



# Pharmaceutical Product Inventory System

by

Ms. Surinthip Sakphoowadon

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  
in Computer Information Systems  
Assumption University

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Project Title                      Pharmaceutical Product Inventory System

Name                                Ms. Surinthip Sakphoowadon

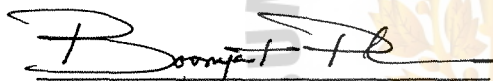
Project Advisor                  Dr. Boonyarit Pokrud

Academic Year                  March 2001

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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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(Dr. Boonyarit Pokrud)  
Advisor



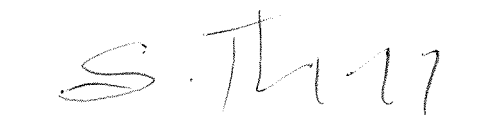
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March 2001

## ABSTRACT

Pharmaceutical product inventory system is developed using system analysis, design and implementation techniques. The current manual system is first analyzed to locate the problems and possible areas for improvement. Business requirements from users are then collected and taken into account in the system design stage, which proposes a new system design for implementing and a computerized inventory system.

The Pharmaceutical Product Inventory System is analyzed based on modern structure analysis. The system is analyzed step to step using Data Model, Process Model and Network Model to represent all information system views. Each method helps to find the exact scope of the project. The project also includes input screen design, inquiry design, output report design, database design and network design. All of them are designed according to the system requirements. The system implementation involves network installation, database construction, software implementation, user training and system conversion.

The database of the proposed computerized system is designed to be centralized so that users can share data between subsystems. All system data are stored in relational database and processed with the capability of a computer system. The proposed system is able to eliminate the existing problems: reducing paper work, mistakes and errors commonly encountered by the existing system. Furthermore, the proposed system helps to increase the efficiency of routine data processing and all report generation for the management.



## ACKNOWLEDGEMENTS

This system development project is completed through the assistance of numerous people. I wish to express my gratitude to my advisor, Dr. Boonyarit Pokrud, for his valuable guidance and encouragement while I was conducting this study. I would like to thank Asst.Prof.Dr. Vichit Avatchanakorn for his valuable suggestions and comments on this project. I also would like to extend my appreciation to all project committee members. I am sincerely thankful to the manager and staff members of Siam Chemi-Pharm Ltd., Part. for providing the information needed for the writing of this report.

Finally, I am grateful to my parents and friends for their endless support throughout this course work.



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## I. INTRODUCTION

### 1.1 Background of the Project

Central Chemi-Pharm Ltd., Part. is a bulk pharmaceutical distributor. It gets pharmaceutical active ingredients such as paracetamol, amoxycilline, cefazolin from both abroad and local areas. The company deals with several leading pharmaceutical manufacturers and companies around the world such as Yoshitomi/Japan, Amifarma/Spain, CHEMO/Switzerland. All customers of the company are local pharmaceutical and veterinary factories.

The company has a lot of documents to control each day. Some documents are stored in computer, and some are kept manually on paper. Manual dealing of data causes a lot of problem such as it is time consuming when searching, documents get lost easily and it is difficult to create a summary report.

Since the company imports some products from abroad, there are complex processes when dealing with suppliers and a lot of information involved. Furthermore, the company needs information that can be transferred to accounting departments effectively. For a local sales system, they have a lot of documents to keep, and require to effectively issue printing form to customer. Therefore, the company needs an efficient computer information system to facilitate all of the above requirements.

The Pharmaceutical product inventory system is developed based on user requirements. This project is concerned with all important functional requirements that are essential for computerization of the existing system. The system consists of many subsystems to fulfil the requirements such as master data subsystem, purchase order subsystem, sales subsystem, stock checking subsystem.

## 1.2 Objectives of the Project

- (1) To study and analyze the existing system in order to identify problems and new business requirements.
- (2) To apply computer capability to efficiently handle the routine jobs within the organization.
- (3) To provide a facility to easily operate inventory control functions.
- (4) To reduce the number of paperwork within the organization.
- (5) To improve the work process by using computer system:
  - (a) Reduce lengthy processing time.
  - (b) Reduce redundancy of data entry.
  - (6) Reduce mistakes and error from manual system.
- (7) To increase efficiency and effectiveness of the inventory system.
- (8) To utilize computer information to generate report for decision making for the management.
- (9) To reduce cost of human resource.

## 1.3 Scope of the Project

This project is concerned with inventory control process, which may be divided into six subsystems of which information are related. The six subsystems are as follows:

- (1) Master file

To record main reference data. All data are determined codes from this step, and then all codes can be used in other subsystems as foreign keys. Reference data consists of customer data, supplier data, product data, unit price and unit cost.



(2) Purchase Order

To record all details of purchase order. The system is able to generate purchase order number, record detail of product order, and print out purchase to supplier. Furthermore, after sending purchase to supplier, the system can cancel any purchase order.

(3) Receive Product from Supplier

To record all details of received information from supplier such as chemical name, receiving quantity and packing. The system can generate receiving number automatically. After receiving, the system will increase the balanced quantity of product

(4) Sales Product

To record sales information to customer and able to calculate total amount of product sale. The system will generate invoice number automatically to facilitate the system, furthermore, all information can be searched by invoice number. After selling product, the system can take care of credit note to customer.

(5) Stock Checking

To print out all product codes and balanced quantity from database to compare with the current amount in location. If the system finds the mistake quantity, each product code has to be corrected by the actual quantity.

(6) Generate Management Report

The report of system can be created from system information which is kept in database. The management reports are history reports, summary

reports and analysis reports. All management reports will be supported the management level for decision making.

#### **1.4 Deliverables**

- (1) Context Diagram
- (2) Data Flow Diagrams
- (3) Data Models
- (4) Database Designs
- (5) Network Design
- (6) Cost and Benefit Analysis
- (7) User Interface Designs
- (8) Report Designs
- (9) Process Specifications
- (10) Data Dictionaries

#### **1.5 Project Plan**

The Project plan of pharmaceutical product inventory system is given in Figure

1.1.

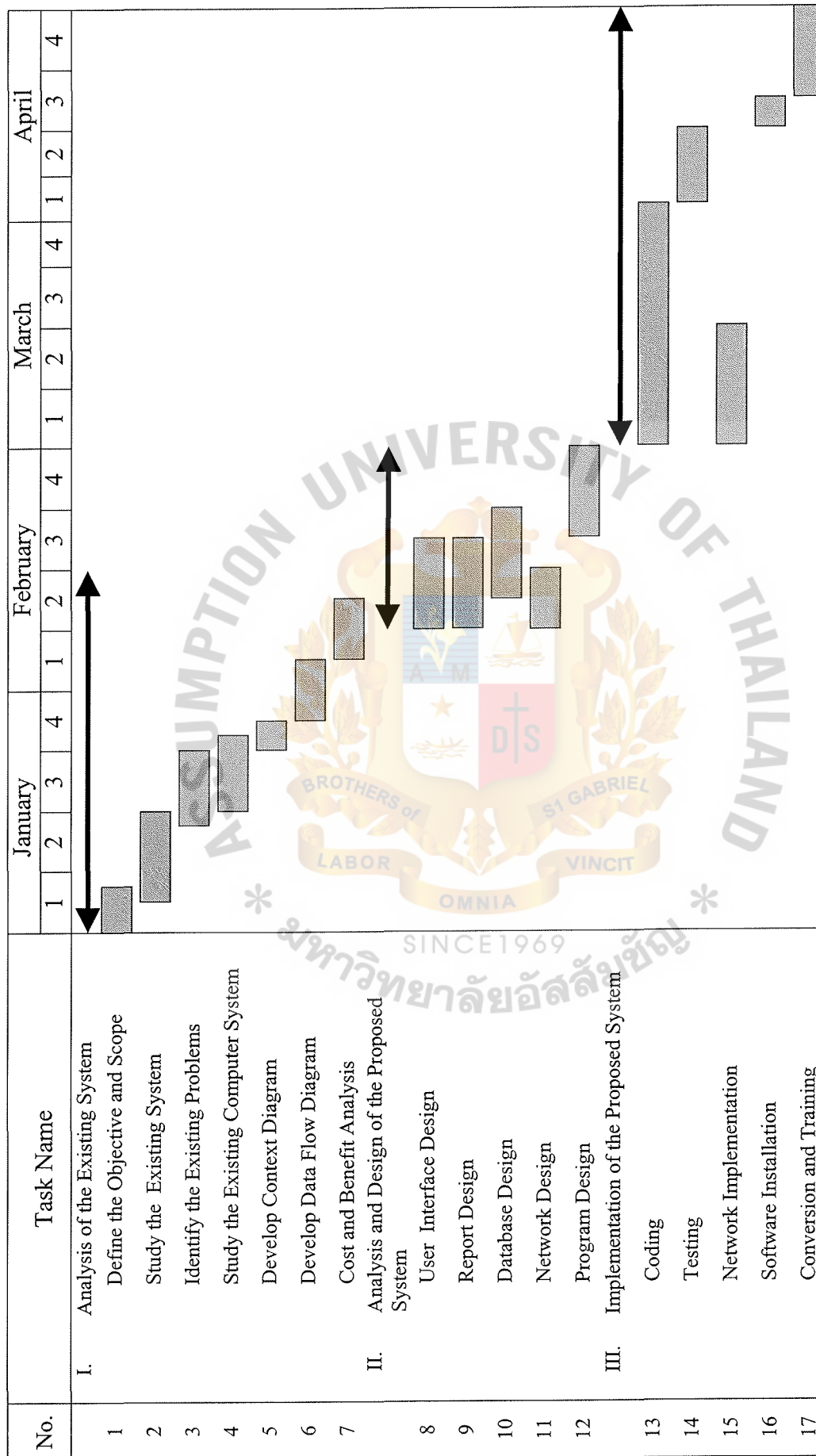


Figure 1.1. Project Plan of Pharmaceutical Product Inventory System.

## II. THE EXISTING SYSTEM

### 2.1 Background of the Organization

Central Chemi-Pharm Ltd., Part. was established in 1970 as a bulk pharmaceutical distributor. The company is a middle sized organization, consisting of 4 departments which take care all of business processes as shown in Figure 2.1. All departments in the company have the related work processing and information with each other. The four departments are as follows:

- (1) Administrative Department
- (2) Marketing Department
- (3) Product Department
- (4) Accounting Department

#### Administrative Department

Administrative staff is responsible for:

- (1) Collecting files and documentation
- (2) Taking care of official supply stock
- (3) Controlling letter in and out, faxes and memo of organization
- (4) Providing printing services to other departments
- (5) Maintaining the employees history files and recruit to the new employees
- (6) Taking responsibility in employee salary.
- (7) Taking responsibility in financial matters between supplier, customer and bank

#### Marketing Department

- (1) Takes care of customer requirement and ordering.
- (2) Presents the company product to the new and current customers.



- (3) Facilitates customer about product information.

#### Product Department

Business Development staff is responsible for:

- (1) Order product from abroad and local areas
- (2) Control product sale within country
- (3) Check balanced stock and update stock
- (4) Maintain and control product cost and price
- (5) Generate Sales report for manager
- (6) Take care of credit note to customer
- (7) Take care of invoice between company and customer

#### Accounting Department

The services provided are:

- (1) Respond to all money transactions of company
- (2) Take care of income or expense document from other departments such as spare part department, marketing department and administrative department.
- (3) Prepare A/P report, A/R report
- (4) Prepare profit report, revenue report
- (5) Take care of accounting summary report to manager

Central Chemi-Pharm Ltd., Part.

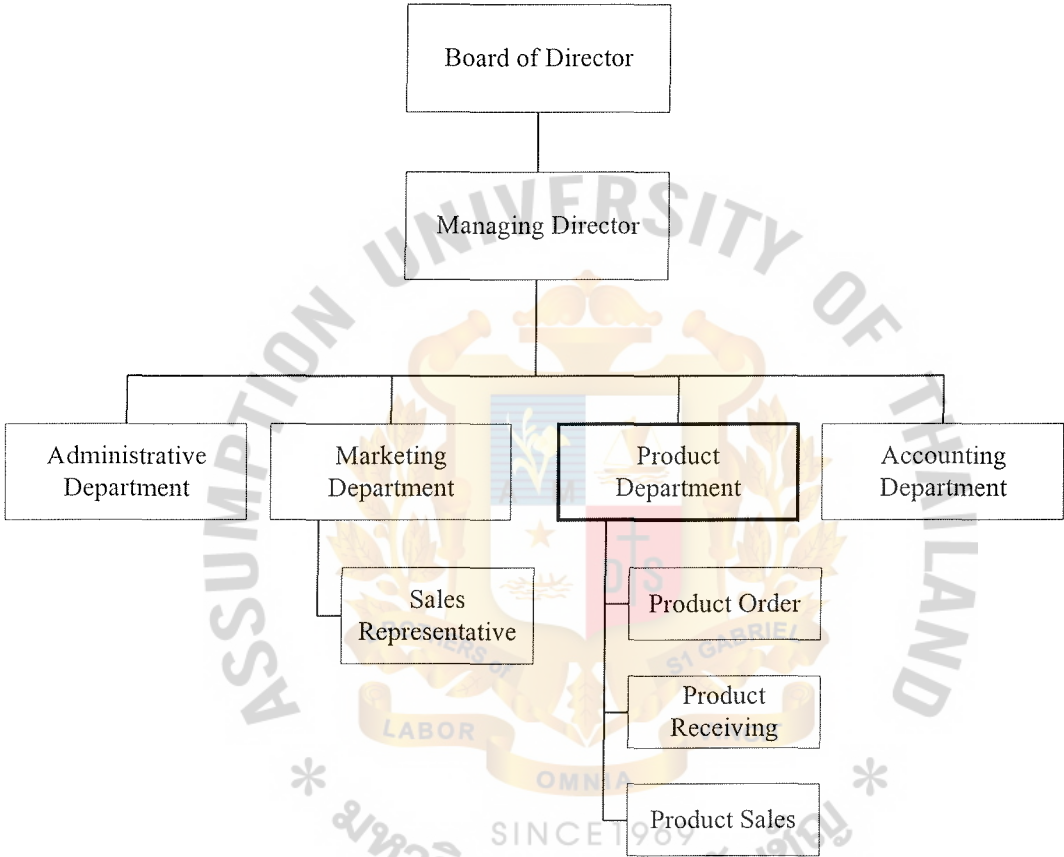


Figure 2.1. Organization Chart of Central Chemi-Pharm Ltd., Part.

## 2.2 Existing Business Functions

The existing business functions of Pharmaceutical Product Inventory System concerns product purchase order, product receiving, product sales and stock checking. The responsibilities directly belong to the product department.

### (1) Purchase Order

The company orders most products from abroad and some locally. Both abroad ordering and local ordering have similar information. The different details are in the forms of currency, exchange rate and shipment.

Purchase order process refers to confirmation number from supplier. After confirmation, the system will print out purchase order form and details of product to supplier.

### (2) Product Receiving

After receiving product from supplier, the product staff will check the completeness of product and product specification from packing condition. The product staff will increase product quantity in to stock. The system can receive the product from the same order more than once depending on condition between the company and supplier.

### (3) Product Sales

The customer sends the order to the company with details of the product, and then the company will send the product to the customer. The delivery to customer refers to the details of customer order.

With sales process, product staff will check available product quantity first. If there is enough stock quantity, the system can sell the product to customer. After the sales, the balance quantity of product in stock will be reduced, and the product staff will calculate the total amount with vat to

customer. The product staff has to send delivery form and invoice form with the delivery product.

After sales, the system will issue a credit note to the customer in case the customer returns the product to the company or the company reduces the sales price to the customer. If customer returns the product, the returned quantity will be increased in to stock.

(4) Stock checking

For stock checking process, the system checks stock only once a year. Product staff will print out the balanced quantity from file in to paper first. The second step is, the product staff will compare the actual product quantity from location with product quantity from the report. After that, the product staff will update the actual quantity in to stock file.

### **2.3 Current Problems and Areas for Improvement**

For the current system, product, supplier and customer files are kept in a computer. Purchase order and sales information is kept in paper file. So the problems and areas for improvement of the existing manual and computerized system can be summarized as follows:

- (1) The information in computer file is not enough and proper to generate the management reports for forecasting and decision making.
- (2) Take more time to create report. The information in computer can not keep all information of the system process. If we want to create a summary report, the product staffs have to find out and summarize from paper file. So making summary report consumes a lot of time.



- (3) The stock information is updated every day, not real time update, so the product staff may not know the exactly balanced quantity, until the product staff updates data again in the evening.
- (4) All documents are operated by human such as purchase order, invoice/receipt and credit note. The problem is each form takes more time for issuing than issue by application software.
- (5) Data are less secured because they are kept in a computer file, so everyone is able to see and access to the information. Furthermore, the files can be deleted by human mistake.
- (6) Working processes have less efficiency because most works are processed by people.
- (7) Inaccuracy of inventory data causes an inefficient financial, accounting control and management.

#### **2.4 The Existing Computer System**

For the existing computer, the company has one stand-alone PC and one dot matrix printer. The PC is Pentium 100, which are installed by Microsoft Windows 98, with Microsoft office and necessary programs.

Some system information are kept and processed by Microsoft office such as Microsoft Word and Microsoft Excel. The information which are kept in computer file consists of product information, customer information and supplier information. Some document forms of system such as purchase order form, invoice form, and credit note are operated by staff and printed by computer.

For product staff, they have the general knowledge on computer. They don't know about the database. They can use only the normal software such as Microsoft Office.

### III. THE PROPOSED SYSTEM

For the proposed pharmaceutical product inventory system, the system can perform every process by computing system efficiently and can facilitate routine work of every subsystem. Furthermore, the proposed system should provide information to management for planing and decision making.

The proposed system is developed according to the system requirements and user's requirements. User requirements are very important information in creating the effective proposed system.

#### 3.1 User's Requirements

- (1) The proposed system must be effective.
- (2) The proposed system must support main functions of every subsystem.
- (3) The proposed system must be multi user application system.
- (4) Data must be centralized and sharable between subsystems.
- (5) All input data require to be validated from the proposed system before saving into data storage.
- (6) The purchase order subsystem must store purchase order details into data store and print out purchase order form from computing system efficiently.
- (7) After saving purchase order into data store, the system can cancel any purchase order.
- (8) For receiving process, the balanced product in stock must be increased automatically after receiving product.
- (9) For product sales, product balanced quantity must be reduced automatically after the product is sold. Furthermore, the system must automatically print out invoice to customer from computing system.

- (10) Product department staff is required to update the balanced quantity of the product in real time.
- (11) Product department staff requires a computing system, which can operate stock checking.
- (12) Manager requires summary report and history report for planing and decision making.

### 3.2 System Design

The proposed system is developed to six subsystems; master file subsystem, purchase order subsystem, product receiving subsystem, product sales subsystem, stock checking subsystem and management report subsystem. The proposed system represents scope of the system by context diagram and main process of each subsystem by data flow diagram. Further more, the system also consists of data model (E-R diagram) to represent the relationship of every entity in the system.

#### (1) Context diagram

The context diagram defines the scope and boundary for the system and project. The diagram will show the information between the project system, and other systems and also other business. Other systems and other business are represented by external entities of the system. The external entities consist of four entities; Customer, Supplier, Accounting Department and Management as shown in Figure 3.1.

