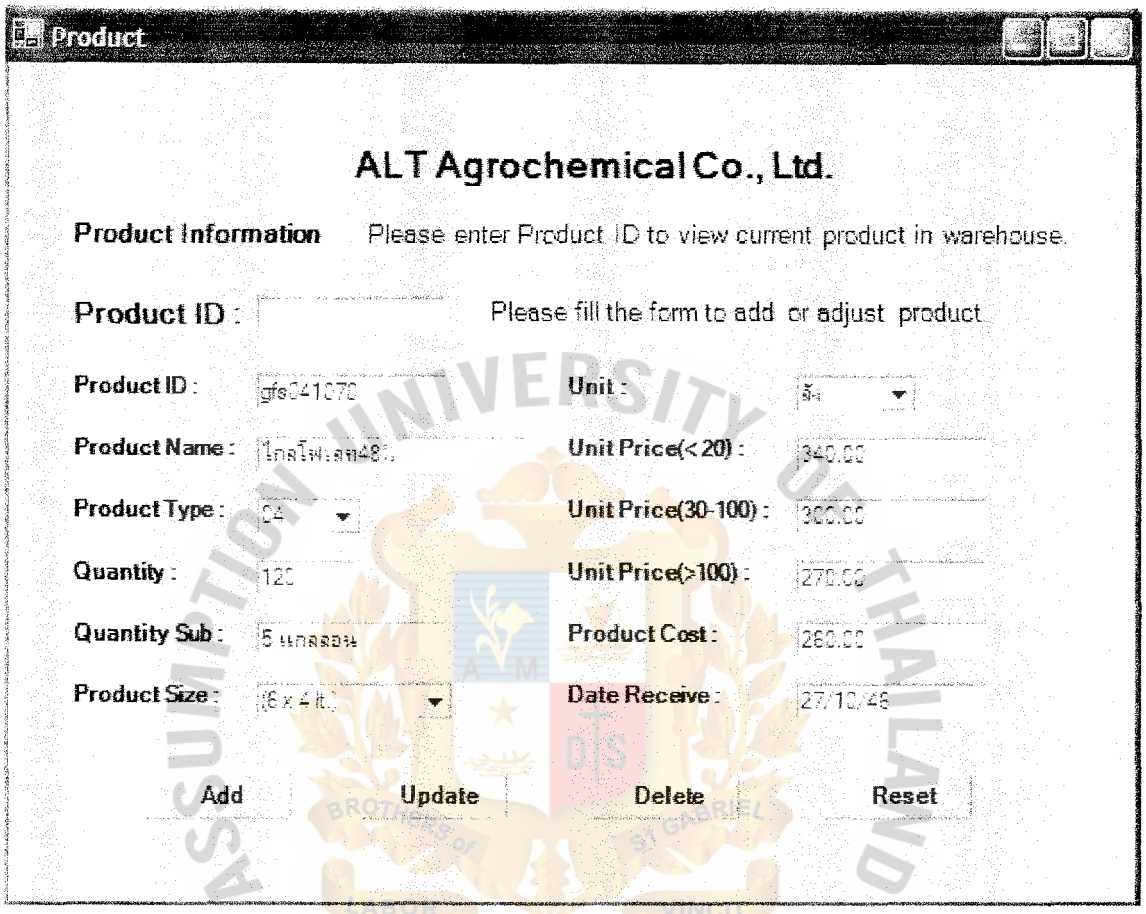

Figure G.9. Product Information of ALT.

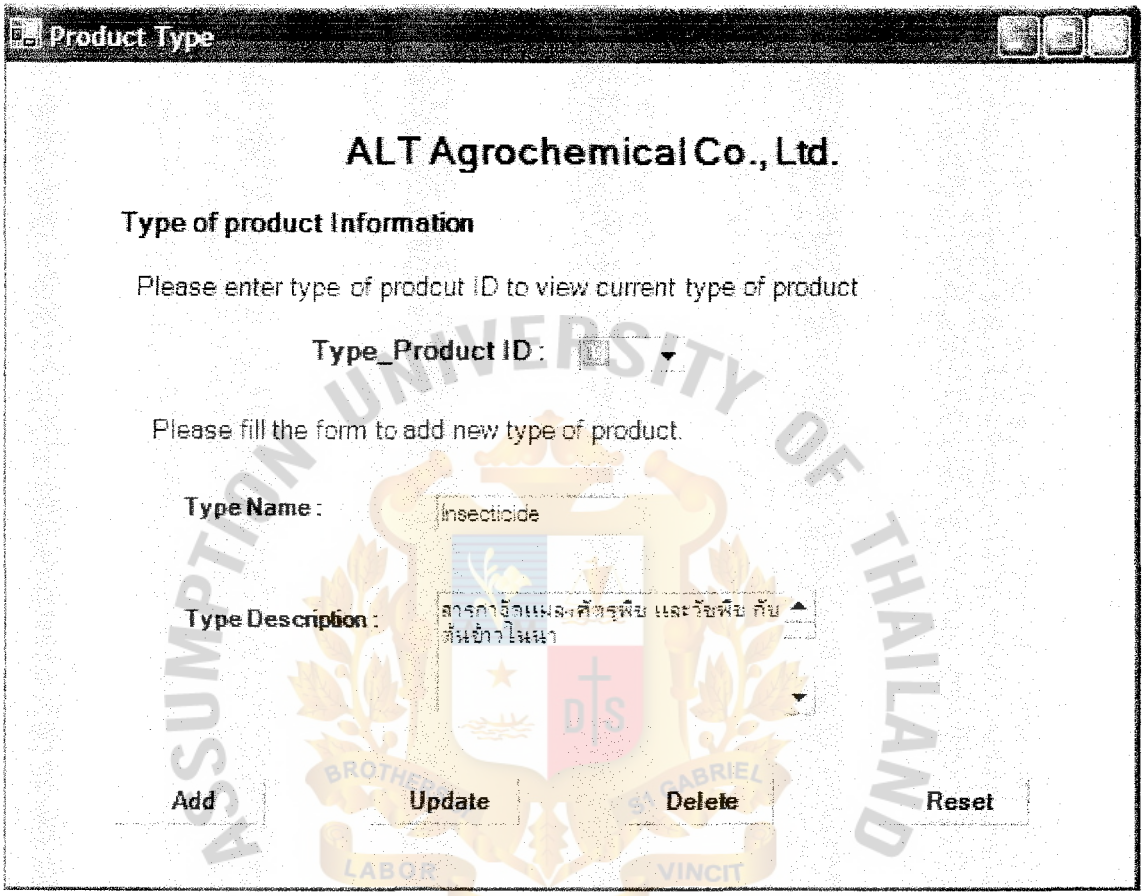

Figure G.10. Type of Product Information of ALT.