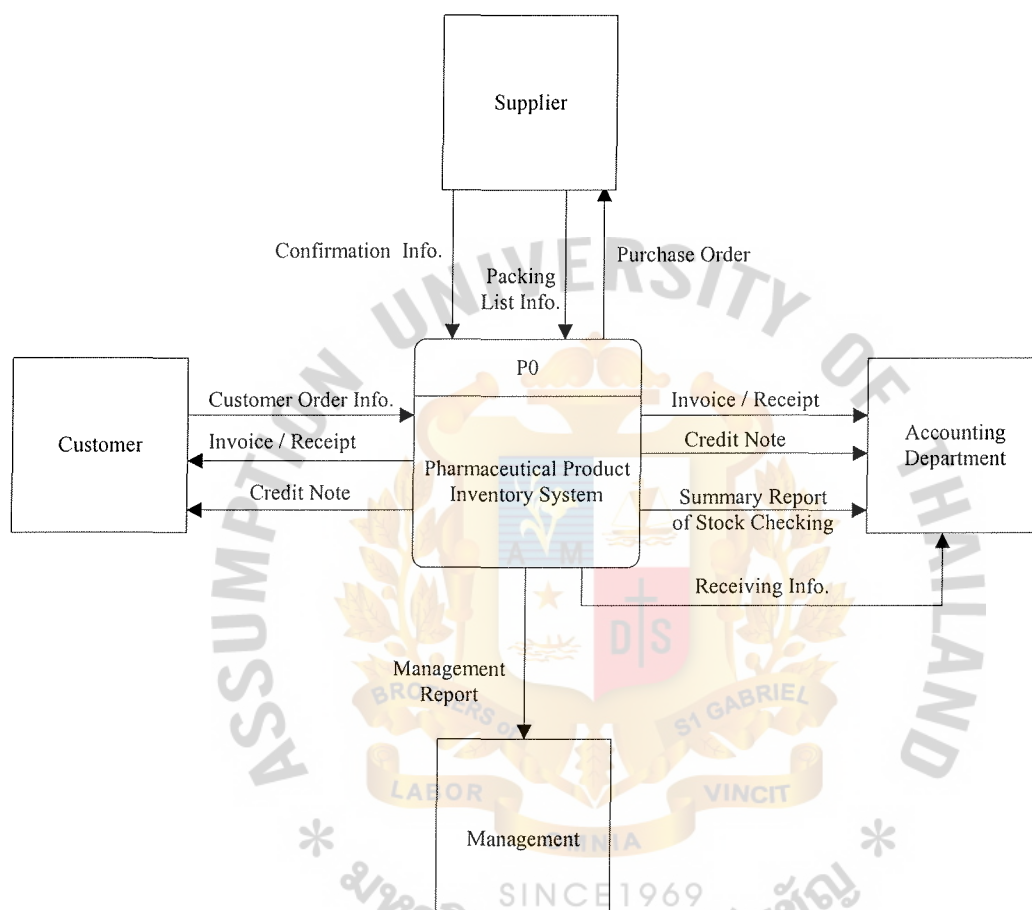


Figure 3.1. Context Diagram of Pharmaceutical Product Inventory System.



(2) Data Flow Diagram

Data Flow diagram (DFD) is a process model that depicts the flow of system data through a system and the work or processing performed by that system. Each arrow represents path from which data can flow. There are 3 symbols and one connection:

- (a) The squares represent external entities, which are supplier, customer, accounting department, and management.
- (b) The rounded rectangles represent work processes in the system.
- (c) The open-ended boxes represent data store or file.
- (d) The arrows represent flow of system data.

The data flow diagram of pharmaceutical product inventory system consists of six main processes; record master data, record product ordering, receive product, record product sales information, check stock and generate management report. Each main process consists of many subprocesses in lower levels, which are represented as in Figures 3.2-3.11. For each process specification, each system process shows the detail of input, output and step to perform the process as shown in Appendix D.

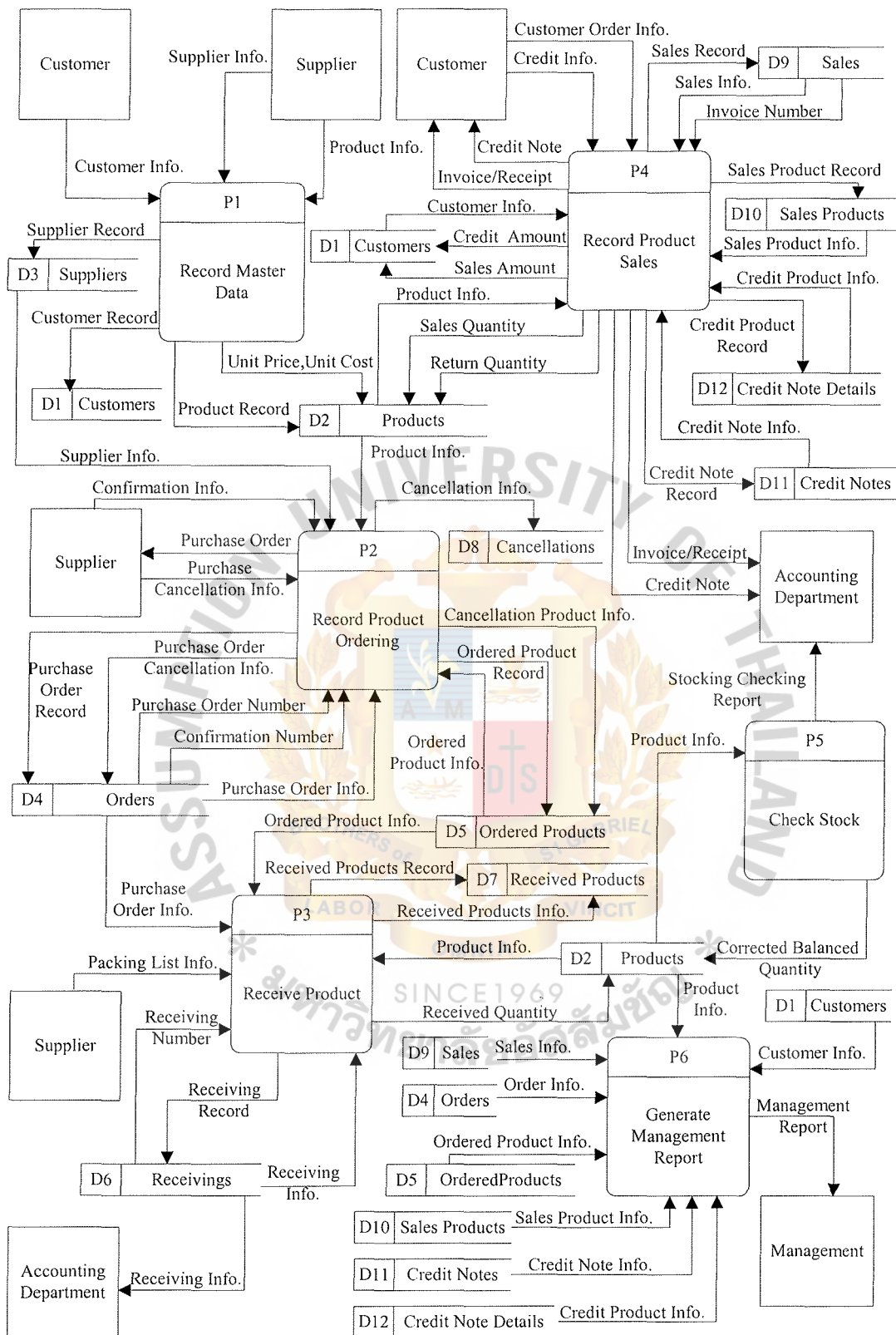


Figure 3.2. Data Flow Diagram Level-0 of Pharmaceutical Product Inventory System.

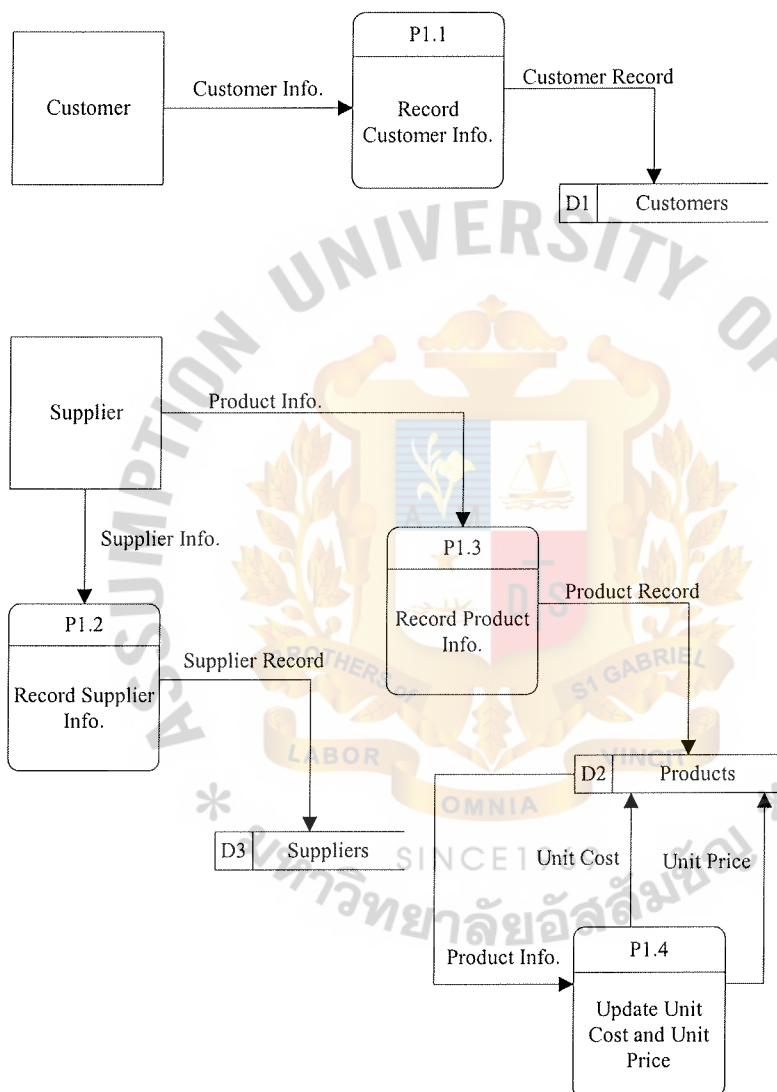


Figure 3.3. Data Flow Diagram Level-1 of Master Data.

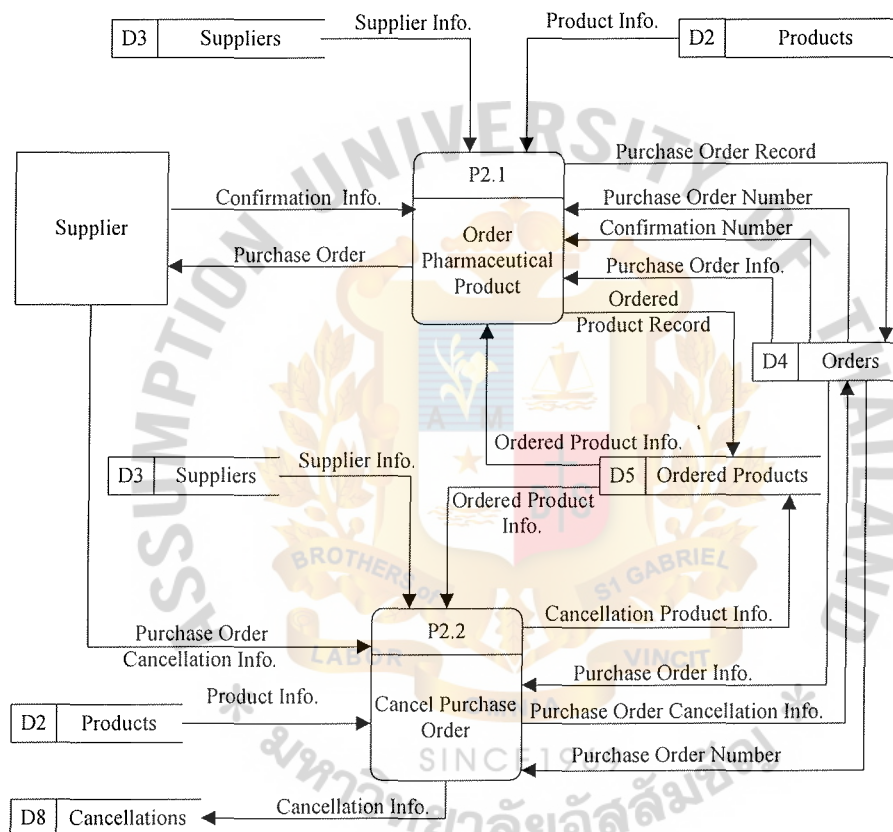


Figure 3.4. Data Flow Diagram Level-1 of Purchase Order.

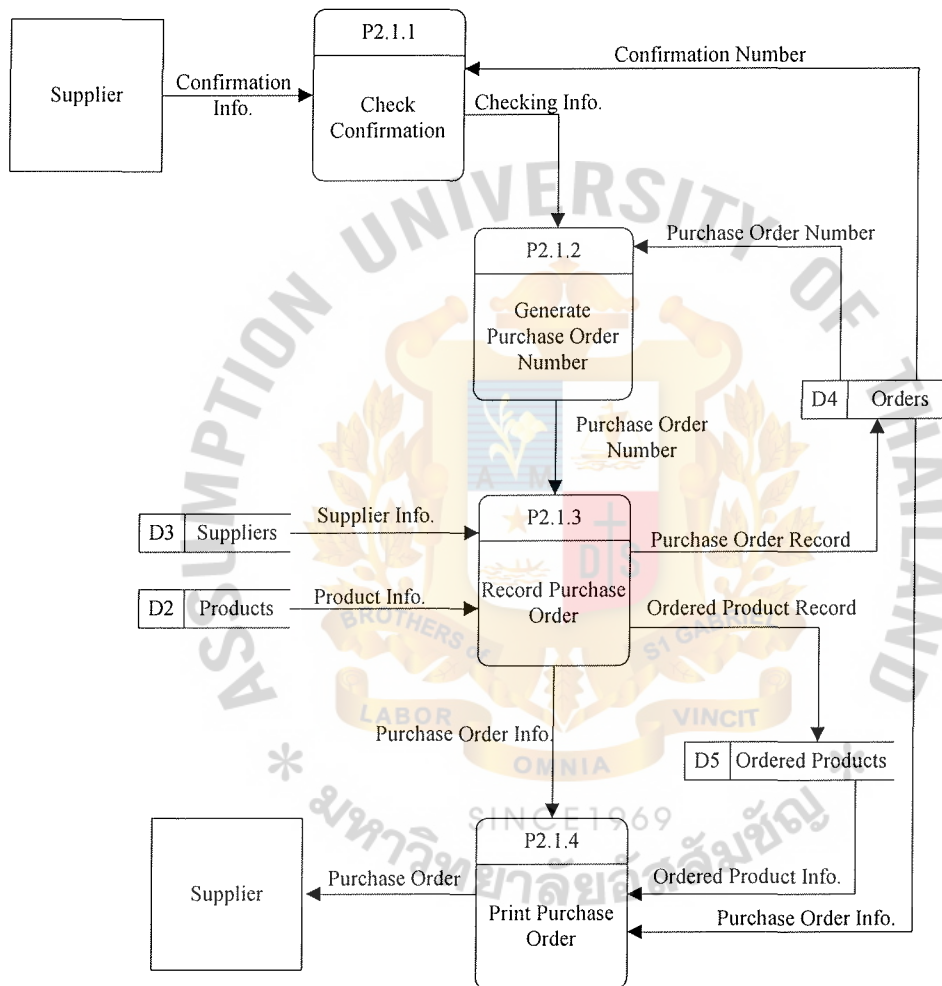


Figure 3.5. Data Flow Diagram Level-2 of Purchase Order.



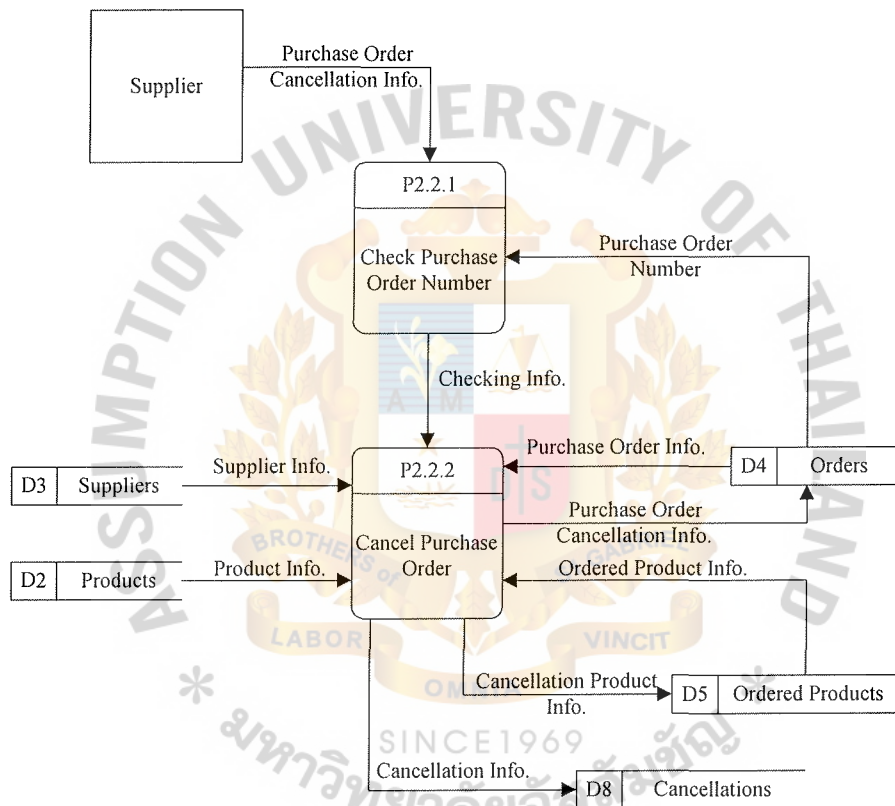


Figure 3.6. Data Flow Diagram Level-2 of Purchase Order Cancellation.

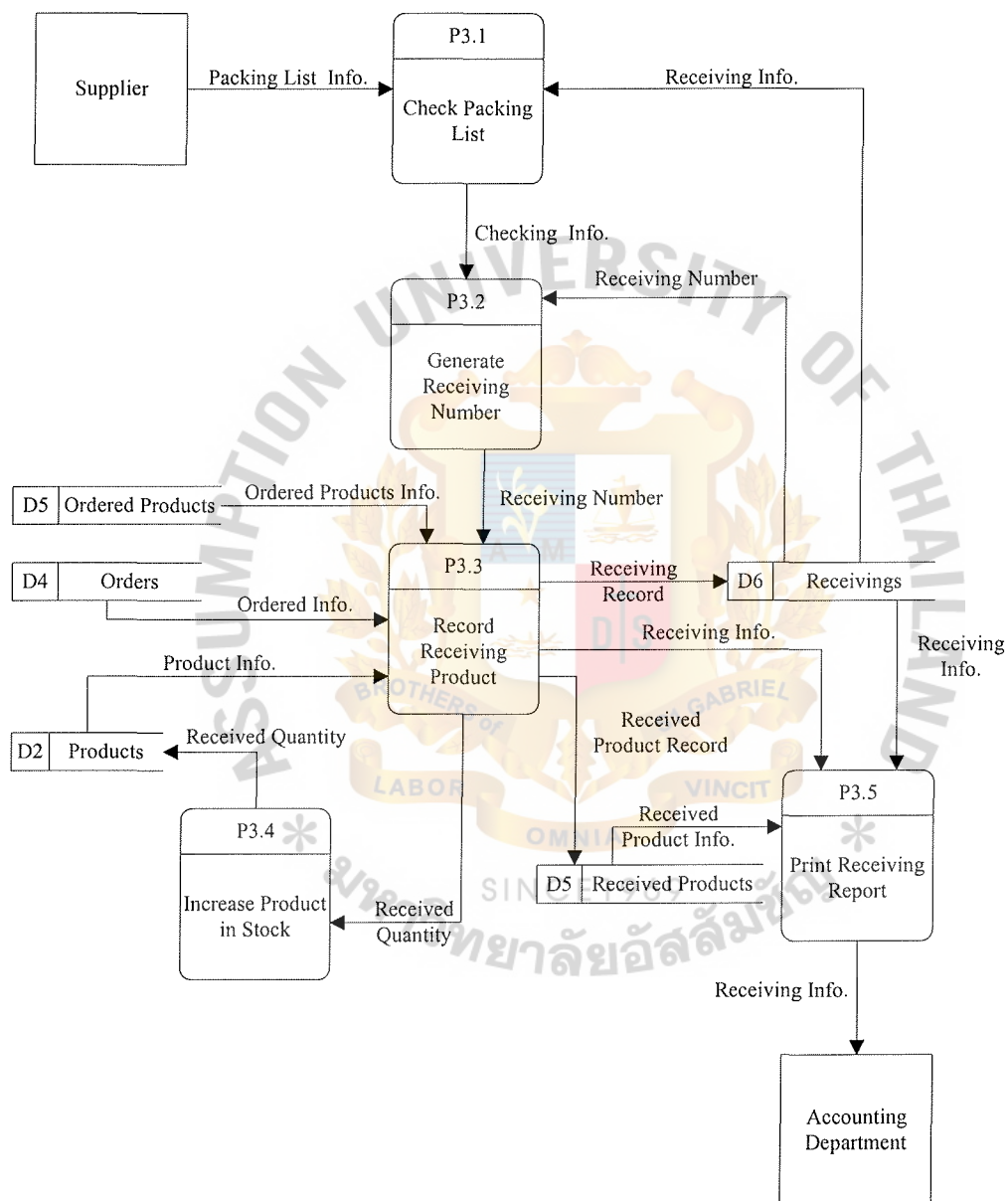


Figure 3.7. Data Flow Diagram Level-1 of Product Receiving.

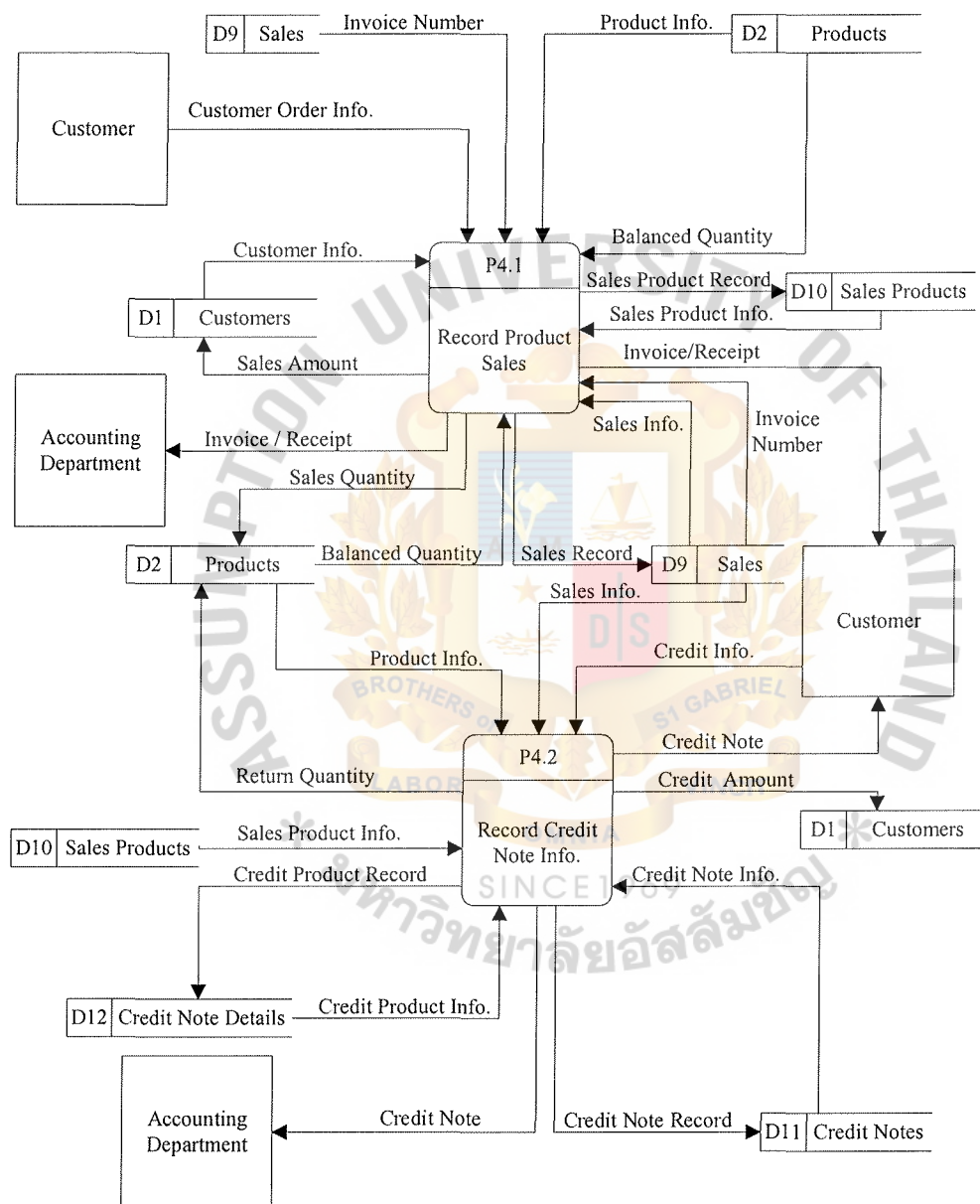


Figure 3.8. Data Flow Diagram Level-1 of Product Sales.

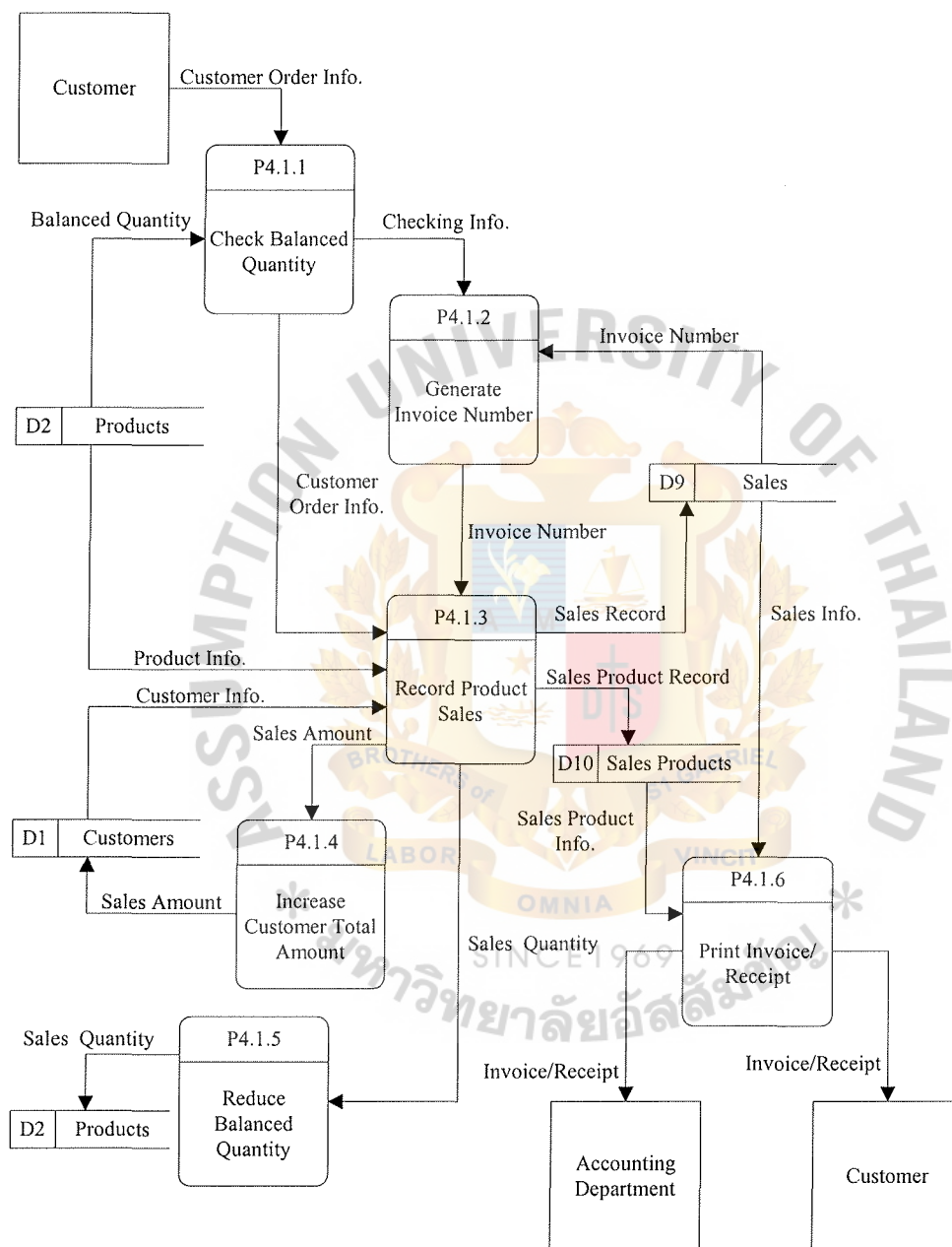


Figure 3.9. Data Flow Diagram Level-2 of Product Sales.

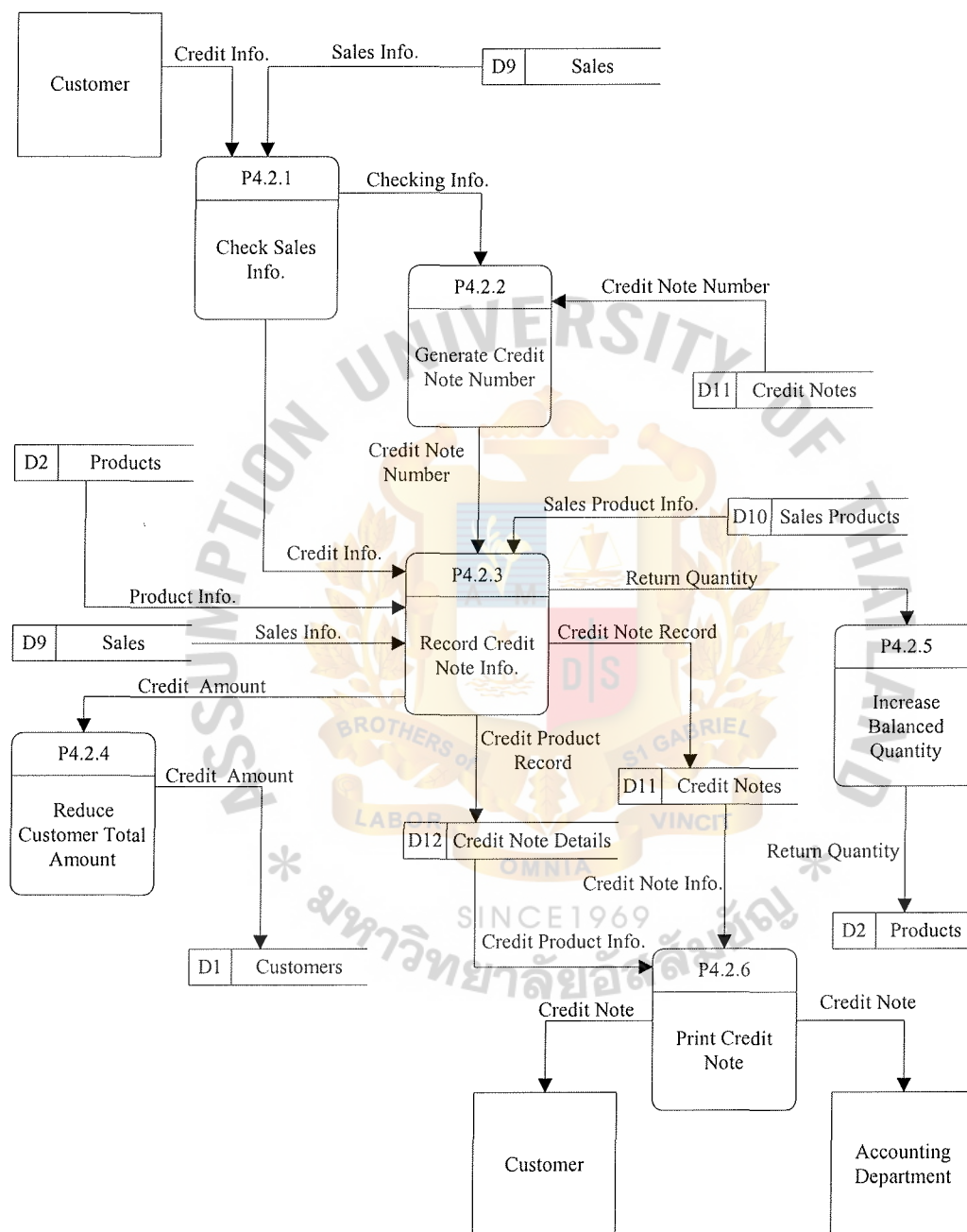


Figure 3.10. Data Flow Diagram Level -2 of Credit Note Information.



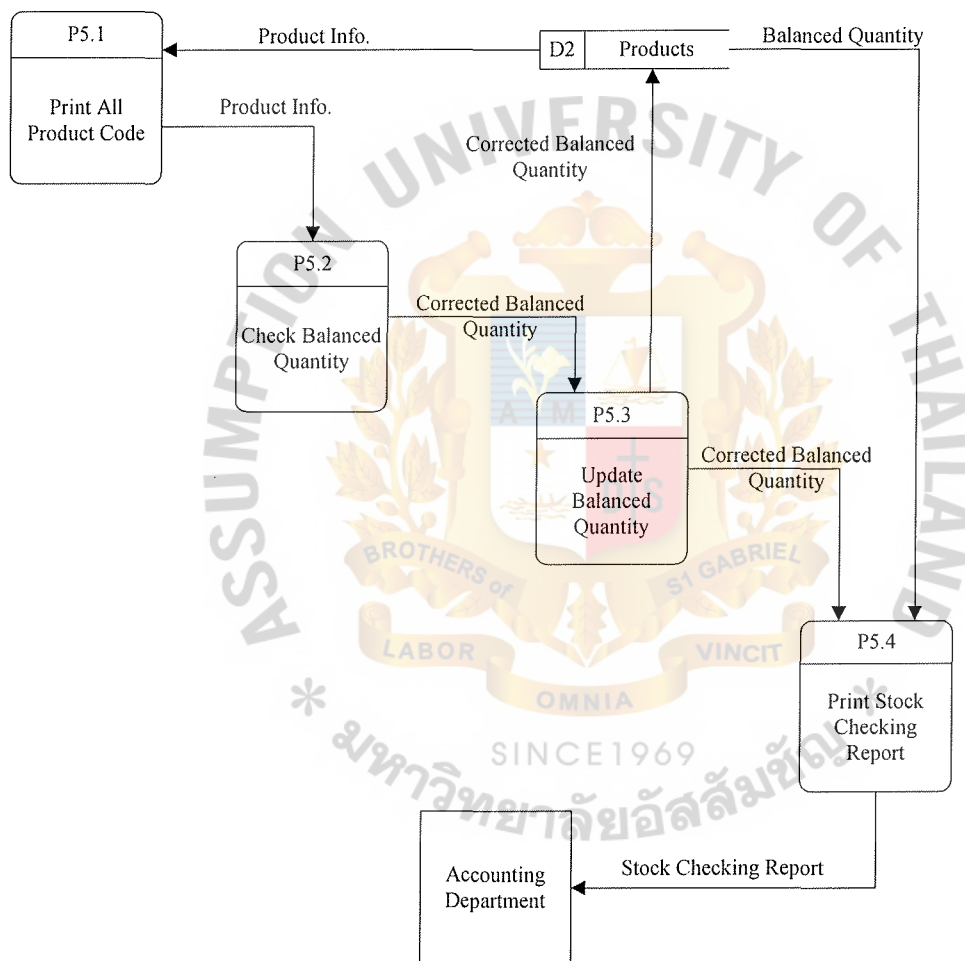


Figure 3.11. Data Flow Diagram Level -1 of Stock Checking.

#### (4) E-R Diagram

The tool that shows relationship of entities in the system is ERD. Context data model will show the scope of system. For fully attributed data model, the model shows all entities in the system and descriptive attributes of each entity. Fully attributed data model is illustrated in Figures 3.12-3.14.

After Context diagram, data flow diagram and E-R diagram are constructed for the proposed system, the next step is system design. For system design, the system concerns application interface design, report design, database design, network design and program design.

For the proposed system, system application is developed by VB6 development software, which supports graphical user interface (GUI) and is easy to develop. For report, system reports are developed by crystal report, which can communicate with VB6 as well. The application is designed especially for client/server architecture. The application is installed in to the client machines, and every client machine has to share the same database in database server.

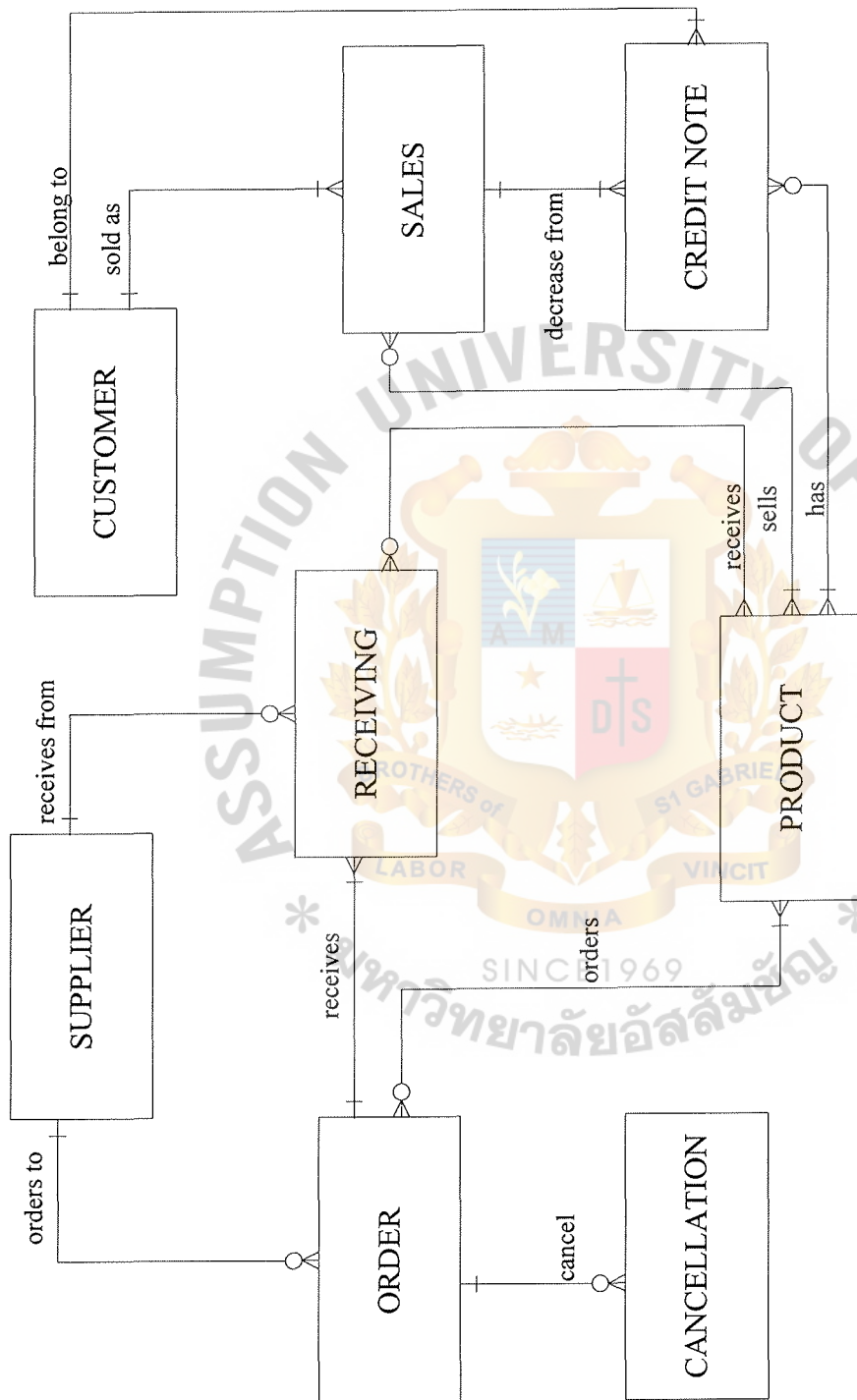


Figure 3.12. Context Data Model of Pharmaceutical Product Inventory System.