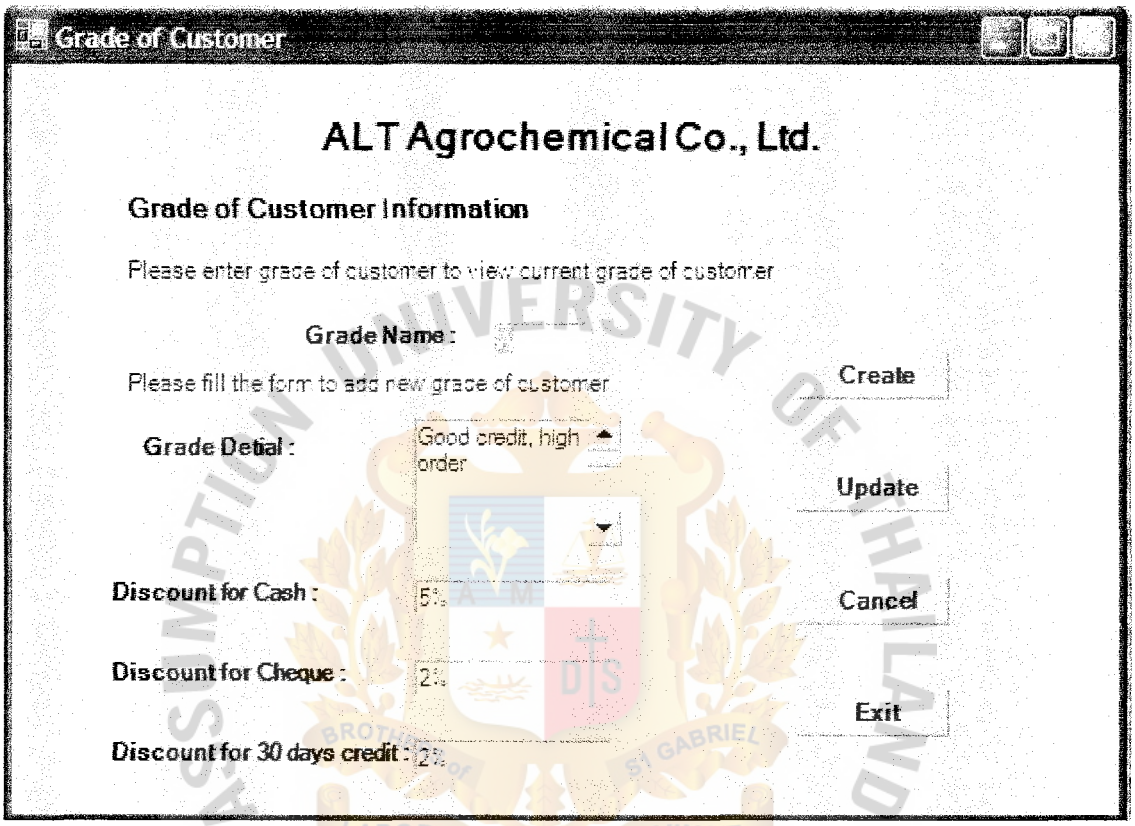

Figure G.11. Grade of Customer of ALT.

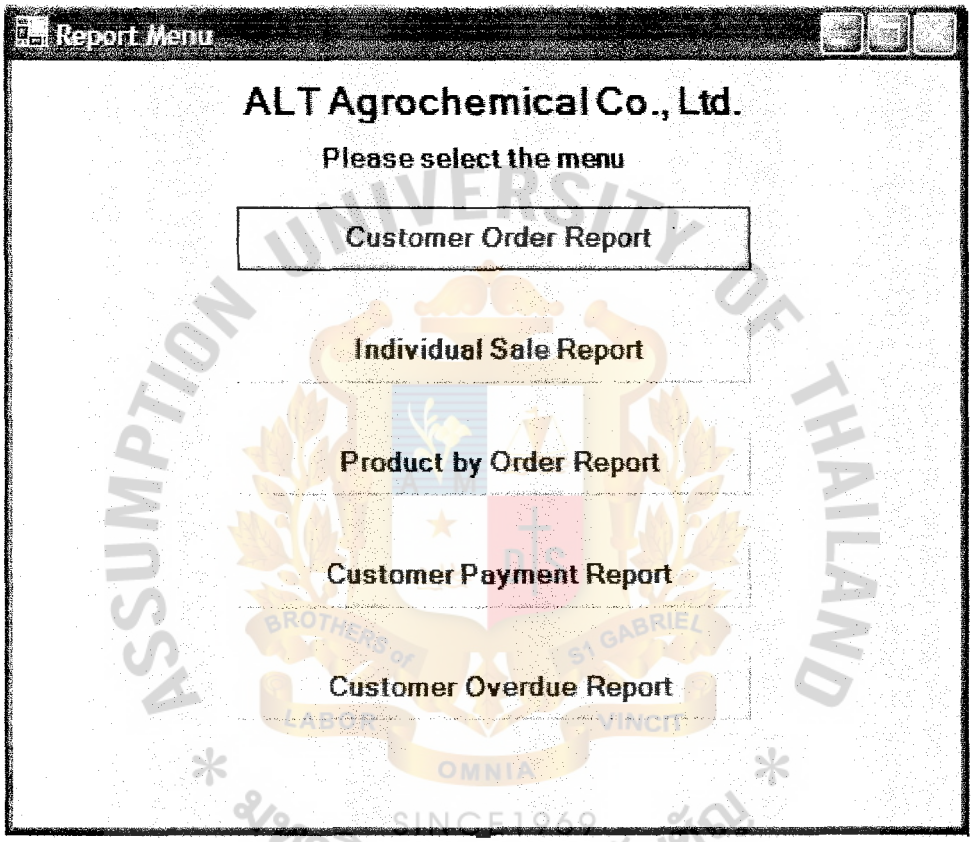

Figure G.12. Sub Menu of Report of ALT.