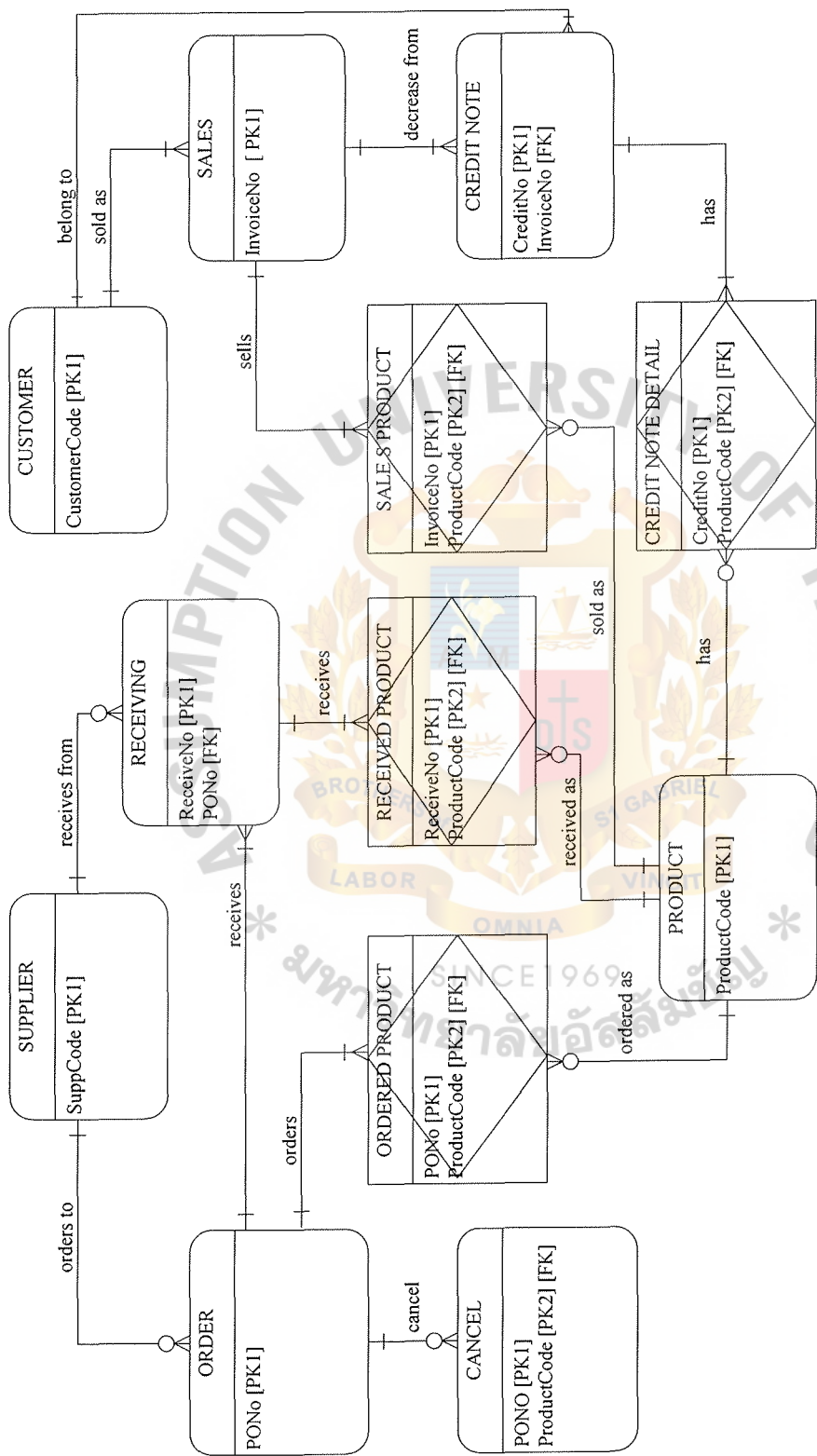


Figure 3.13. Key-Based Data Model of Pharmaceutical Product Inventory System.

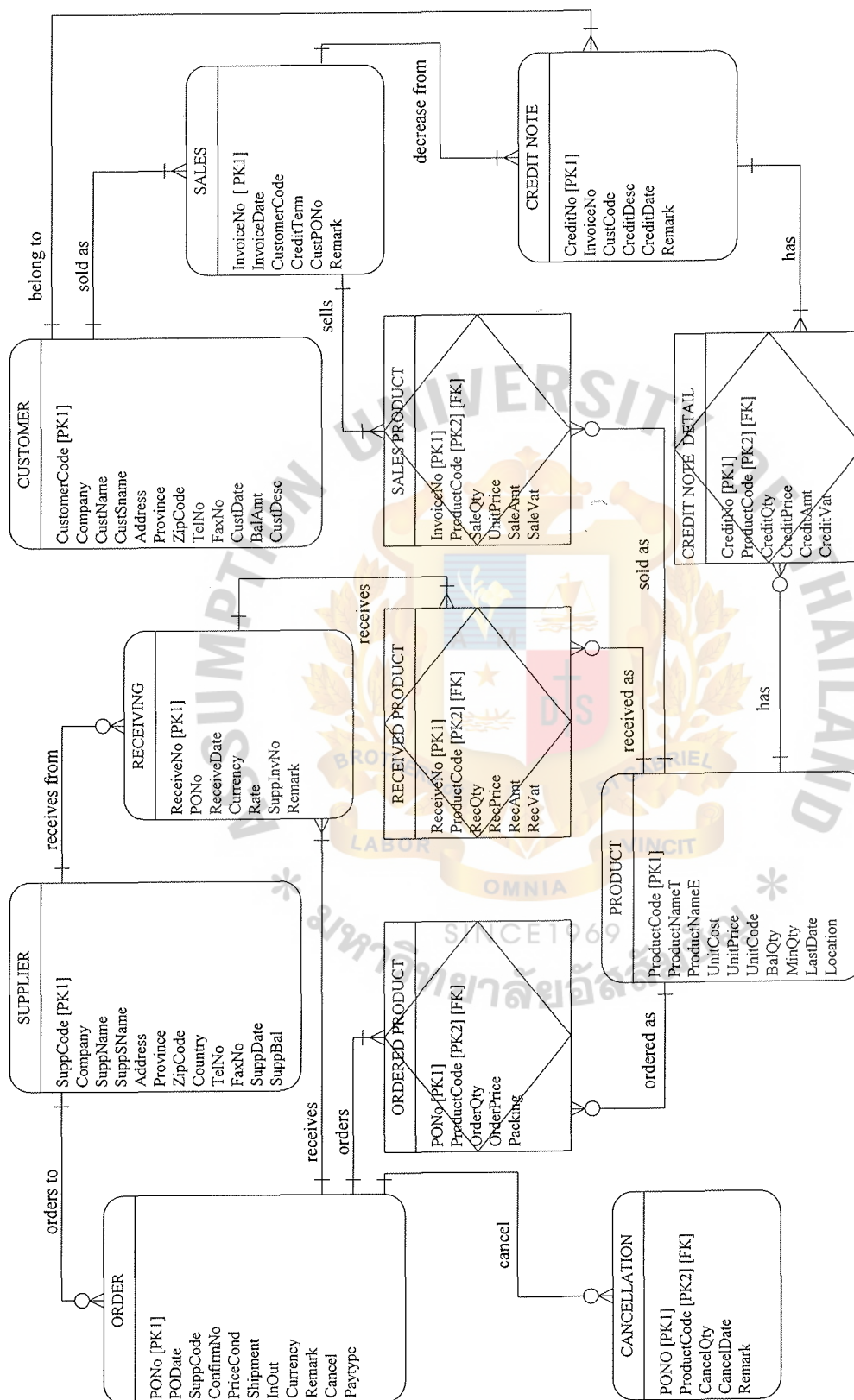


Figure 3.14. Fully Attributed Data Model of Pharmaceutical Product Inventory System.



### 3.2.1 Program Design

System program is developed by VB6, which supports graphical user interface (GUI). More over, VB6 is the program, which is easy to understand for programmer and coding takes short time. The software that designs reports interface is Crystal Report. However, Crystal report can not issue report to the system with out VB6. VB6 generates process code and then communicates to Crystal report for issuing the structure system report.

Before going in to the system, users have to enter the correct user id and passwords in order to prevent unauthorized users to access the system. The program consists of many screens. The main menu is the map for user to go to each screen in the system. The main menu shows the main functions of the system. Users have to choose any main function first, and then they can select the operation screen from the program.

Each operation screen consists of command button such as add command button, edit command button, delete command button, search command button, clear command button, preview command button, print command button, save command button and exit command button.

For application, all data from screen will be stored into database after selecting save command button. If user would like to change information already saved, they can retrieve that information from database by using edit command. Moreover, system users can delete data from database by using delete command too.

The proposed system application of pharmaceutical product inventory system has been designed upon user requirements. The application consists of every mainly function of the system. Furthermore, the system application has been designed upon the concept of user friendly interface and working. Most screens have the button of List of Value (LOV), which makes the system easy to use and to search for more information.

All information input from screen will be stored in to database immediately. Some information may be retrieved in to the other screens for reference, and some information will be retrieved to generate reports for system. All input screen designs of the system are shown in Appendix A. All modules in program can describe by structure chart in Appendix F.

### 3.2.2 Report Design

All reports are designed according to the user requirements and management requirement. Operation reports help users to recheck their input information into system. Summary reports are generated in order to support management level for decision making and forecasting investment in the next year. The system application can generate complicated reports within a minute of time. The speed of generating a report depends on the volume of information and performance of machine. The reports of pharmaceutical product inventory system are illustrated in Appendix B.

### 3.2.3 Database Design

Pharmaceutical product inventory system has 5 subsystems to take care. For effective information storing, the system needs database server to accumulate all information to be in single database and share data between sub systems.

The database is designed for relational database, which stores data in a tabular form. Each file is implemented as table. Each column in table is called field. Each row in table is called record. Large amount of data can be kept separately as many tables and all of them can be joined together by Primary Key, Foreign Key property. RDBMS which is used to manage data is Microsoft SQL Server. Furthermore, database is designed to eliminate redundancy of the system information. Database normalization will be used to support database design in this project.

After normalization database, the system consists of 12 suitable tables. The database design is illustrated in Appendix C. All tables in the system consist of name as follows:

(1) Customer table

Customer table is the master file. It stores important information of every system customer. Details of customer table are shown in Table C.1.

(2) Product Table

Product table is also master file. Product table stores information of every product in the stock. Details of the product table are shown in Table C.2.

(3) Supplier Table

Supplier table is the master file like customer table. Supplier table stores information of every system supplier. Details of supplier table are shown in Table C.3.

(4) Order Table

Order table stores data of purchase order such as order number, supplier code, order date and etc. All details of order table are shown in Table C.4.

(5) Ordered Product Table

Ordered product table stores information of the product, which is ordered in each purchase order number. One purchase order number has one or more products. All details of order product table are shown in Table C.5.

(6) Receiving Table

Receiving table stores information of product received from supplier.

Receiving always refers to purchase order. One purchase order can receive more than once. All details of receiving table are shown in Table C.6.

(7) Received Product Table

Received product table stores information of products, which are received in each receiving number. So, Received product table always refers to receiving number of receiving table. One receiving number has one or more products. All details of received product table are shown in Table C.7.

(8) Cancellation Table

Cancellation table stores information of purchase order cancellation. The system can cancel all products in the purchase order or cancel some products in the purchase order. All details of sales product table are shown in Table C.8.

(9) Sales Table

Sales table stores information of each invoice to customer and details of sales information. All details of sales table are shown in Table C.9.

(10) Sales Product Table

Sales product table stores information of products, which are sold in each invoice number. Every product information always refers to invoice number in sales table. One invoice number can have one or more product. All details of sales product table are shown in Table C.10.

(11) Credit Note Table

Credit note table stores information of credit note to customer after sales. The credit note always refers to invoice. Credit note table concerns

information of total reduced product amount to the system. All details of credit note table are shown in Table C.11.

#### (12) Credit Note Detail Table

Credit note table stores information of products, which are reduced in price or return product quantity back to the system. Every credit note detail record refers to credit note number from credit note table C.12.

#### 3.2.4 Network Design

All departments can connect together via Local Area Network (LAN), that is, all clients computers are connected to server through cable over short distance. The topology of network is star network topology, which has hub as the line distributor from server to every client. The speed between server to hub is 10/100 mbps, and speed between hub to client is 10/100 mbps.

The suitable network architecture is two-tiered client/server for applying to business system. This architecture stores data at the server side, and stores the business logic and user interface at the client side. Since all data is stored at server side, the other department of company can access and share information in the same database server across the LAN.

The proposed network design is illustrated in Figure 3.15.



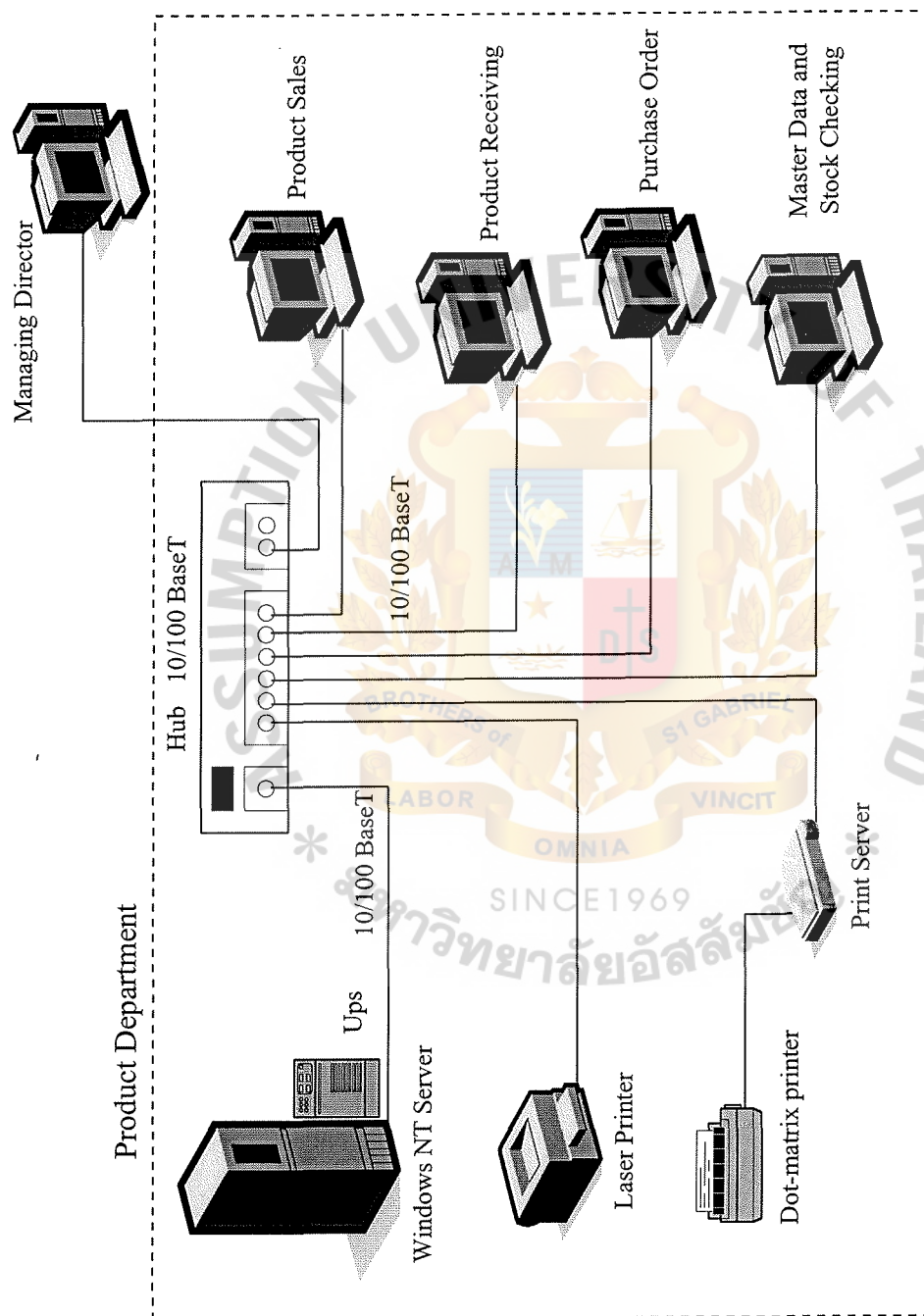


Figure 3.15. Network Architecture for Pharmaceutical Product Inventory System.

### 3.3 Hardware and Software Requirement

The proposed system consists of suitable hardware specification respect to size of company, size of business information and return on investment time. The system can categorize group of hardware and software requirement as follows:

Table 3.1. The Hardware Specification for the Server Computer.

| Hardware        | Specification  |
|-----------------|--|
| Processor       | Pentium III 733MHz, FSB 133MHz<br>(Dual processors capability) |
| Cache           | 256KB L2 ECC per processors                                    |
| Memory          | 128MB 133 MHz ECC SDRAM  |
| Hard Disk @3    | 18.2GB Non-Hot Plug up to 109.2GB                              |
| SCSI Controller | Dual Channel Wide Ultra2 SCSI                                  |
| Graphic         | 4MB Video Memory, 64-bit PCI                                   |
| CD-ROM Drive    | 32X  |
| LAN Card        | Fast Ethernet NIC 10/100                                       |
| Monitor         | 15 ''(S510)  |

Table 3.2. The Software Specification for the Server Computer.

| Software         | Specification                 |
|------------------|-------------------------------|
| Operating System | Microsoft Windows 2000 Server |
| RDBMS            | Microsoft SQL Server 6.5      |

Table 3.3. Hardware Specification for the Client Computer.

| Hardware     | Specification          |
|--------------|------------------------|
| CPU          | Celeron 600 Mhz        |
| Cache        | 128KB                  |
| Memory       | 64 MB SDRAM            |
| Hard Disk    | 10 GB IDE              |
| CD-ROM Drive | 52X                    |
| Floppy Drive | 1.44 MB                |
| LAN          | 10/100 on Board        |
| Monitor      | Acer V551 Monitor 15'' |

Table 3.4. The Software Specification for the Client Computer.

| Software             | Specification          |
|----------------------|------------------------|
| Operating System     | Microsoft Windows 98   |
| Application Program  | Inventory Program      |
| Programming Software | Microsoft Visual Basic |

Table 3.5. Other Hardware.

| Hardware          | Specification                                       |
|-------------------|---|
| HUB               | 3Com SuperStack II Baseline Dual Speed Hub 12 ports |
| UPS               | SMART 1000  |
| Printer           | HP LaserJet 2100TN                                  |
| DotMatrix Printer | DOTMATRIC KX-P1131                                  |
| Print Servers     | HP JetDirect 170X                                   |

### 3.4 Security and Control

Data is the important asset in an organization. If we lose data, we have to key in all of them again. So security and control is one very important thing that we must be concerned with. The pharmaceutical product inventory system concerns security and control of application software and database. Data of system is protected for availability, integrity and confidentiality.

#### Security

- (1) Data back up and recovery for data availability

With mirrored technique, (RAID 1), all data and transactions in the database will be written in parallel in both two sets of hard disks. The data on the primary set of hard disk will be used on the system, while the users run application program. Once the primary set of hard disk fails, the data in the secondary set of hard disk will automatically be used in the application program.

(2) Back up application software

The application software should be more than one file. One file for actual running in the system, the other back up files should be kept in another machine.

(3) Security of system application

System administrator will manage all users id and password and level of authorization. The system prevents unauthorized people to access system information by using user id and password. All users have their own user id and password for confidentiality in the system. Only the authorized users can access the system application. Each user id and password has difference level of authorization. Users have to key in both user id and password before using the application.

(4) Security of database server

Operating system of database server is Windows NT, which is very reliable for the system. The system requires to input both log in name and password every time before logging in to the system. Furthermore, SQL server RDBMS needs to enter password every time before direct accessing to database.

## Control

With input control for data integrity, system application will emphasize on input control for data integrity. Data stored in database should be correct. System application consists of many functions that can check and validate input data before saving in to database. So all input data will be guaranteed data integrity by validate function.

Furthermore, important data can be updated after being stored into database. System application provides function to update information, if users would like to

correct information or change information via application software. The system tries to prevent updating database manually through interactive mode from RDBMS. Only system administrator can update database through interactive mode from RDBMS.

### 3.5 Cost/Benefit Analysis

The cost of manual system and cost of computerized system for five years are compared as in Tables 3.6-3.10. After we receive the total cost of manual system and proposed system or computerized system, we will crate the comparison graph and show the break even point as Figure 3.16.

Table 3.6. Manual System Cost Analysis, Baht.

| Cost items  | Years     |           |           |           |           |
|---|-----------|-----------|-----------|-----------|-----------|
|   | 1         | 2         | 3         | 4         | 5         |
| <u>Fixed Cost:</u>                                |           |           |           |           |           |
| Stand Alone Machine (32,500)                      | 6,500     | 6,500     | 6,500     | 6,500     | 6,500     |
| DotMatrix Printer (8,100)                         | 1,620     | 1,620     | 1,620     | 1,620     | 1,620     |
| Total Fixed Cost                                  | 8,120     | 8,120     | 8,120     | 8,120     | 8,120     |
| <u>Operating Cost</u>                             |           |           |           |           |           |
| <u>Salary Cost:</u>                               |           |           |           |           |           |
| Product Manager 1 person @ 20,000                 | 240,000   | 264,000   | 290,400   | 319,440   | 351,384   |
| Product Staff 5 persons @ 12,000                  | 720,000   | 792,000   | 871,200   | 958,320   | 1,054,152 |
| Overtime  | 138,000   | 158,700   | 182,505   | 209,880   | 241,362   |
| Bonus   | 80,000    | 92,000    | 105,800   | 121,670   | 139,920   |
| Total Annual Salary Cost                          | 1,178,000 | 1,306,700 | 1,449,905 | 1,609,310 | 1,786,818 |
| <u>Office Supplies &amp; Miscellaneous Cost:</u>  |           |           |           |           |           |
| Stationary Per Annual                             | 7,000     | 7,700     | 8,470     | 9,317     | 10,248    |
| Paper Per Annual                                  | 8,000     | 8,800     | 9,680     | 10,648    | 11,712    |
| Preprint Form Per Annual                          | 10,000    | 11,000    | 12,100    | 13,310    | 14,641    |
| Ribbon Per Annual                                 | 1,000     | 1,200     | 1,400     | 1,600     | 1,800     |
| Utility Per Annual                                | 30,000    | 32,000    | 34,000    | 36,000    | 38,000    |
| Miscellaneous Per Annual                          | 20,000    | 25,000    | 30,000    | 35,000    | 40,000    |
| Total Annual Office Supplies & Miscellaneous Cost | 76,000    | 85,700    | 95,650    | 105,875   | 116,401   |
| Total Manual System Cost                          | 1,262,120 | 1,400,520 | 1,553,675 | 1,723,305 | 1,911,339 |



Table 3.7. Five Years Accumulated Manual System Cost, Baht.

| Year  | Total Manual Cost | Accumulated Cost |
|-------|-------------------|------------------|
| 1     | 1,262,120.00      | 1,262,120.00     |
| 2     | 1,400,520.00      | 2,662,640.00     |
| 3     | 1,553,675.00      | 4,216,315.00     |
| 4     | 1,723,305.00      | 5,939,620.00     |
| 5     | 1,911,339.00      | 7,850,959.00     |
| Total | 7,850,959.00      | -                |



Table 3.8. Computerized System Cost Analysis, Baht.

| Cost items                                  | Years     |           |           |           |           |
|---|-----------|-----------|-----------|-----------|-----------|
|   | 1         | 2         | 3         | 4         | 5         |
| <b>Fixed Cost</b>                           |           |           |           |           |           |
| Hardware Cost:                              |           |           |           |           |           |
| Computer Server Cost                        | 28,100    | 28,100    | 28,100    | 28,100    | 28,100    |
| Workstation Cost 5 sets @ 32,500            | 32,500    | 32,500    | 32,500    | 32,500    | 32,500    |
| Laser Printer                               | 7,100     | 7,100     | 7,100     | 7,100     | 7,100     |
| UPS   | 4,000     | 4,000     | 4,000     | 4,000     | 4,000     |
| Total Hardware Cost                         | 71,700    | 71,700    | 71,700    | 71,700    | 71,700    |
| Software Cost:                              |           |           |           |           |           |
| Windows Server 2000                         | 6,800     | 6,800     | 6,800     | 6,800     | 6,800     |
| Windows 98                                  | 3,500     | 3,500     | 3,500     | 3,500     | 3,500     |
| Microsoft Office 97 3 set @ 22,000          | 13,200    | 13,200    | 13,200    | 13,200    | 13,200    |
| MS SQL Server 6.5 (RDBMS)                   | 12,000    | 12,000    | 12,000    | 12,000    | 12,000    |
| Total Software Cost:                        | 35,500    | 35,500    | 35,500    | 35,500    | 35,500    |
| Network Cost:                               |           |           |           |           |           |
| Hub   | 2,700     | 2,700     | 2,700     | 2,700     | 2,700     |
| Print Server                                | 1,400     | 1,400     | 1,400     | 1,400     | 1,400     |
| Total Network Cost                          | 4,100     | 4,100     | 4,100     | 4,100     | 4,100     |
| Maintenance Cost:                           | -         | 20,000    | 20,000    | 20,000    | 20,000    |
| Implementation Cost:                        |           |           |           |           |           |
| Basic Training Cost:                        | 50,000    | -         | -         | -         | -         |
| Application Software Development Cost       | 400,000   | -         | -         | -         | -         |
| Wiring Cost                                 | 35,000    | -         | -         | -         | -         |
| Total Implementation Cost                   | 485,000   | -         | -         | -         | -         |
| Total Fixed Cost                            | 596,300   | 131,300   | 131,300   | 131,300   | 131,300   |
| <b>Operating Cost</b>                       |           |           |           |           |           |
| People-Ware Cost:                           |           |           |           |           |           |
| Product Manager 1 person @ 20,000           | 240,000   | 264,000   | 290,400   | 319,440   | 351,384   |
| Product Staff 4 persons @ 12,000            | 576,000   | 633,600   | 696,960   | 766,656   | 843,321   |
| Bonus                                       | 68,000    | 74,800    | 82,280    | 90,508    | 99,558    |
| Total Annual Salary Cost                    | 884,000   | 972,400   | 1,069,640 | 1,176,604 | 1,294,263 |
| Office Supplies & Miscellaneous Cost:       |           |           |           |           |           |
| Stationary Per Annual                       | 6,500     | 6,500     | 6,600     | 6,600     | 6,600     |
| Paper Per Annual                            | 6,000     | 6,000     | 6,100     | 6,100     | 6,100     |
| Printer Toners Per Annual                   | 10,000    | 10,000    | 10,000    | 10,000    | 10,000    |
| Ribbon Per Annual                           | 1,000     | 1,050     | 1,100     | 1,150     | 1,200     |
| Preprint Form Per Annual                    | 15,000    | 15,000    | 15,000    | 15,000    | 15,000    |
| Utility Per Annual                          | 40,000    | 40,000    | 40,000    | 40,000    | 40,000    |
| Miscellaneous Per Annual                    | 40,000    | 40,000    | 40,200    | 40,200    | 40,200    |
| Annual Office Supplies & Miscellaneous Cost | 118,500   | 118,550   | 119,000   | 119,050   | 119,100   |
| Total Operating Cost                        | 1,002,500 | 1,090,950 | 1,188,640 | 1,295,654 | 1,413,363 |
| Total Computerized System Cost              | 1,598,800 | 1,222,250 | 1,319,940 | 1,426,954 | 1,544,663 |

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

| Year  | Total Computerized Cost | Accumulated Cost |
|-------|-------------------------|------------------|
| 1     | 1,598,800.00            | 1,598,800.00     |
| 2     | 1,222,250.00            | 2,821,050.00     |
| 3     | 1,319,940.00            | 4,140,990.00     |
| 4     | 1,426,954.00            | 5,567,944.00     |
| 5     | 1,544,663.00            | 7,112,607.00     |
| Total | 7,112,607.00            | -                |

Table 3.10. The Comparison of the System Cost, Baht.

| Year | Accumulated Manual Cost | Accumulated Computerized Cost |
|------|-------------------------|-------------------------------|
| 1    | 1,262,120.00            | 1,598,800.00                  |
| 2    | 2,662,640.00            | 2,821,050.00                  |
| 3    | 4,216,315.00            | 4,140,990.00                  |
| 4    | 5,939,620.00            | 5,567,944.00                  |
| 5    | 7,850,959.00            | 7,112,607.00                  |

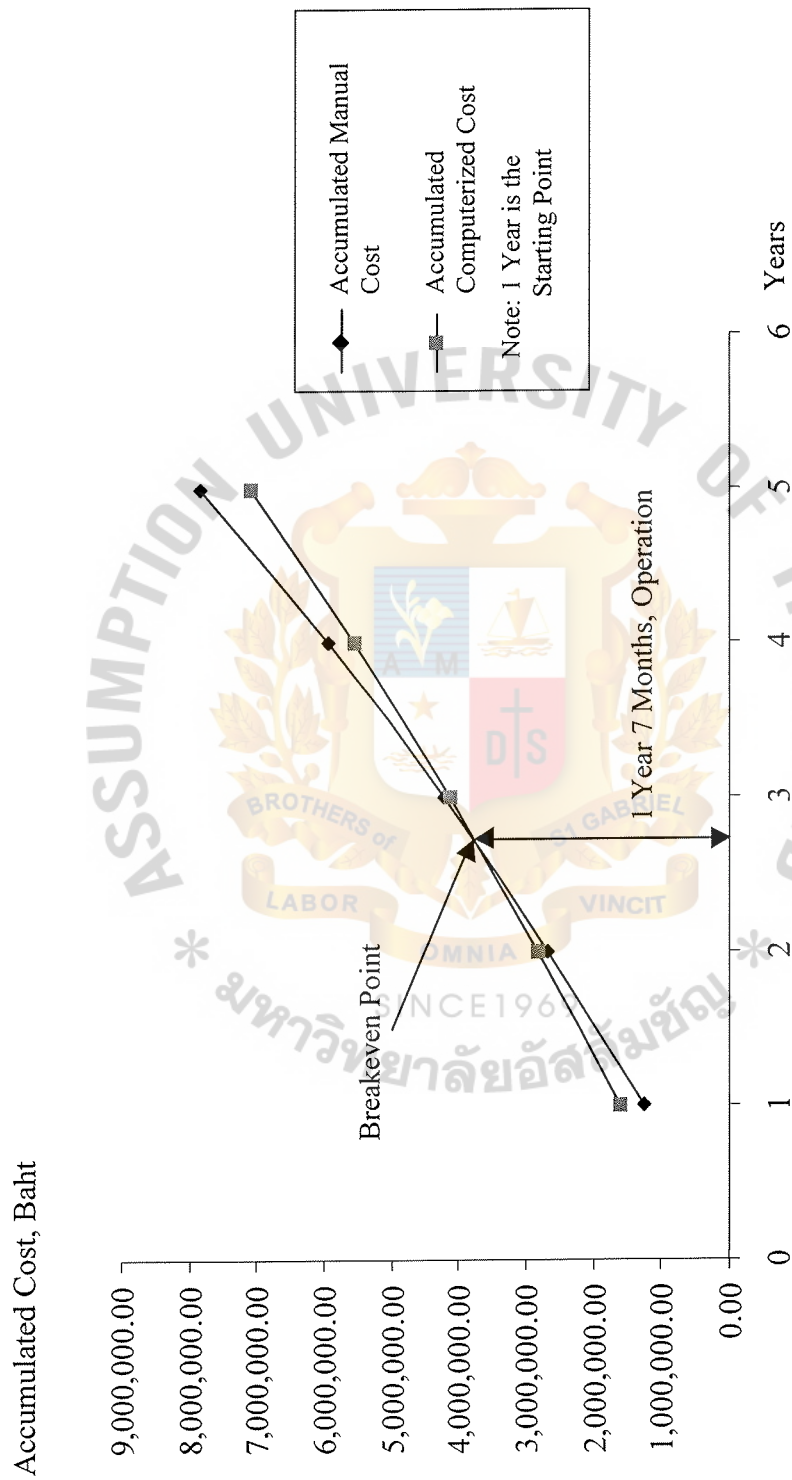


Figure 3.16. Cost Comparison between Manual and Proposed System.

### 3.5.1 Breakeven Analysis

Breakeven analysis is the cost comparison between the existing system and the proposed system to determine the point that costs of both systems become equal, or the point of intersection.

From Table 3.7 and Table 3.9, we found that only at in the first year, the cost of computerized system is higher than the cost of manual system. For the next four years, the cost of computerized is lower than the manual system cost. We compare the accumulated costs for five years of both the manual and computerized systems by using line graph as shown in Figure 3.1. From the above graph, the cost of computerized system intersects the cost of the existing system at 1 year and 7 months called breakeven point. At this point of intersection, the computerized system begins to generate a positive monetary return in comparison with the existing system. That is, the computerized system can recover the investment within 1 year and 7 months, operation.

### 3.5.2 Benefit Analysis

The proposed system provides both tangible and intangible benefits as follows:

#### Tangible benefits

The Tangible benefits are the result from effective new proposed system. They can reduce salary expense, overtime expense, bonus and paper cost. Furthermore, they increase efficiency of processing.

Annual Benefits are estimated as follows: (Baht/Year)

|     |  |                |
|-----|--|----------------|
| (1) | Reduction of salary payment            | 144,000 baht   |
| (2) | Reduction of overtime                  | 138,000 baht   |
| (3) | Reduction of bonus                     | 12,000 baht    |
| (4) | Reduction of paper cost                | 4,000 baht     |
| (5) | Increasing of efficiency in processing | 880,000 baht   |
|     | Total benefits                         | 1,178,000 baht |



Intangible Benefits are:

- (1) Improve efficiency and effectiveness of work operation
- (2) Provide availability, integrity, confidentiality and reliability data
- (3) Increase performance of searching by providing faster access to information
- (4) Provide accurate data and high performance in generating management report
- (5) Provide better managerial control for inventory system
- (6) Reduce human error
- (7) Increase customer satisfaction

### 3.5.3 Payback Analysis

Table 3.11. Payback Analysis of the Proposed System, Baht.

| Cost items  | Year 0   | Year 1     | Year 2     | Year 3     | Year 4     | Year 5     |
|---|----------|------------|------------|------------|------------|------------|
| Development cost:                                   | -596,300 |            |            |            |            |            |
| Operation and maintenance cost:                     |          | -1,002,500 | -1,090,950 | -1,188,640 | -1,295,654 | -1,413,363 |
| Discount factors for 12%                            | 1        | 0.893      | 0.797      | 0.712      | 0.636      | 0.567      |
| Time-adjusted costs (adjust to present value):      | -596,300 | -895,233   | -869,487   | -846,312   | -824,036   | -801,377   |
| Cumulative time-adjusted cost Over lifetime:        | -596,300 | -1,491,533 | -2,361,020 | -3,207,332 | -4,031,368 | -4,832,745 |
| Benefit derived from operation of new system:       | 0        | 1,178,000  | 1,295,800  | 1,425,380  | 1,567,918  | 1,724,710  |
| Discount factor for 12%:                            | 1.000    | 0.893      | 0.797      | 0.712      | 0.636      | 0.567      |
| Time-adjusted benefits (adjusted to present value): | 0        | 1,051,954  | 1,032,753  | 1,014,871  | 997,196    | 977,911    |
| Cumulative time-adjusted benefits over lifetime:    | 0        | 1,051,954  | 2,084,707  | 3,099,578  | 4,096,774  | 5,074,685  |
| Cumulative lifetime time-adjusted costs+benefits    | -596,300 | -439,579   | -276,313   | -107,754   | 65,406     | 241,940    |

Data from the table will be transform to be graph as Figure 3.17.

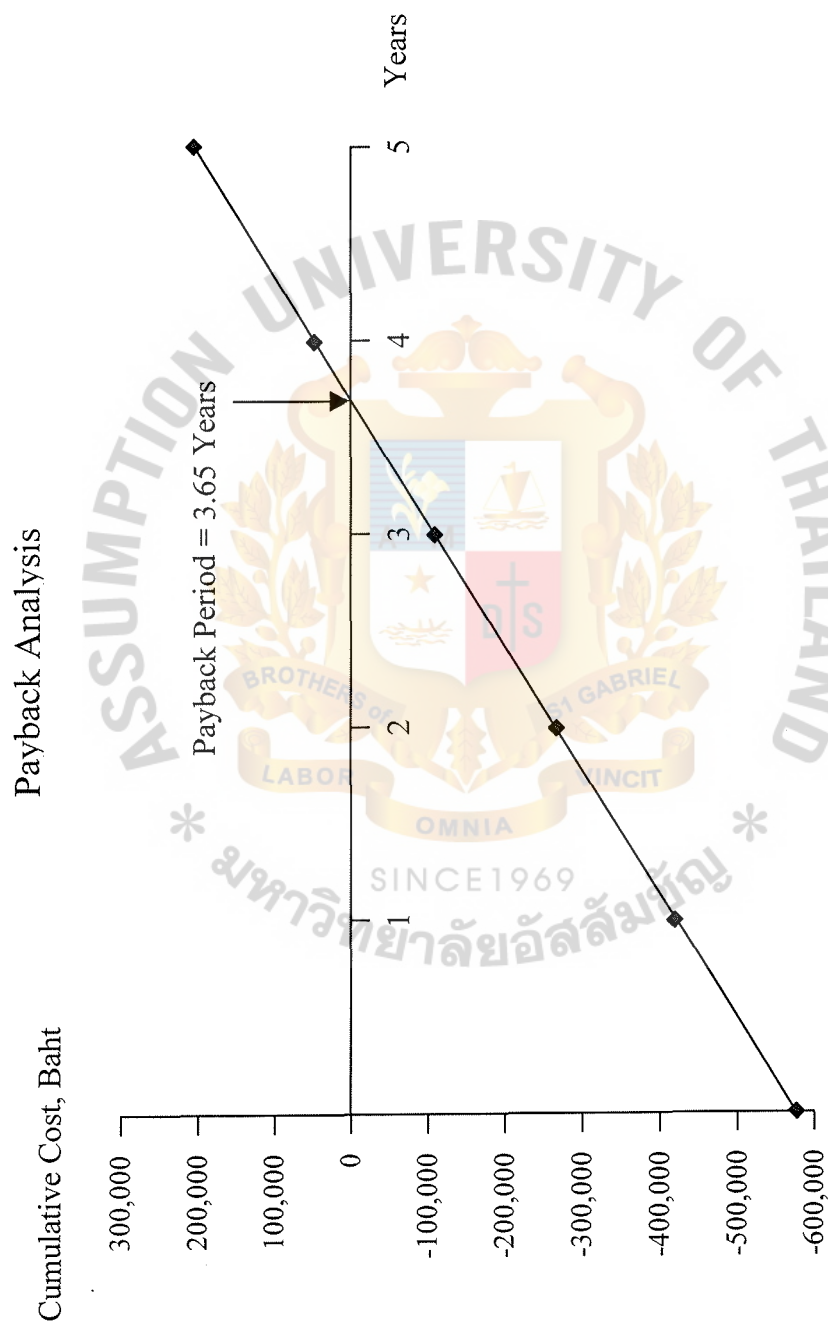


Figure 3.17. Payback Analysis for Proposed System.

Payback Analysis is a method for determining if and when an investment will pay for itself. Because systems development costs are incurred long before benefits begin to accrue, it will take some time period for benefits to overtake the costs. After implementation of purposed computerized system, the system will incur expenses that must be recovered. Payback analysis determines how much time will lapse before accrued benefits overtake accrued and continuing costs. This period of time is called the payback period. We can calculate the payback period by formula as follows:

$$P = \frac{I}{(1-T)R}$$

Where

P = Payback period

I = Development Cost

R = Annual saving realized by investment

T = Tax rate in percentage

Payback Period =  $\frac{596,300}{(1-0.07)(1,178,000-1,002,500)}$

= 3.65 Years

The payback period of proposed system is 3.65 years.

## **IV. PROJECT IMPLEMENTATION**

### **4.1 Overview of Project Implementation**

System implementation is a step of construction of the proposed system. After system design has been finished, system developer will implement the system according to system design. The process of implementation consists of the follows:

### **4.2 Write and Test Application Programs**

#### **(1) Program coding**

Programmers will code program followed by screen design and process specification that is generated during system design. For coding, the programmer will validate every critical input data, before saving into database.