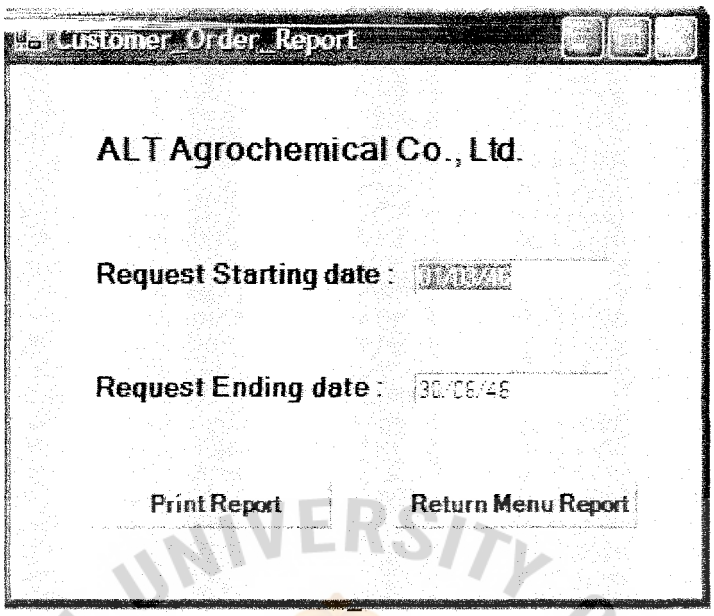

Figure G.13. Screen of Entry of the Order by Customer Report.

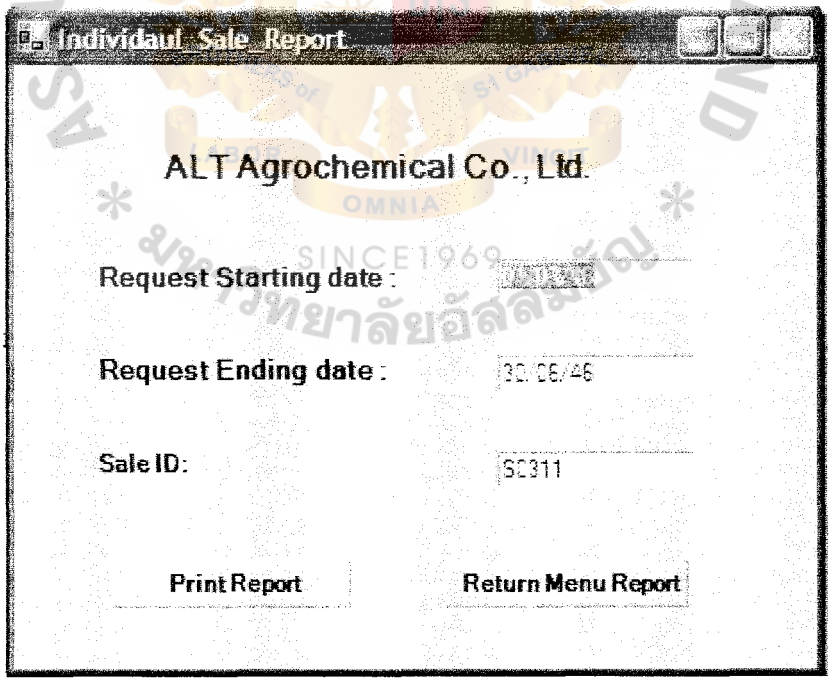

Figure G.14. Screen of Entry of the Sale by Order Report.

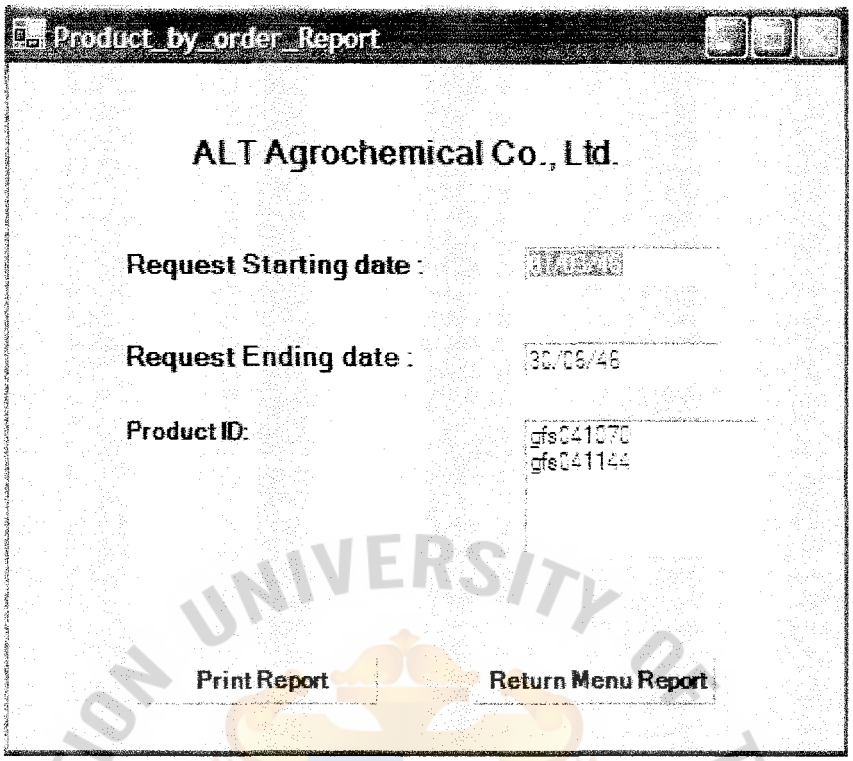

Figure G.15. Screen of Entry of Product by Order Report.

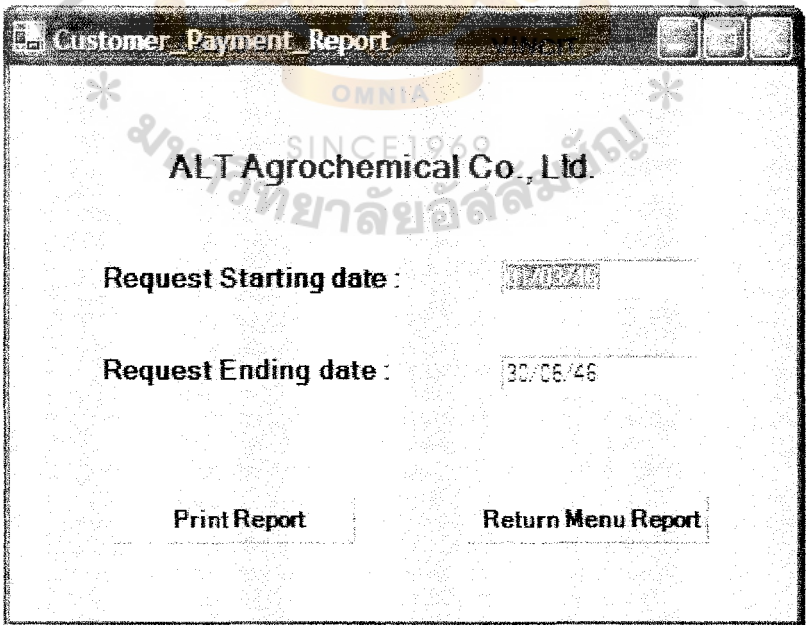

Figure G.16. Screen of Entry of Customer Payment by Order Report.