After finishing coding, each program will be tested by programmer again called unit testing. Unit testing will test the correctness of program processing to guarantee that the function will work correctly. After unit test, the system testing will be performed to make sure that every program can work together correctly. Data for testing will be created before testing. Furthermore, programmer will test performance of program after processing. If the software have low performance, programmer and development team will find the solution to the problem.

#### **(2) Report Generating**

Report can be generated parallel with input screen coding. Programmer can simulate data for generating report while another group of programmer can create the input data screen

After generating the report, the report will be tested by programmer again as program testing. The programmer will prepare the test data before testing. The error of program will be corrected and tested until the software is without error or bug.

#### **4.3 Network Implementation**

For system implementation, the first activity is building and testing network because the other activities have to build and test via network environment.

The existing system has only one stand-alone computer machine, so the proposed system needs to install a new network. The proposed network is LAN network, which consists of one server, five client machines and two printers.

The network is implemented upon network design requirement during system design and then the network will be tested for availability and security. The time spent for network implementation is 1 or 2 days. The network of company is as in Figure 3.16.

#### **4.4 Software Installation**

##### **(1) Operating software installation**

For system server computer, the operating system is windows server 2000. The operating system of every client is windows 98.

##### **(2) RDBMS software installation**

Microsoft SQL Server is relational database management system, which is installed only on server machine before building physical database.

##### **(3) Application software installation**

After we install operating system and RDBMS already, the next step we install the application software.



#### **4.5 Build and Test Database**

After completed network and system software implementations, the next activity is build and test database. The physical database will be created at server machine. The database will be built on the structure of database design requirements during system design.

After building database structure, which consists of tables, fields in each table, type of each field and length of each field, the next step is testing sample data with database to adding, modifying, deleting and retrieving data. Furthermore, database performance, database security, backup and recovery will be tested in this activities.

#### **4.6 Conversion and Training**

After software application finished, the data of existing system will be transferred to a new database. For the conversion, the technique used is parallel conversion, that is both old and new system will run together for some period of time until new system solve all problems and programs out of error. Then the old system will be discarded from working and only the new system will be used.

For user training, system analyst will train user to work with new system application software. User training of this system took only 2 days in order to train and practice all functions of the system software. After training, system user can use new system and ask development team about the software using again. User manual is another important document after training because user manual is the document, that describes how to use all screens in the system.

## V. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

The study of this pharmaceutical product inventory system can improve the efficiency work process and reduce expense of the existing system. The computerized system facilitates working process for system user, and supports forecasting and decision making to management level. Furthermore, the proposed system concerns security and integrity of the system data.

With the computerized system, product staff performs all routine work easily. They are able to record purchase order, product receiving, product sale or product credit details, and print out the document form to supplier or customer easily and quickly. The application can calculate the number in the system automatically such as total amount and balance quantity. For system report, the computerized system can show history and summary report within the short time, so the problem from taking more time to generate report can be eliminated. With the computerized system, the system provides a lot of tangible and intangible benefits to the company and system users.

The advantages of proposed system are:

- (1) Increase the efficiency of the system processing
- (2) Reduce time consumed to search system data and generate report
- (3) Improve accurate for saving data into system and calculate product amount
- (4) Reduce paper in the existing system
- (5) Reduce number of product staff and expense for product staff salary
- (6) Increase security and control of system information
- (7) Support management level

## Degree of Achievements

Table 5.1 shows the time comparison of performance between the existing and proposed system.

Table 5.1. The Degree of Achievement of the Proposed System.

| Process  | Existing System | Proposed System |
|--|-----------------|-----------------|
| Checking product quantity availability process | 10 mins.        | 1 min.          |
| Print purchase order                           | 15 mins.        | 2 mins.         |
| Print invoice/receipt to customer              | 15 mins.        | 2 mins.         |
| Print credit Note                              | 15 mins.        | 2 mins.         |
| Generate management report                     | 8 hrs.          | 5 mins.         |
| Searching information                          | 10 mins.        | 2 mins.         |
| Update stock                                   | 10 mins.        | 2 mins.         |
| Total  | 9 hrs. 15 mins. | 16 mins.        |

From the information in Table 5.1, the process which takes time most between two systems is management report generating process. All processes of proposed system take less time than the existing system because of following reasons:

(1) Checking product quantity availability process

The existing system check balanced quantity from stock card and computer spread sheet file, but proposed system can search from database.

(2) Print purchase order

The existing system, staff has to key in all detail in to the purchase order by using Microsoft word. The computerized system retrieves all information from database to generate purchase order for supplier.

(3) Print invoice/receipt to customer

The existing system, staff has to key in all detail in to the invoice/receipt by using Microsoft word. The computerized system retrieves all information from database to generate invoice/receipt.

(4) Print credit note

The existing system, the product staff has to key in all details in to the credit note form using Microsoft word. The computerized system retrieves all information from database to generate credit note.

(5) Generate management report

Reports of existing system are created from many documents, but the computerized reports are generated from information in database.

(6) Searching information

Most information of the existing system is recorded in the documents, so the product staff have to search from documents. For computerized, user can search information by inquiry screen.

(7) Update stock

The existing system updates balance quantity into stock card and spreadsheet file in computer. The proposed system after receiving and sales process, the balanced quantity in computer will be updated automatically.

## 5.2 Recommendations

With the computerized system, it provides a lot of benefits for organization and product staffs. From pharmaceutical product inventory system, the next computer information system that the organization should concern are accounting information system and marketing information system. Accounting and marketing information system can share data with pharmaceutical product inventory system in order to reduce task of departments and utilize the information system.

The future trend of pharmaceutical product inventory system concerns to intranet system in the company and web application. The company should have its own web site to promote the company and service local customer and supplier. The supplier can contact with the company through internet. All new and current customers can make order to company through company web site. After company receives order from customer, the company can contact back to customer. The advantages of this future trend will increase the new customer and sales amount for system.





## APPENDIX A

### INTERFACE DESIGN

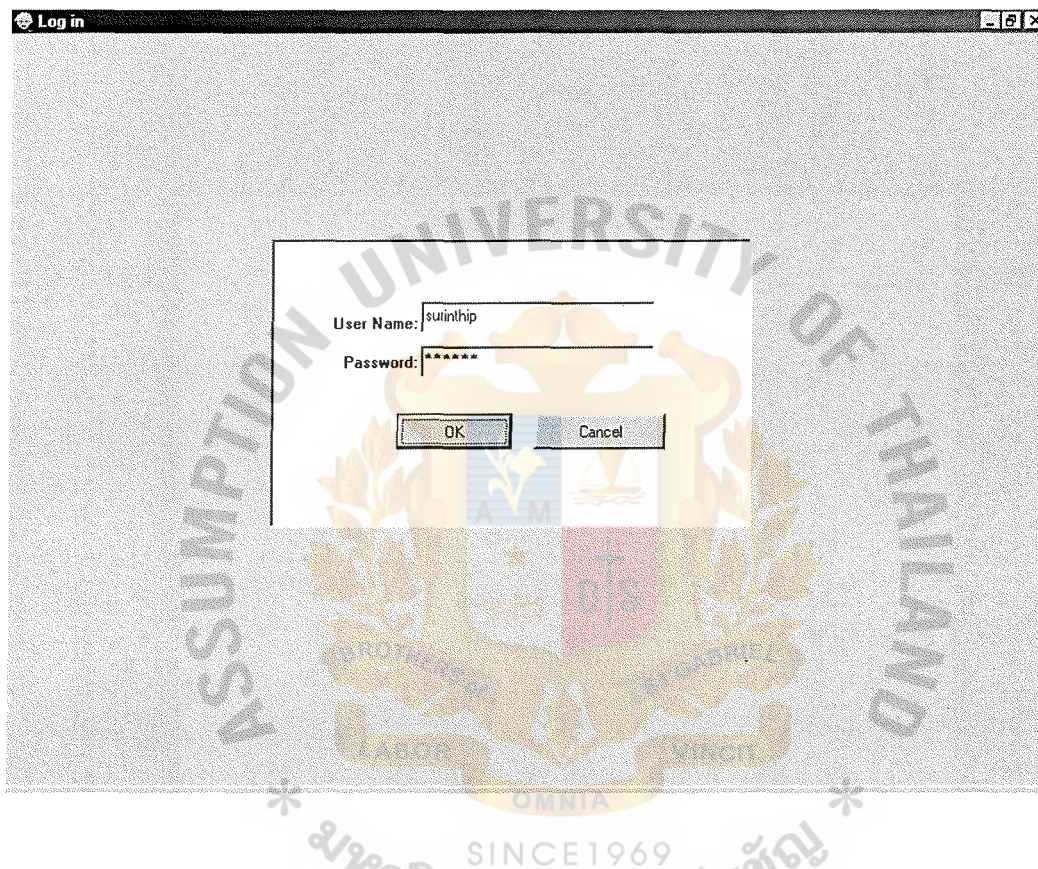


Figure A.1. System Log in Screen.

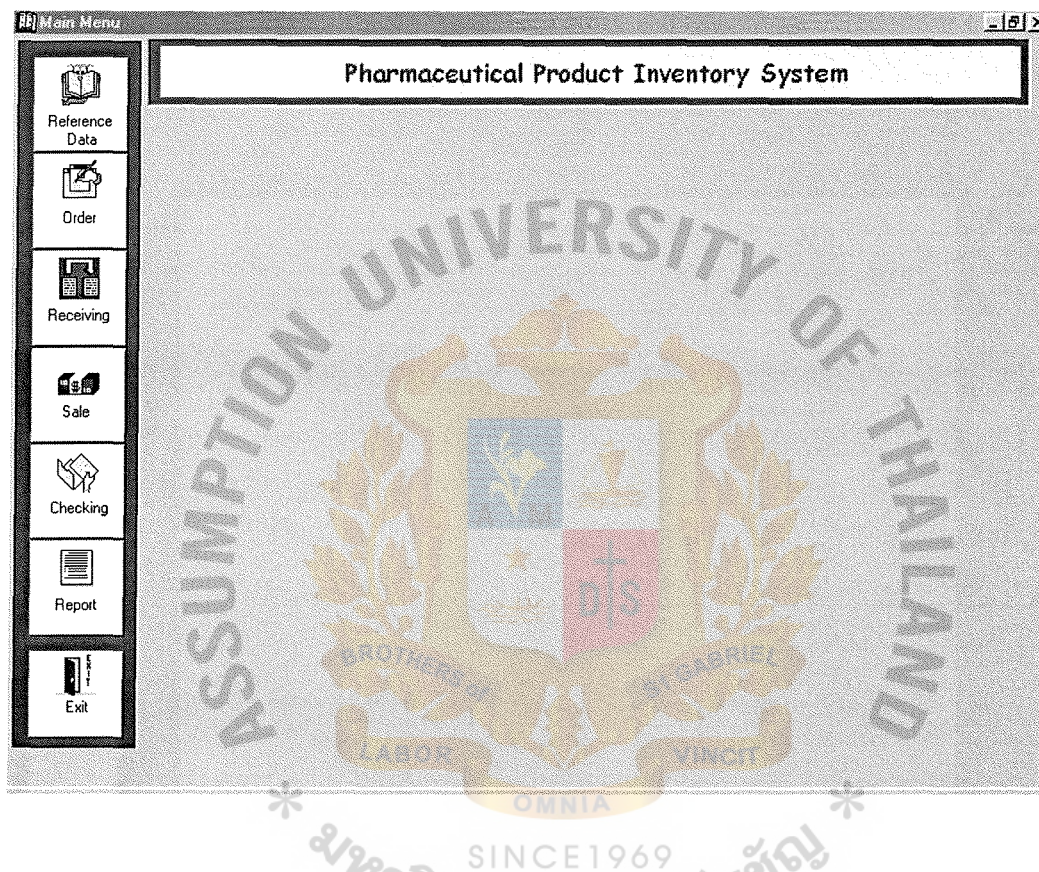


Figure A.2. Main Menu of System Application.



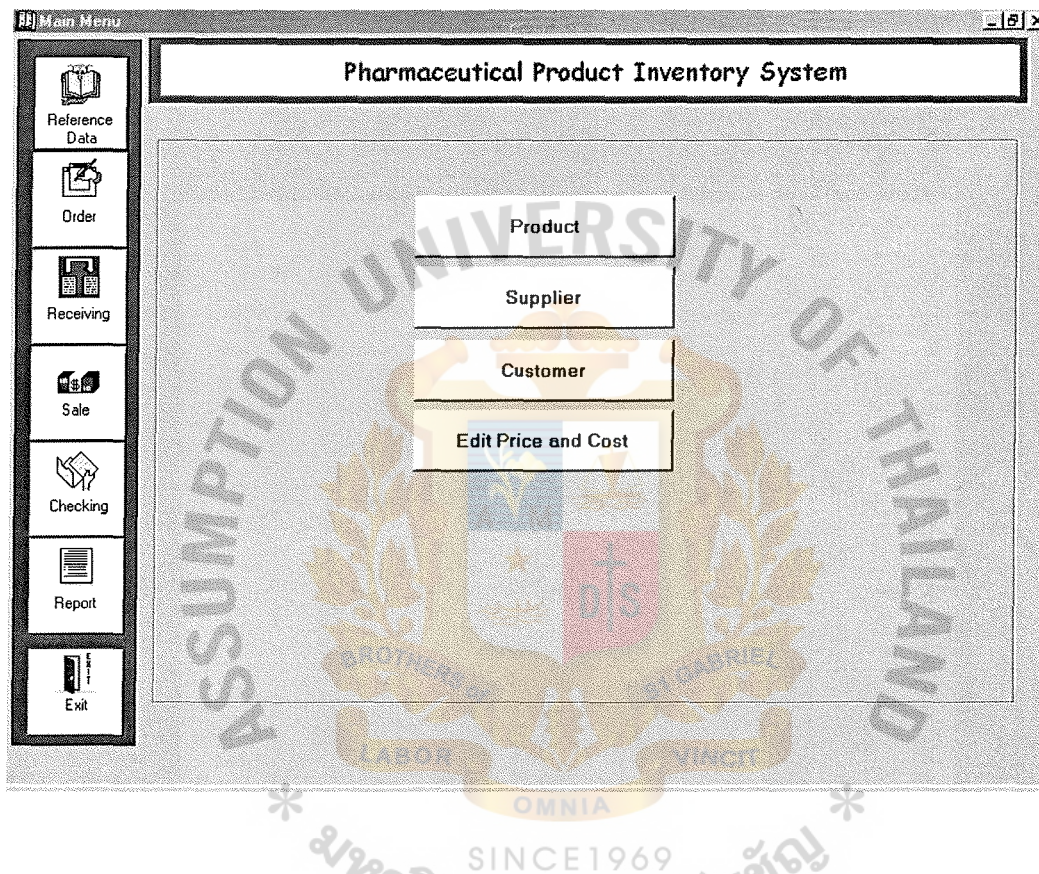


Figure A.3. Main Menu of Master Data.

**Product**

Add Update Delete Search Clear Save Cancel Preview Print Exit

Product Code: A0001 Date: 01/02/2001  
 Product Name Thai: อะนาลจิน แด็บ 9  
 Product Name Eng: ANALGIN DAB 9  
 Balance Quantity: 50 Reorder Point: 5  
 Unit Name: KG Last Movement Date: 05/02/2001  
 Location: CH001

| Product Code | Product Name                        | Product Name Eng                   | Unit |
|--------------|-------------------------------------|------------------------------------|------|
| A0001        | อะนาลจิน แด็บ 9                     | ANALGIN DAB 9                      | KG   |
| C0007        | คลอเบตาโซล โพลีโพรเพนิก ไมโครไนท์   | CLOBETASOL PROPIONATE MICRONIZED   | GM   |
| A0003        | อะเบนดาโซล                          | ALBENDAZOLE                        | KG   |
| A0004        | อะม็อกซิซิลลิน ไตรไฮเดรต คอมแพคเค็ต | AMOXICILLIN TRIHYDRATE COMP        | KG   |
| B0001        | เบต้าเมทาโซน 17 วาเลเรต ไมโครไนท์   | BETAMETHASONE 17-VALERATE          | GM   |
| B0002        | เบต้าเมทาโซน ไดโพรปิโอเนต ไมโครไนท์ | BETAMETHASONE DIPROPIONATE MICRONI | GM   |
| C0001        | ซิโปรฟลอกซาซิน ไฮโดรคลอไรด์         | CIPROFLOXACIN HYDROCHLORIDE        | KG   |
| C0002        | คลอแพรฟานนิคอลล โซเดียม ซัลซิเนส    | CIPROFLOXACIN HYDROCHLORIDE        | KG   |
| D0001        | เด็กซ์าเมทาโซน ไมโครไนท์            | DEXAMETHASONE MICRO                | GM   |

Figure A.4. Product Screen.



**Supplier**

Add Update Delete Search Clear Save Cancel Preview Print Exit

Supplier Code: AD001

Company: ADE CHEMICALS INTERNATIONAL CO., LTD Date: 15/09/2000

Supplier Name: Ken Supplier Surname: Smith

Address: 115/45 SOI LADPRAW128, LADPRAW RD. BANGKAPI

Province: BANGKOK Country: THAILAND

Zip Code: 10240 Fax Number: 02-3760805

Tel. Number: 02-3760806-9

| Supplier Code | Company                               | Country     |
|---------------|---------------------------------------|-------------|
| AD001         | ADE CHEMICALS INTERNATIONAL CO., LTD. | THAILAND    |
| ES001         | ESSENCE CHEMICALS CO., LTD            | SWITZERLAND |

Figure A.5. Supplier Screen.

**Customer**

Add Edit Delete Search Clear Save Cancel Preview Print Exit

Customer Code: B0001  
 Company: Best Pharmaceutical Ltd., Part  
 Date: 01/01/2001  
 Customer Name: Anun  
 Customer Surname: Meechok  
 Address: 110 Soi Saree 3 Ramkamhang 24 Road, Huamark, Bangkapi  
 Province: Bangkok  
 Zip Code: 10240  
 Fax Number: 7191000  
 Tel. Number: 7191001-5

| Customer Code | Company                        | Customer Surname | Customer Surname |
|---------------|--------------------------------|------------------|------------------|
| B0001         | Best Pharmaceutical Ltd., Part | Anun             | Meechok          |
| W0001         | White Chemical Co., Ltd        |                  |                  |

Figure A.6. Customer Screen.



**Product Cost**

Add Update Delete Search Clear Save Cancel Preview Print Exit

Product Code: A0001 Date: 20/01/2001  
 Product Name: ANALGIN DAB 9  
 Old Cost: 60 New Cost: 70  
 Old Price: 80 New Price: 90

| Product Code | Product Name                          | Unit Cost | Unit Price |
|--------------|---------------------------------------|-----------|------------|
| A0001        | ANALGIN DAB 9                         | 60        | 80         |
| A0002        | AMITRIPTYLINE HCL                     | 1000      | 1200       |
| A0003        | ALBENDAZOLE                           | 800       | 900        |
| A0004        | AMOXYCILLIN TRIHYDRATE COMP           | 200       | 300        |
| B0001        | BETAMETHASONE 17-VALERATE             | 60        | 70         |
| B0002        | BETAMETHASONE DIPROPIONATE MICRONIZED | 100       | 200        |
| C0001        | CIPROFLOXACIN HYDROCHLORIDE           | 5000      | 5500       |
| C0002        | CIPROFLOXACIN HYDROCHLORIDE           | 2000      | 2100       |
| D0001        | DEXAMETHASONE MICRO                   | 500       | 550        |
| E0001        | ERYTHROMYCIN STEARATE                 | 4000      | 4500       |
| F0001        | FURAZOLIDONE                          | 250       | 270        |
| F0002        | FLUPHENAZINE DECANOATE                | 350       | 400        |

Figure A.7. Update Unit Cost and Unit Price Screen.