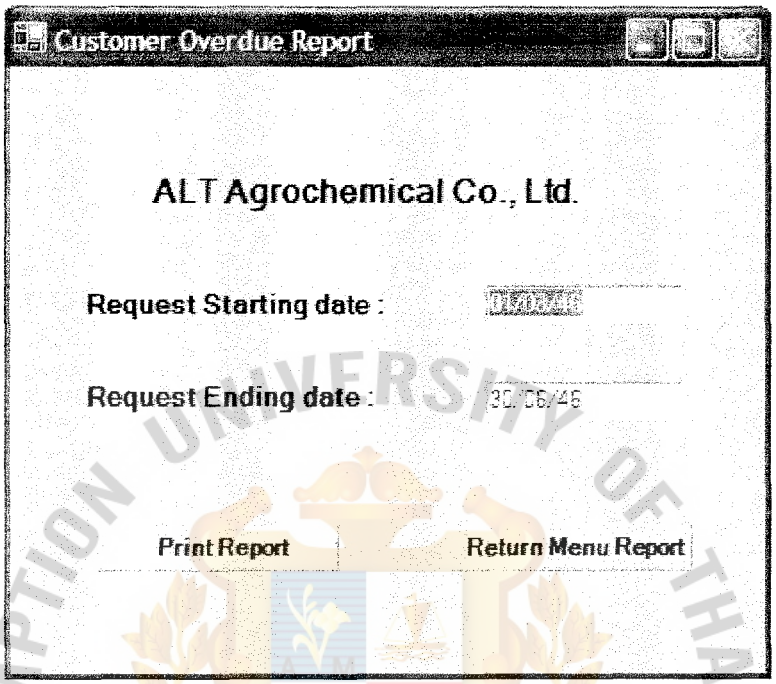

Figure G.17. Screen of Entry of the Customer over due payment by Invoice.

APPENDIX H

OUTPUT REPORT

ALT Agrochemical Co., Ltd.

Customer Order Report

From : 01/06/03 To : 15/06/03 Print Date, September 22,2003

No.	Customer ID	Customer Name	Amount
1.	SC290109	สมบูรณ์โชคกิจเกษตร (ท่ายาง จ.เพชรบุรี)	1,860,000.00
2.	SS110303	ประสิทธิ์พานิช (หาดใหญ่ จ.สงขลา)	2,536,400.00
3.	SS020319	ว.เกษตรภัณฑ์การเกษตร (บ้านส้อง จ.สุราษฎร์ธานี)	745,000.00
4.	SN450123	สมพรพานิช (โคกสำโรง จ.ลพบุรี)	516,400.00
5.	NN170072	บุญเสริฐการเกษตร (ฝาง จ.เชียงใหม่)	945,860.00
6.	SN220058	พีระเวชเคมีเกษตร (ตาคลี จ.นครสวรรค์)	1,429,000.00
7.	SS040214	หจก.แสงเพชรการเกษตร จก. (หลังสวน จ.ชุมพร)	740,000.00
			TOTAL AMOUNT
			8,772,660.00

Figure H.1. Customer Order Report.

ALT Agrochemical Co., Ltd.

Individual Sale Report

From : 01/06/03 To : 28/06/03 Printed Date: August 20,2003

S0311 สมพงษ์ วงศ์พานิช

Order No.	Customer ID.	Customer Name	Total(Baht)
40011	SS090439	สหกิจเคมีภัณฑ์การเกษตร	570,800.00
40012	SS110363	ประสิทธิ์พานิช	20,540.00
40015	SC290109	สมบูรณ์โชคกิจเกษตร	340,700.00
40016	SS040314	หจก.แสงเพชร	45,800.00
40019	SS020319	ว.เกษตรภัณฑ์	28,000.00
40020	SC180065	จิวการเกษตร	13,450.00
40022	SS020331	กวงฮงหลี	15,900.00
40030	SS040114	ปรีชาฟาร์มาซี	20,650.00

Total Amount : 1,055,840.00

Figure H.2. Individual Sale Report.

ALT Agrochemical Co., Ltd.

Product by Order Report

From : 01/06/46 To : 15/06/46 Printed Date : September 22,2003

Product Id	Product Name	Size	Quantity	Amount
GFS041070	Glyphosate 48% OC	(6 x 4 lt.)	760	1,322,400.00
GFS040870	Glyphosate 48% OC	(20 x 1000 cc.)	550	1,200,000.00
GFS041145	Glyphosate 48% MT	(12 x 1000 cc.)	500	480,000.00
GFS040827	Glyphosate 48% Sabic	(6 x 4 lt.)	320	556,800.00
GFS041453	Glyphosate 48% Sabic	(12 x 1000 cc.)	300	288,000.00
GFS041144	Glyphosate 16% OC	(6 x 4 lt.)	430	387,000.00
GFS041332	Glyphosate 16% ALT	(4 x 4 lt.)	270	162,000.00
			TOTAL AMOUNT	4,396,200.00

Figure H.3. Product by Order Report.

ALT Agrochemical Co., Ltd.

Customer Payment Report

From : 01/04/03 To : 25/04/03 Printed Date : June 13, 2003

Invoice No.	Sale ID	Customer ID	Customer Name	Due Date	Paid Date	Amount Due(Baht)
003011	S0304	ES080487	บ่อทองการเกษตร	05/04/03	05/04/03	204,530.00
003014	S0306	SS020319	ว.เกษตรภัณฑ์	10/04/03	11/04/03	142,500.00
003015	S0311	SC290109	สมบูรณ์โชคกิจเกษตร	13/04/03	13/04/03	25,000.00
003018	S0308	SS110363	ประสิทธิ์พานิช	17/04/03	15/04/03	1,500,080.00
003019	S0302	ES080024	ภ.เกษตรภัณฑ์	18/04/03	18/04/03	604,500.00
003021	S0301	ES270078	สมบัติโอสถการเกษตร	20/04/03	19/04/03	421,200.00
003022	S0310	NN170072	บุญเสริฐการเกษตร	20/04/03	20/04/03	18,440.00
Total Customer Payment form 01/04/03 to 25/04/03						3,082,210.00

Figure H.4. Customer Payment Report.

ALT Agrochemical Co., Ltd.

Customer Overdue Report

From : 01/04/03 To : 20/04/03 Printed Date : June 15,2003

Invoice No.	Sale ID	Customer ID.	Customer Name	Due Date	Paid Date	Amount Over due
003013	S0311	ss020378	เกษตรภัณฑ์ภาคใต้	15/04/03		145,890.00
003027	S0301	sn220061	ส.ศิริการเกษตร	20/04/03		112,400.00
				Total Overdue Payment from 01/04/03 to 20/04/03		258,290.00

Figure H.5. Customer Overdue Report.

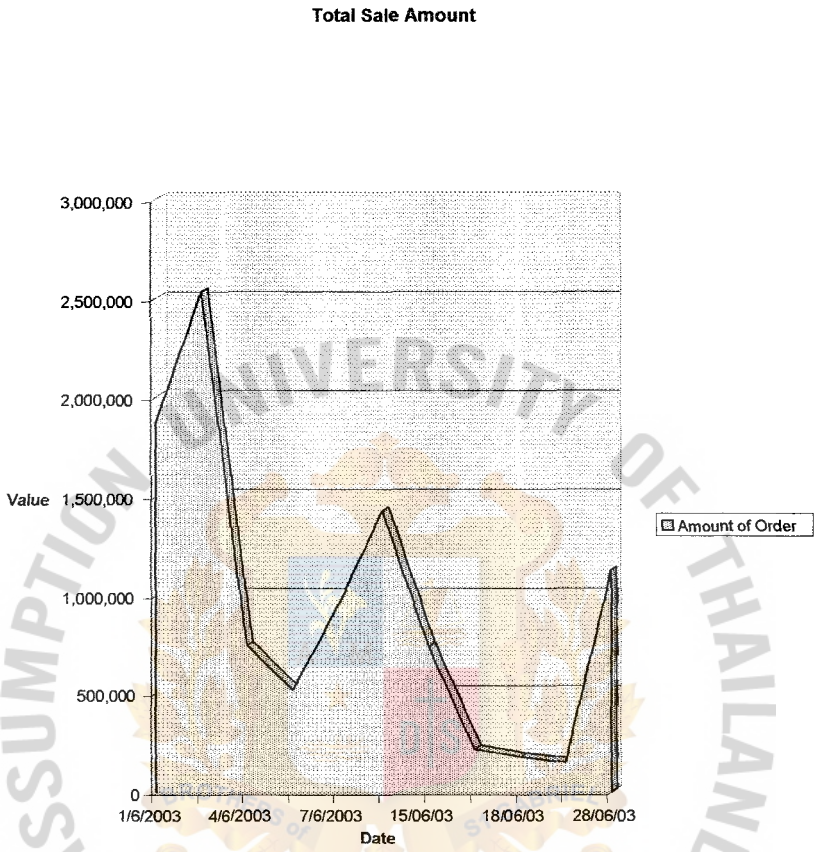

Figure H.6. Monthly Summary Report for Total Sale Amount.

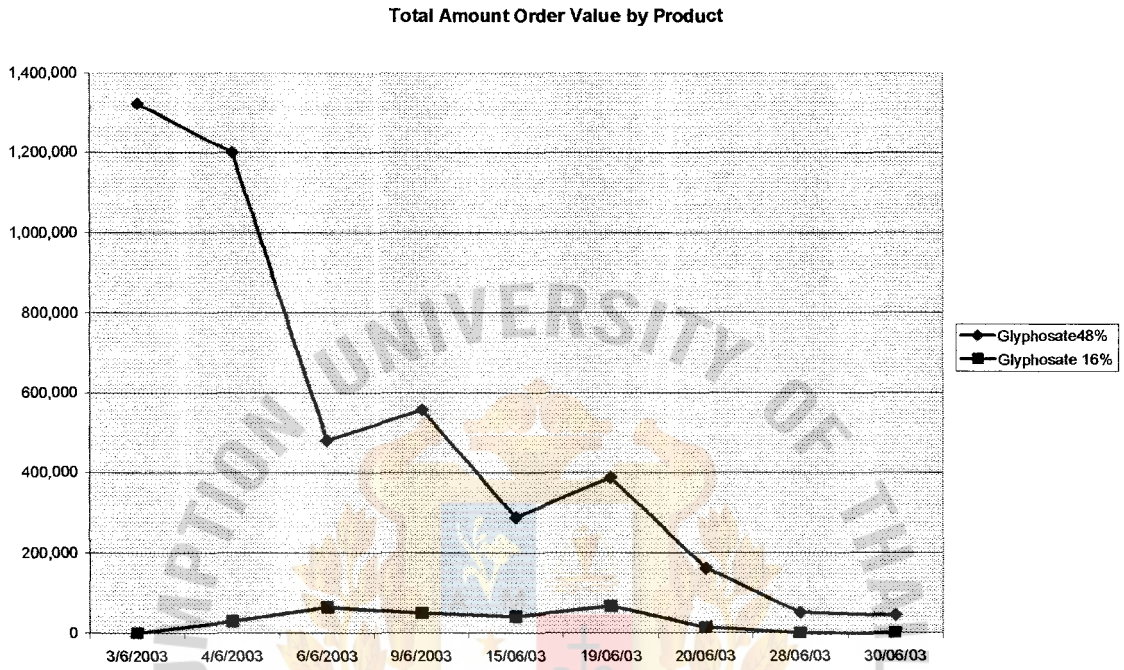

Figure H.7. Monthly Summary for Total Amount Order Value by Product.

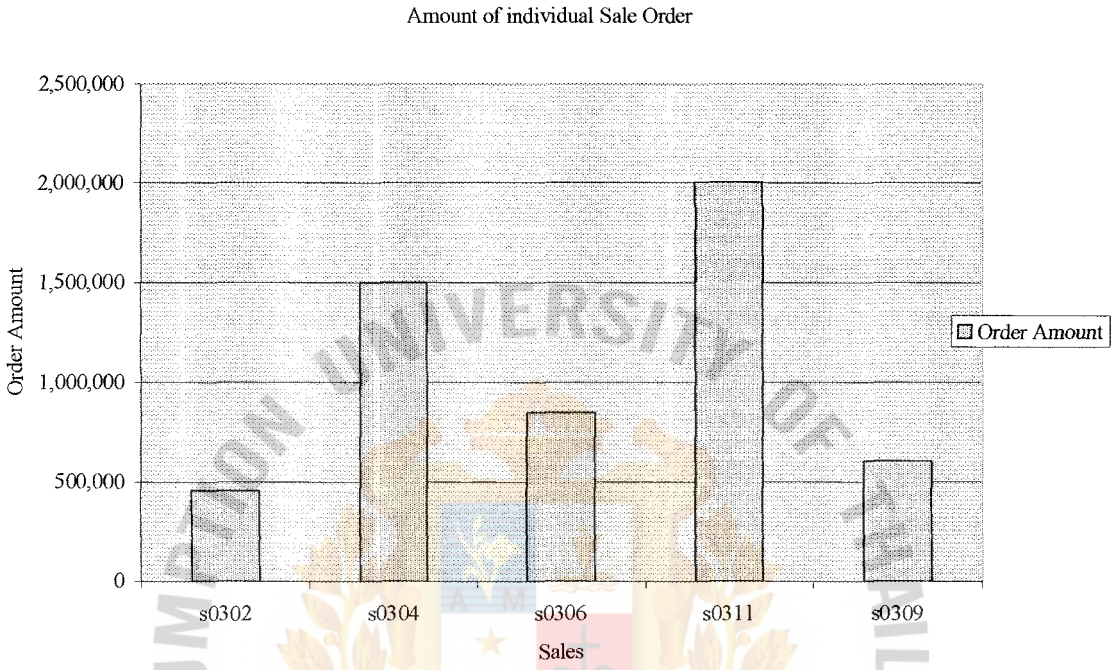

Figure H.8. Monthly Summary for Amount of individual Sale Order.