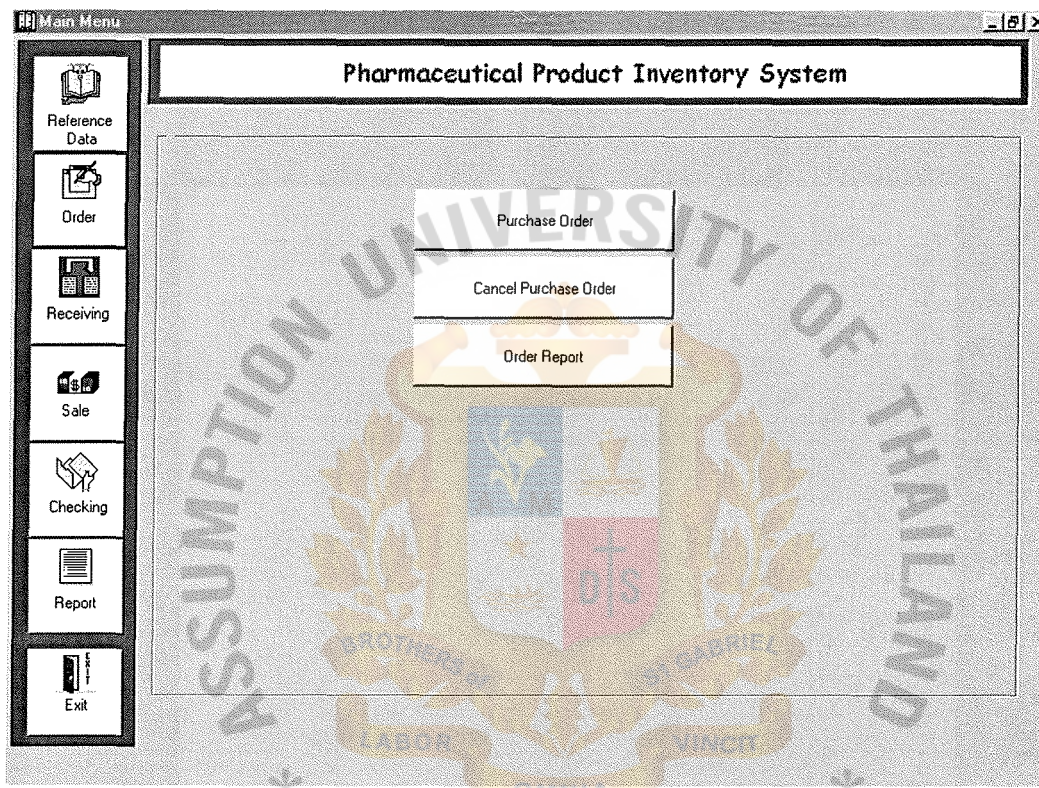


Figure A.8. Purchase Order Menu.



**Purchase Order**

Add Update Delete Search Clear Save Cancel Preview Print Exit

Order Number: P200101004 Date: 20/01/2001  
 Confirmation Number: 115/2001 Price Condition: CIF SEA BKK  
 Supplier Code: ES007 Supplier Name: ESSENCE CHEMICALS CO., LTD  
 Currency: USD Shipment: FAB-2001 Order From: ☐ Local ☒ Abroad  
 Type of Payment: L/C 180 DAYS  
 Remark:

Product Order:

Product Code: A0001 Product Name: ANALGIN DAB 9 Add  
 Order Quantity: 100 Order Price: 60 Remove  
 Packing: 10 KG NET

| Product Code | Product Name                     | Quantity | Order Price | Amount    | Unit | Packing    |
|--------------|----------------------------------|----------|-------------|-----------|------|------------|
| A0001        | ANALGIN DAB 9                    | 100      | 60          | 6,000.00  | KG   | 10 KG NET  |
| C0007        | CLOBETASOL PROPIONATE MICRONIZED | 2,000    | 15          | 30,000.00 | GM   | 500 GM NET |

Total Amount: 36,000.00

Figure A.9. Purchase Order Screen.





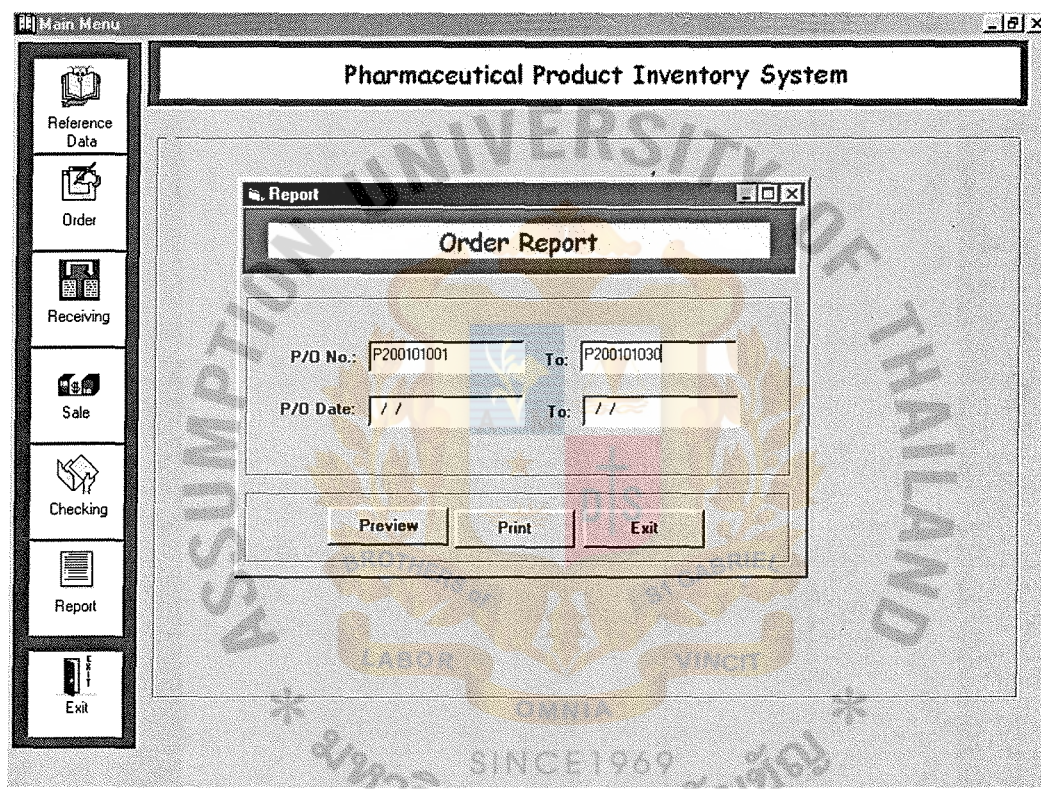


Figure A.11. Order Report Screen.



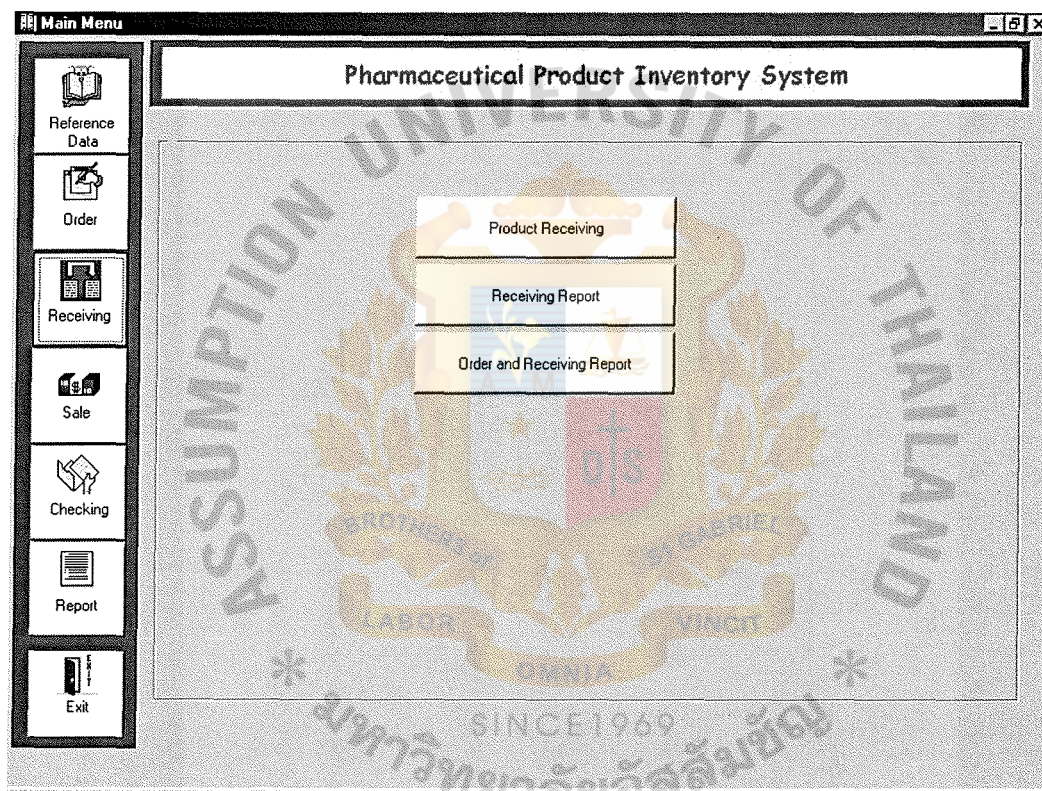


Figure A.12. Product Receiving Menu.

**Product Receiving**

Add Update Delete Search Clear Save Cancel Preview Print Exit

Receiving Number: R200101004 P/O Number: P200101004 Received Date: 15/02/2001

Supplier Code: ES007 Supplier Name: ESSENCE CHEMICALS CO., LTD

Invoice Number: C0051/2001 Order From: ☐ Local ☒ Abroad

Currency: USD Exchange Rate: 42.00

Remark:

Product Receiving:

Product Code: C0007 Product Name: CLOBETASOL PROPIONATE MICRONIZED Add

Received Quantity: 2,000 Order Price: 15.00 Remove

| Product Code | Product Name                     | Order Qty | Received Qty | Order Price | Amount    | Unit |
|--------------|----------------------------------|-----------|--------------|-------------|-----------|------|
| C0007        | CLOBETASOL PROPIONATE MICRONIZED | 2,000     | 2,000        | 15.00       | 30,000.00 | GM   |

Amount: 30,000.00 Vat: 2,100.00 Total Amount: 32,100.00

Figure A.13. Product Receiving Screen.



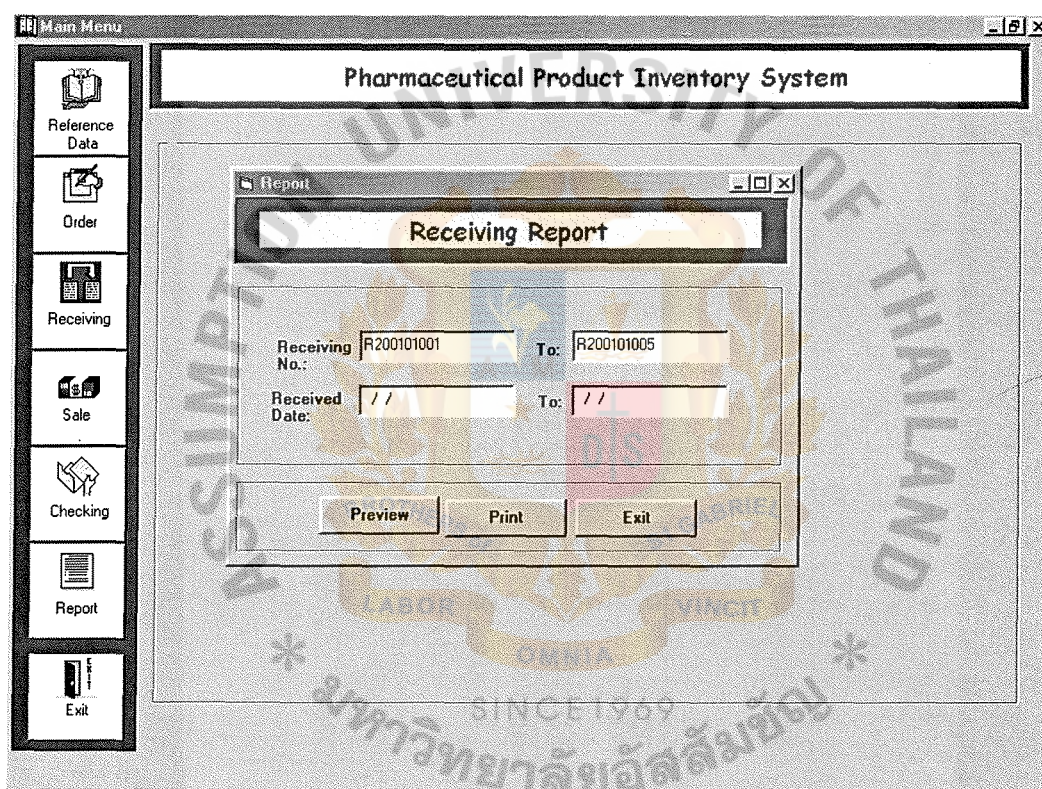


Figure A.14. Receiving Report Screen.



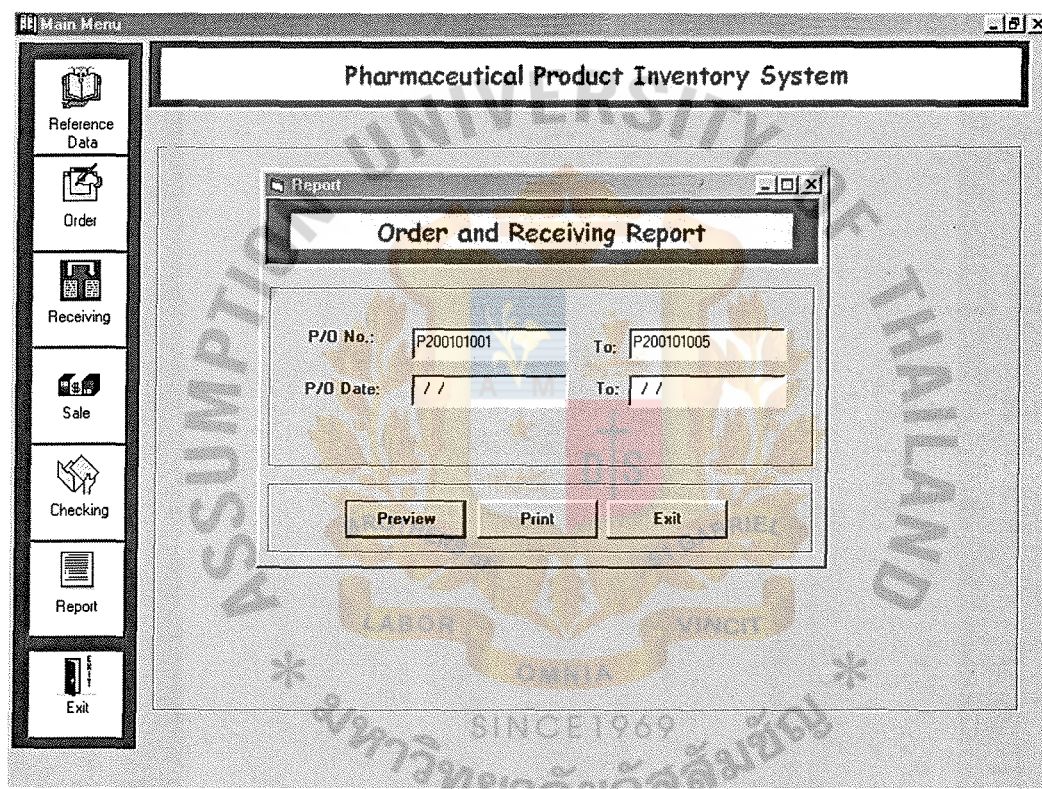


Figure A.15. Order and Receiving Report Screen.

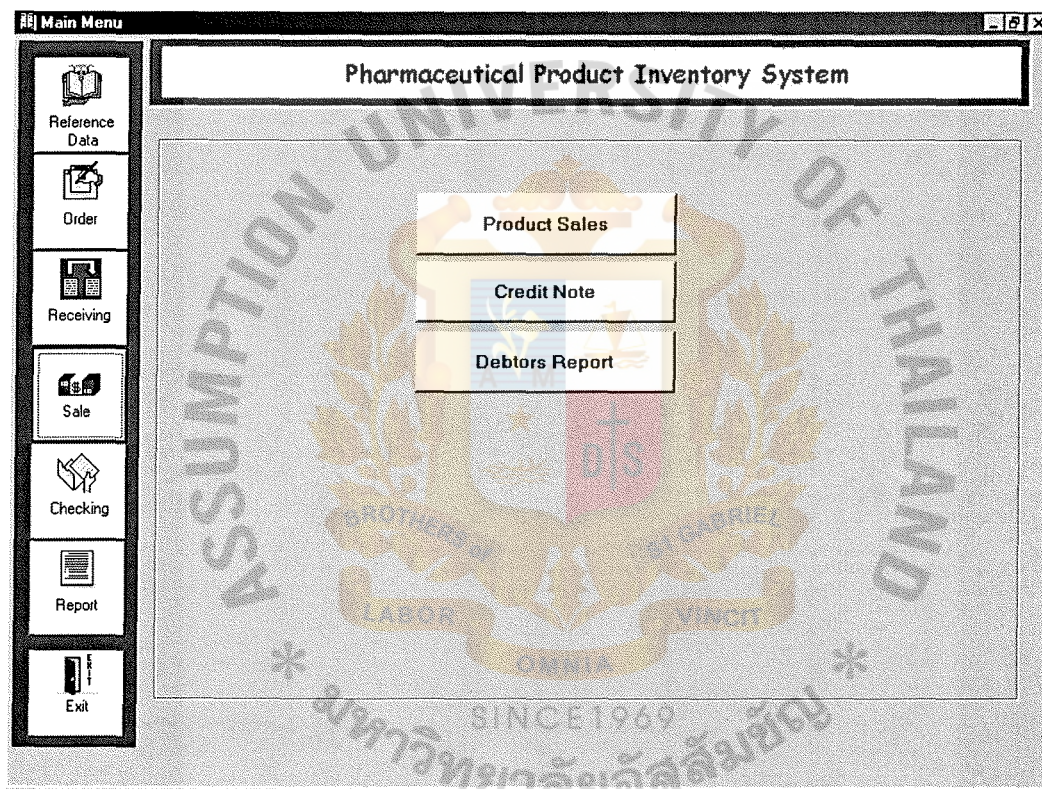


Figure A.16. Product Sales Menu.



**Product Sales**

Add Update Delete Search Clear Save Cancel Preview Print Exit

Invoice Number: 1200101004 Date: 15/02/2001

Customer Code: B0001 Customer Name: Best Pharmaceutical Ltd., Part

Customer P/O Number: 0098/2001 Credit Term: 60 Days

Remark:

Product Sales:

Product Code: A0004 Product Name: AMOXYCILLIN TRIHYDRATE COMP Add

Sales Quantity: 10 Remove

| Product Code | Product Name                | Quantity | Sales Price | Amount    | Unit |
|--------------|-----------------------------|----------|-------------|-----------|------|
| A0004        | AMOXYCILLIN TRIHYDRATE COMP | 10       | 2,300.00    | 23,000.00 | KG   |
| B0001        | BETAMETHASONE 17-VALEPATE   | 5        | 140.00      | 700.00    | GM   |

Amount: 23,700.00 Vat: 1,659.00 Total Amount: 25,359.00

Figure A.17. Product Sales Screen.

**Credit Product**

**Credit Note Number:** CN20010001    **Invoice Number:** I200101004    **Date:** 17/02/2001  
**Customer Code:** B0001    **Customer Name:** Best Pharmaceutical Ltd., Part  
**Return Reason:** Wrong Product Code  
**Remark:**

☒ Return Quantity    ☐ Reduce Price

**Product Sales :**

**Product Code:** A0004    **Product Name:** AMOXYCILLIN TRIHYDRATE COMP      
**Credit Quantity:** 6   

| Product Code | Product Name                | Quantity | Sales Price | Amount    | Unit |
|--------------|-----------------------------|----------|-------------|-----------|------|
| A0004        | AMOXYCILLIN TRIHYDRATE COMP | 6        | 2,300.00    | 13,800.00 | KG   |

**Amount:** 13,800.00    **Vat:** 966.00    **Total Amount:** 14,766.00

Figure A.18. Credit Product Screen.