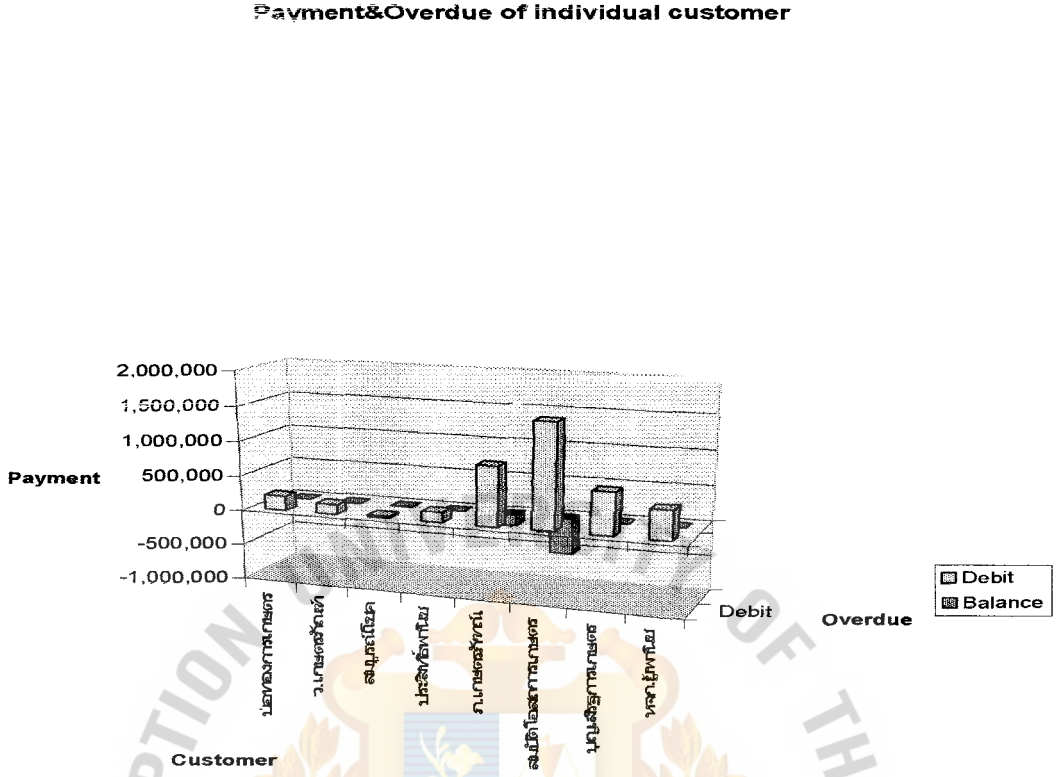

Figure H.9. Monthly Summary for Payment & Overdue of Individual Customer.

ALT Agrochemical Co., Ltd. **INVOICE**

519 Soi 8 Bangpoo Industrial Estate, Preaksa, Samutprakran 10280.
Tel :02-3240405 Fax : 02-3240404

Tax Invoice No :3 03004839 Invoice No. 200111

CustomerID : sc290109 สมบูรณ์โชคกิจเกษตร 144/4 ถ.สุขุมวิท อ.ท่ายาง จ.เพชรบุรี 40140	Ship to: มิตรเกษตร ทับสะแก ประจวบคีรีขันธ์

Order Date	Scheduled Date	Due Date	Term of Payment	Sale No.
12/04/03	15/04/03	14/05/03	30 days	s0311

Quantity	Product ID	Product Name	Unit Price	Amount
1 ถัง	Gfs041291	Glyphosate 48% (100 lt.)	8,000.00	8,000.00
1 ถัง	Gfs041290	Glyphosate 48% (115 lt.)	9,200.00	9,200.00
50 หีบ	Gfs031285	Glyphosate 48% (SBR) (6 x 4 lt.)	320.00	96,000.00
50 หีบ	Gfs021279	Glyphosate 48%(LBKlg) (12 x 1000 cc.)	85.00	51,000.00
			Total	164,000.00

Discount 00
Grand Total 164,000.00

	Authorized	Received By
	Date _____	Date _____

Figure H.10. Customer Invoice of ALT.

APPENDIX I

DATA DICTIONARY

DATA DICTIONARY

Contact_sale — Data Element
- contacts — Relationship
- creates — Relationship
- CREDIT — Entity
  - *Description:*
    - It uses to record the credit status of each customer.
- Cus_ID — Data Element
- INVOICE::Cus_ID
  - *Description:*
    - Customer number for reference by company
- Cust_addr1 — Data Element
- Cust_addr1 — Data Element
- CUSTOMER::Cust_addr1
  - *Description:*
    - The address of customer
- Cust_addr2 — Data Element
- Cust_addr2 — Data Element
- CUSTOMER::Cust_addr2
  - *Description:*
    - The address of customer
- Cust_fax — Data Element
- Cust_fax — Data Element
- CUSTOMER::Cust_fax
  - *Description:*
    - Fax number of customer
- Cust_ID — Data Element
- CUSTOMER::Cust_ID
  - *Description:*
    - Customer number for reference by company
- Cust_ID — Data Element
- CUSTOMER ORDER::Cust_ID
  - *Description:*
    - Customer number for reference by company
- Cust_memo — Data Element
- Cust_memo — Data Element
- CUSTOMER::Cust_memo
  - *Description:*
    - Memo of each customer such as the customer can't deliver product on Saturday.
- Cust_name — Data Element
- CUSTOMER::Cust_name
  - *Description:*
    - Name of customer
- Cust_province — Data Element
- Cust_province — Data Element
- CUSTOMER::Cust_province

Description:
Province of customer

Cust_status Data Element

Cust_status Data Element

CUSTOMER::Cust_status

Description:
Credit status of customer

Cust_tel1 Data Element

Cust_tel1 Data Element

CUSTOMER::Cust_tel1

Description:
Telephone or mobile phone number of customer

Cust_tel2 Data Element

Cust_tel2 Data Element

CUSTOMER::Cust_tel2

Description:
Telephone or mobile phone number of customer

Cust_zip Data Element

Cust_zip Data Element

CUSTOMER::Cust_zip

Description:
Zipcode of customer address

CUSTOMER Entity

Description:
It keeps all personal information record of each customer.

Composition:

Cust_ID	VarChar(8) NotNull [PK]
Cust_name	VarChar(30) NotNull
Sale_ID	VarChar(5) Null
Cust_status	VarChar(2) Null
Cust_addr1	VarChar(50) NotNull
Cust_addr2	VarChar(50) Null
Cust_province	VarChar(20) NotNull
Cust_zip	VarChar(5) NotNull
Cust_tel1	VarChar(29) NotNull
Cust_tel2	VarChar(20) Null
Cust_fax	VarChar(20) Null
Cust_memo	VarChar(40) Null

CUSTOMER ORDE DETAIL Associative Entity

Composition:

ORDER_NO	Integer [Undefined] NotNull [PK]
Product_No	VarChar(9) NotNull
QUANTITY	Integer [Undefined] NotNull
PRICE	Float NotNull
ORDER_NOTE	VarChar(25) Null

CUSTOMER ORDER Entity

Description:
It keeps record about the request order from each customer.

Composition:

Order_No Integer [Undefined] NotNull [PK]
Cust_ID VarChar(8) NotNull
Ship_to VarChar(30) Null
Ship_to1 VarChar(30) Null
Sche_date Date(6) Null
Term Integer [Undefined] Null
Sale_ID VarChar(5) NotNull
Transport VarChar(20) Null
Order_status VarChar(1) NotNull
Order_memo VarChar(40) Null

CUSTOMER ORDER DETAIL Associative Entity

Description:

It keeps the detail of customer's order.

Composition:

Order_No Integer [Undefined] NotNull [PK]
Product_No VarChar(9) NotNull
Quantity Integer [Undefined] NotNull
Price Float NotNull
Order_note VarChar(25) Null

Date_receive Data Element

Description Data Element

Discount Data Element

INVOICE::Discount

Description:

Discount granted to customer's order

Due_date Data Element

INVOICE::Due_date

Description:

Last date on which customer has to make payment against invoice

has Relationship

Integer [Domain] Data Element

Inv_date Data Element

Description:

Date on which the invoice is issued

Inv_No Data Element

Description:

Invoice number for reference by company

INVOICE Entity

Description:

It reports the purchasing and the total payment amount.

Composition:

Inv_No Integer [Undefined] Null [PK]
Order_No Date(6) NotNull
Inv_date Date(6) NotNull
Ship_to VarChar(30) Null
Ship_to1 VarChar(30) Null
Cus_ID VarChar(8) Null

Order_date Date(6) NotNull
Schd_date Char(6) Null
Term Integer [Undefined] Null
Due_date Date(6) Null
Paid_date Date(6) Null
Sale_ID VarChar(5) Null
Discount Float Null
Note VarChar(40) Null
Transport VarChar(20) Null
Transport_No VarChar(10) Null

INVOICE DETAIL Attributive Entity

Description:

It keeps the product detail of customer's account receivable.

Composition:

Inv_No Integer [Undefined] Null [PK]
Product_No VarChar(9) NotNull
Product_name VarChar(15) NotNull
Product_size VarChar(15) Null
Quantity Integer [Undefined] NotNull
Total_line Float NotNull
Total_amt Float NotNull

is a Relationship

is sent Relationship

Note Data Element

INVOICE::Note

Description:

The remark for each invoice or each order

Order_date Data Element

INVOICE::Order_date

Description:

Date on which customer places an order

Order_memo Data Element

Description:

The remark for each customer order.

ORDER_NO Data Element

CUSTOMER ORDE DETAIL::ORDER_NO

Order_No Data Element

CUSTOMER ORDER::Order_No

Description:

Order number for reference by customer and company.

Order_No Data Element

CUSTOMER ORDER DETAIL::Order_No

Description:

Order number for reference by customer and company

Order_No Data Element

INVOICE::Order_No

Description:

Order number for reference by customer and company

ORDER_NOTE Data Element

CUSTOMER ORDE DETAIL::ORDER_NOTE
Order_note Data Element
CUSTOMER ORDER DETAIL::Order_note
Description:
The note for each customer order
Order_status Data Element
Order_term Data Element
Paid_Date Data Element
Paid_date Data Element
INVOICE::Paid_date
Description:
Acutal date on which customer makes payment against invoice
places Relationship
PRICE Data Element
CUSTOMER ORDE DETAIL::PRICE
Price Data Element
CUSTOMER ORDER DETAIL::Price
Description:
Price of product per unit
PRODUCT Entity
Description:
Product is kept in the stock warehouse and should be available for serving the customer.
Composition:
Product_No VarChar(9) NotNull [PK]
Type_Id VarChar(2) NotNull
Product_name VarChar(15) NotNull
Product_price Float NotNull
Product_cost Float NotNull
Product_quantity Integer 4 NotNull
Product_sub Integer [Undefined] Null
Product_size VarChar(15) Null
Date_receive Date(6) NotNull
PRODUCT TYPE Entity
Description:
It categorizes the product type such as fertilizer,insecticide,rodenticide and so on.
Composition:
Type_Id VarChar(2) NotNull [PK]
Type_name VarChar(15) NotNull
Product_cost Data Element
Product_name Data Element
Description:
Name of product
Product_No Data Element
Description:
Number of product for reference by warehouse of company
Product_price Data Element
Product_quantity Data Element

Product_size Data Element

Description:

Type of package of each product which are of various type

Product_sub Data Element

QUANTITY Data Element

CUSTOMER ORDE DETAIL::QUANTITY

Quantity Data Element

CUSTOMER ORDER DETAIL::Quantity

Description:

Quantity of products order by customer

Quantity Data Element

INVOICE DETAIL::Quantity

Description:

Quantity of product order by customer

Refund Data Element

Sale_addr Data Element

Description:

Address of sale employee

Sale_ID Data Element

Description:

ID of sale employee who got the order from customer

Sale_ID Data Element

CUSTOMER::Sale_ID

Description:

Code of sale employee who got the order from customer

Sale_ID Data Element

INVOICE::Sale_ID

Description:

Code of sale employee who got the order from customer

Sale_ID Data Element

SALES::Sale_ID

Description:

Code of sale employee

Sale_name Data Element

SALES::Sale_name

Description:

Name and surname of sale employee

Sale_tel Data Element

Description:

Mobile phone of sale employee

Sale_title Data Element

SALES::Sale_title

Description:

Prefix of sale employee such as Mr.,Ms.

SALES Entity

Description:

It records the personal information of each sale employee of company.

Composition:

Sale_ID VarChar(5) NotNull [PK]

Sale_name VarChar(30) NotNull
Sale_title VarChar(10) NotNull
Sale_addr VarChar(40) NotNull
Sale_tel VarChar(20) NotNull

Schd_date Data Element
INVOICE::Schd_date
Description:
Date on which shipping department delivers products to customer

Sche_date Data Element
CUSTOMER ORDER::Sche_date
Description:
Date on which shipping department delivers products to customer

sells Relationship

Ship_to Data Element
CUSTOMER ORDER::Ship_to
Description:
The distination that shipping department of company will deliver to

Ship_to Data Element
INVOICE::Ship_to
Description:
The destination that shipping department will deliver the product to customer

Ship_to1 Data Element
CUSTOMER ORDER::Ship_to1
Description:
The destination that shipping department of company will deliver to

Ship_to1 Data Element
INVOICE::Ship_to1
Description:
The destination that shipping department will deliver products to customer

sold as Relationship

Stock_quantity Data Element

Stock_sub Data Element

Term Data Element
Description:
Credit term granted to customer's order

Term Data Element
INVOICE::Term
Description:
Credit term granted to customer's order

Total_amt Data Element
INVOICE DETAIL::Total_amt
Description:
Total amount of money for customer order

Total_line Data Element

Total_line Data Element
INVOICE DETAIL::Total_line
Description:
Total amount of money for each item

Transport Data Element

Description:

The method of individual order's transportation and the name of transportation

Transport Data Element

INVOICE::Transport

Description:

The method and the name of transportion of each order

Transport_No Data Element

INVOICE::Transport_No

Description:

The number of each transportaion bill

Type_Id Data Element

Description:

The catagory of product which is categoried into 6 types.

Type_name Data Element

Description:

Name of categories: namely insecticide, fungicide,hormone,fertilizer,rodenticide,and herbicide.

Type_No Data Element

APPENDIX J

PIECES EVALUATION

PIECES EVALUATION

PIECES is the abbreviation of Performance, Information, Economic, Control, Efficiency and Service. PIECES is a useful framework for classifying problems, opportunities and directives. Note that the categories of PIECES are not mutually exclusive; some possible problems slow up in multiple lists. Also the list of possible problems is not exhaustive. The PIECES framework is equally suited to analyze both manual and computerized system applications.

(1) Performance

(a) Response Time

Problem: The delay of manual inventory checking process causes problem when taking customer orders.

Opportunity: A better inventory system could lead to better response time, which leads to a better performance.

(2) Information

(a) Output

Problem: The information is not a useful format, because inventories are marked by handwriting for showing the information of the amount of products of a particular order. This information is sometimes not accurate because they are handwritten by factory workers, and at times, there are human errors.

Opportunity: Better inventory system could lead to better output of information. It would be in a useful format, accurate and easy to produce, leading to more efficient operations.

Directive: The government's requirement of correct book of record for account keeping system asks for accurate inventory information.

(a) Input

Problem: When the stock arrives from production to be stored in the warehouse, the data (amount of products and ship to order) are read manually. Hence sometimes the data are not accurately captured.

(b) Stores Date

Problem : Because the order processing system is stored by writing and erasing in the customer order book, the stored information is sometimes inaccurate. Inaccurate data may also be derived from human error. The data is only stored in one particular book with no backup, and this makes the data not well organized. Sometimes, the customer order book is mislocated, making the data inaccessible.

Opportunity: With computerized order processing system, the above problems could be solved, and a more efficient company could better-store information so that there is no faulty order taken from customers or making unnecessary orders for production. This leads to better customer and production section.

Directive: It is required by law to store precise information on all types of information including order for warehouse section. The order processing system could provide this.

(3) Economics

(a) Costs

Opportunity: Costs could be saved from having better order processing system, so that there is no loss of order or even pending

order.

(b) Profit

Opportunity : More profit could be attained from better order processing system, by having immediate information when the order is taken from the customers. Moreover, orders could be received with accurate information.

(4) Control

(a) Too little control

Problem: Input data are not adequately edited. Processing errors occur from human mistakes. Decision making error also occurs.

Opportunity: Correct input data and no processing errors would lead to better decision making.

(5) Efficiency

(a) Lack of efficiency

Problem: Too much effort is required for storing and retrieval of information of the order.

Opportunity: Better efficiency in order taking results in better business operations.

(6) Service

(a) Unreliable Services

Problem: The current order processing system produces unsystematic and unreliable results. It is not easy and awkward to use.

Opportunity: Better(computerized) order processing system could produce systematic and reliable results. Also the systems would be easier to use, leading to better business performance.

BIBLIOGRAPHY

English References:

1. Dennis, Alan and Barbara Kaley Wixo. System Analysis and Design. NY: John Wiley & Sons Inc., 1999.

2. James, Martin. Computer Database Organization. Second Edition. Englewood Cliffs. N.J.: Prentice-Hall, 1997.

3. Jeffrey L. Whitten, Lonnie D. Bentley, Kevin C. Dittman. System Analysis and Design Methods, fifth edition. McGraw-Hill, 2000.

4. Kendall, Kenneth E. System Analysis and Design, Third Edition. NJ: Prentice-Hall, 1995.

5. Laudon, Kenneth C. and Jane P. Laudon. Management Information System, Seventh Edition. Boston: Prentice-Hall, Inc., 2002.

6. Lucas, Henry C. Information Technology for Management, Sixth Edition. New York: McGraw-Hill, Inc., 1997.

7. Miser, Hugh J. and Edward S. Quade. Handbook of System Analysis, Third Edition. London: Johgn Wiley & Sons Ltd., 1996.

8. Muller, Robert J. Database Desging for Smarties. MA: Morgan Kaufmann Publishers, 1999.

9. Page Jones, Meilir. The Practical Guide to Structured System Design, Second Edition. NJ: Prentice-Hall, 1988.

10. Whitten, Jeffrey L. and Lonnie D. Bentley. System Analysis and Design Method, Fifth Edition. Boston: McGraw-Hill companies, Inc., 2000.

Thai Reference :

1. ผศ. เรวัตร ธรรมาอภิรมย์. Start Microsoft Visual Basic.NET. กรุงเทพฯ เอส.พี.ซี.บุ๊คส์ 2545.