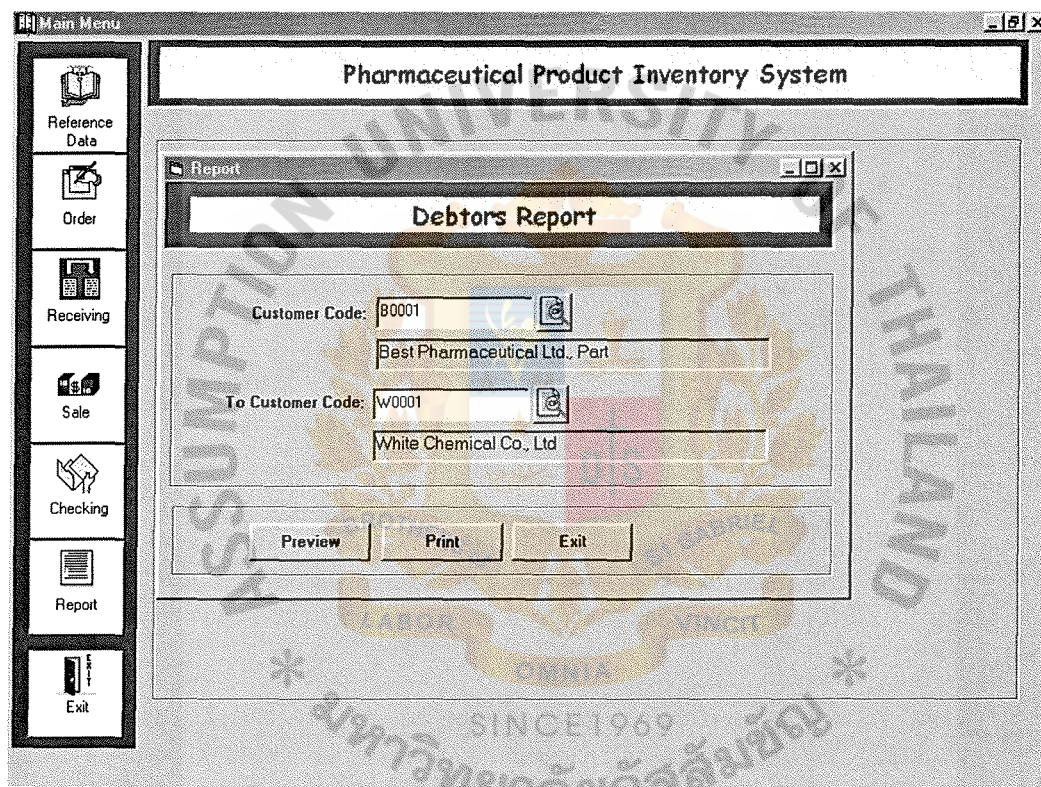


Figure A.19. Debtors Report Screen.



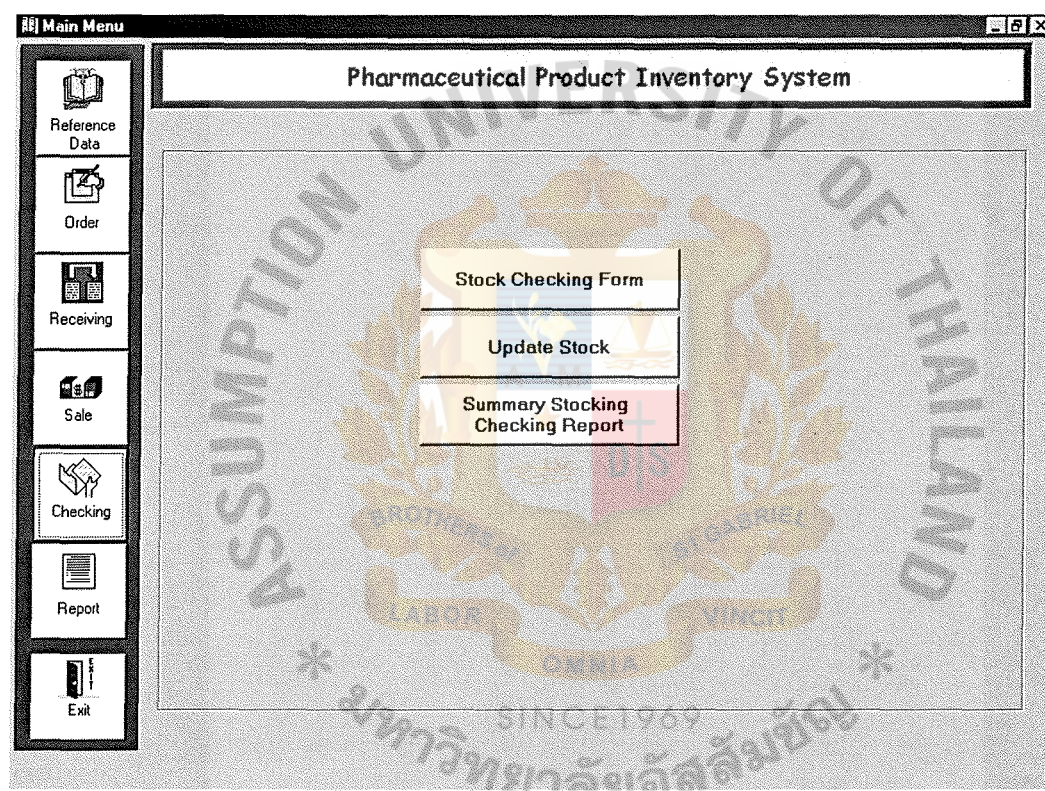


Figure A.20. Stock Checking Menu.

**Stock Checking**

Add Update Delete Search Clear Save Cancel Preview Print Exit

Product Code : D0001 Date : 20/01/2001

Product Name : DEXAMETHASONE MICRO

Balanced Quantity : 5000 Checked Quantity : 5000

Add Remove

| Product Code | Product Name                         | Balanced Qty. | Checked Qty. | Unit |
|--------------|--------------------------------------|---------------|--------------|------|
| A0001        | ANALGIN DAB 9                        | 120           | 150          | KG   |
| A0002        | AMITRIPTYLINE HCL                    | 50            | 70           | KG   |
| A0003        | ALBENDAZOLE                          | 60            | 60           | KG   |
| A0004        | AMOXYCILLIN TRIHYDRATE COMP          | 200           | 150          | KG   |
| B0001        | BETAMETHASONE 17-VALERATE            | 4000          | 250          | GM   |
| B0002        | BETAMETHASONE DIPROPIONATE MICRONIZE | 5000          | 400          | GM   |
| C0001        | CIPROFLOXACIN HYDROCHLORIDE          | 500           | 480          | KG   |
| C0002        | CIPROFLOXACIN HYDROCHLORIDE          | 100           | 115          | KG   |
| D0001        | DEXAMETHASONE MICRO                  | 5000          | 60           | GM   |
| E0001        | ERYTHROMYCIN STEARATE                | 400           | 60           | KG   |
| F0001        | FURAZOLIDONE                         | 200           | 50           | KG   |
| F0002        | FLUPHENAZINE DECANOATE               | 40            | 40           | KG   |

Figure A.21. Update Balanced Product Quantity Screen.



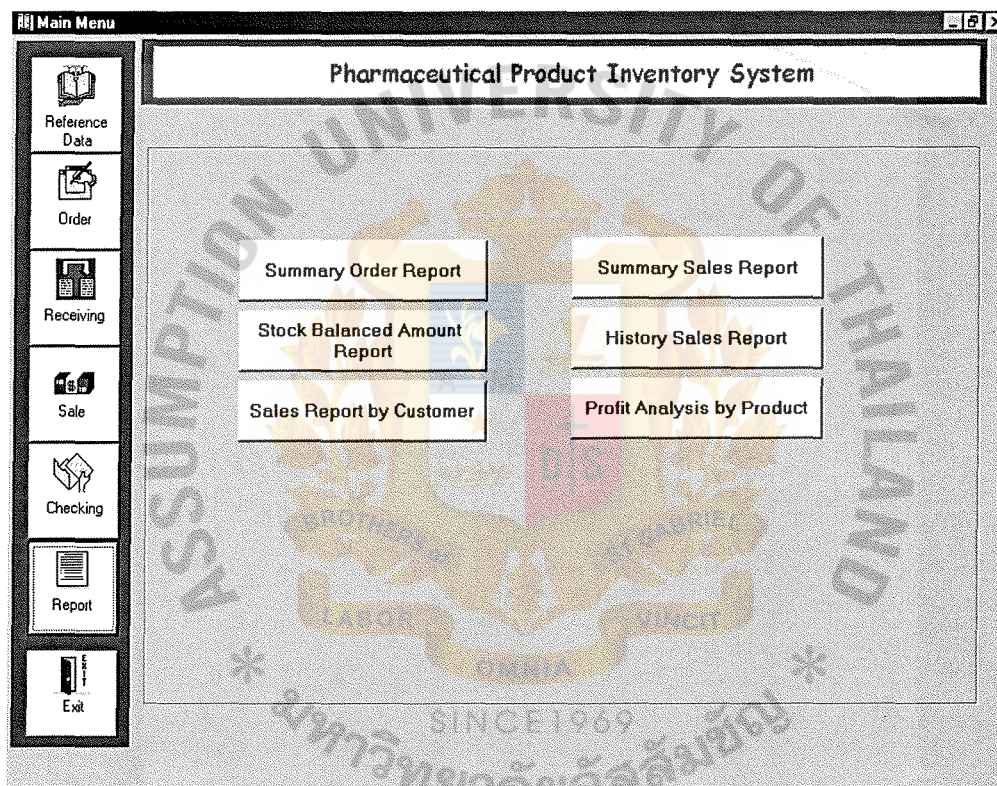


Figure A.22. Management Reports Menu.

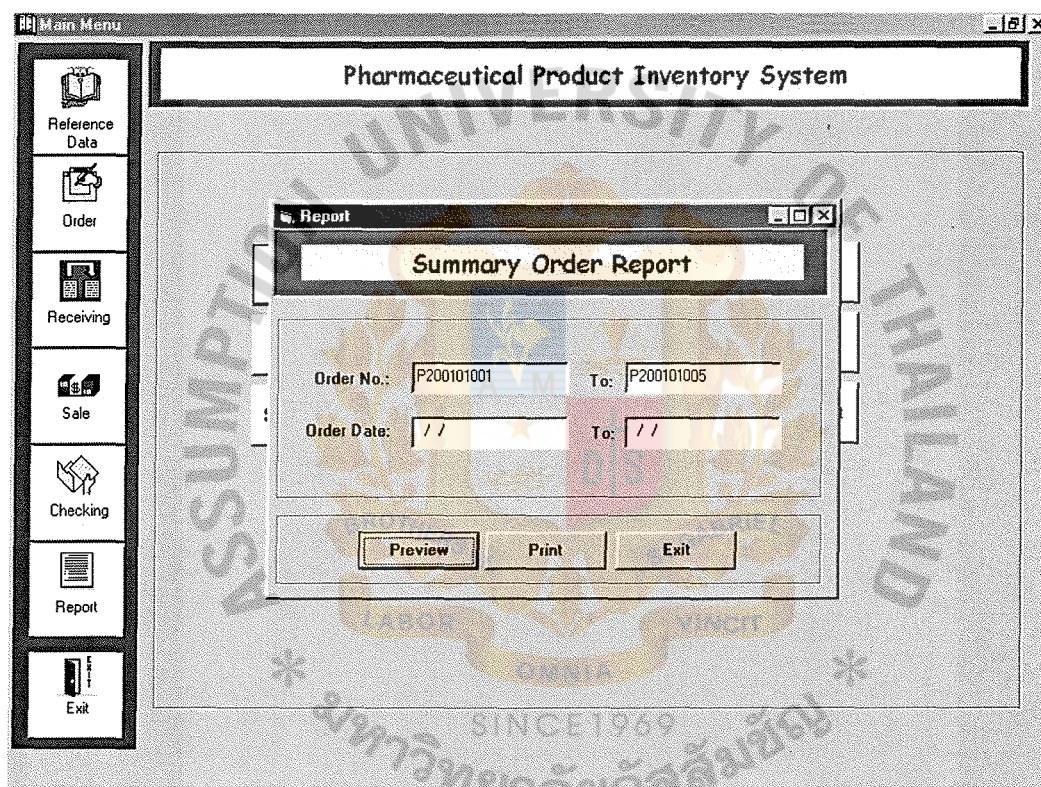


Figure A.23. Summary Order Report Screen.



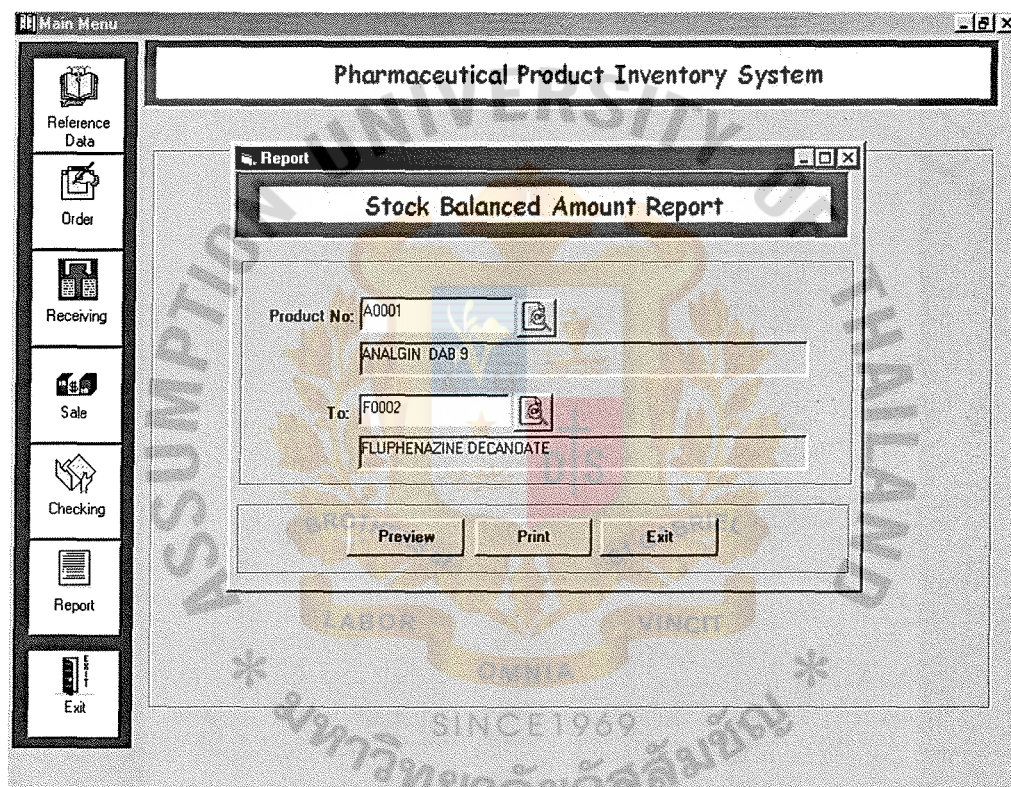


Figure A.24. Stock Balanced Amount Report Screen.



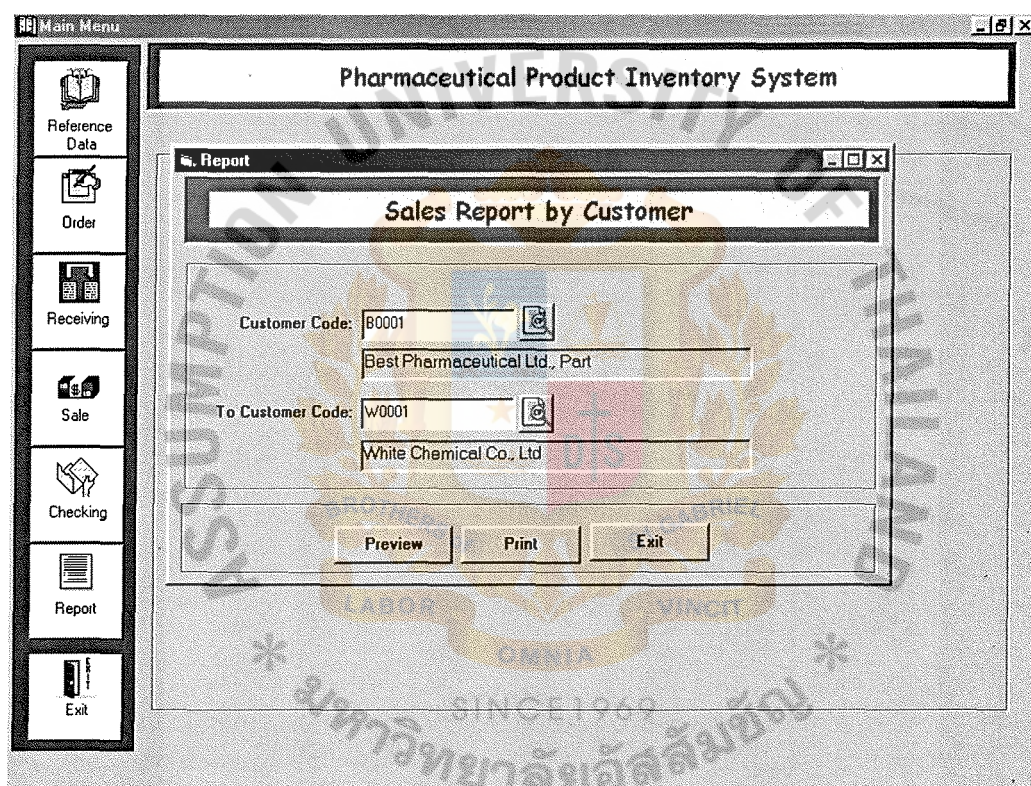


Figure A.25. Sales Report by Customer Screen.

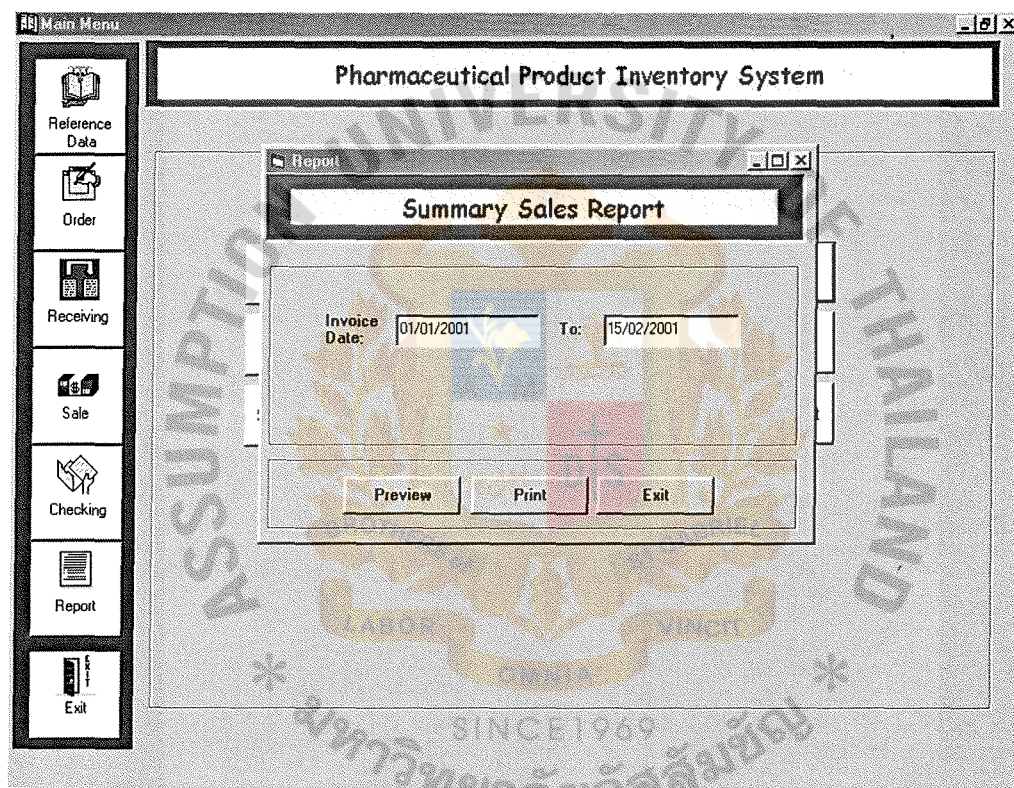


Figure A.26. Summary Sales Report Screen.



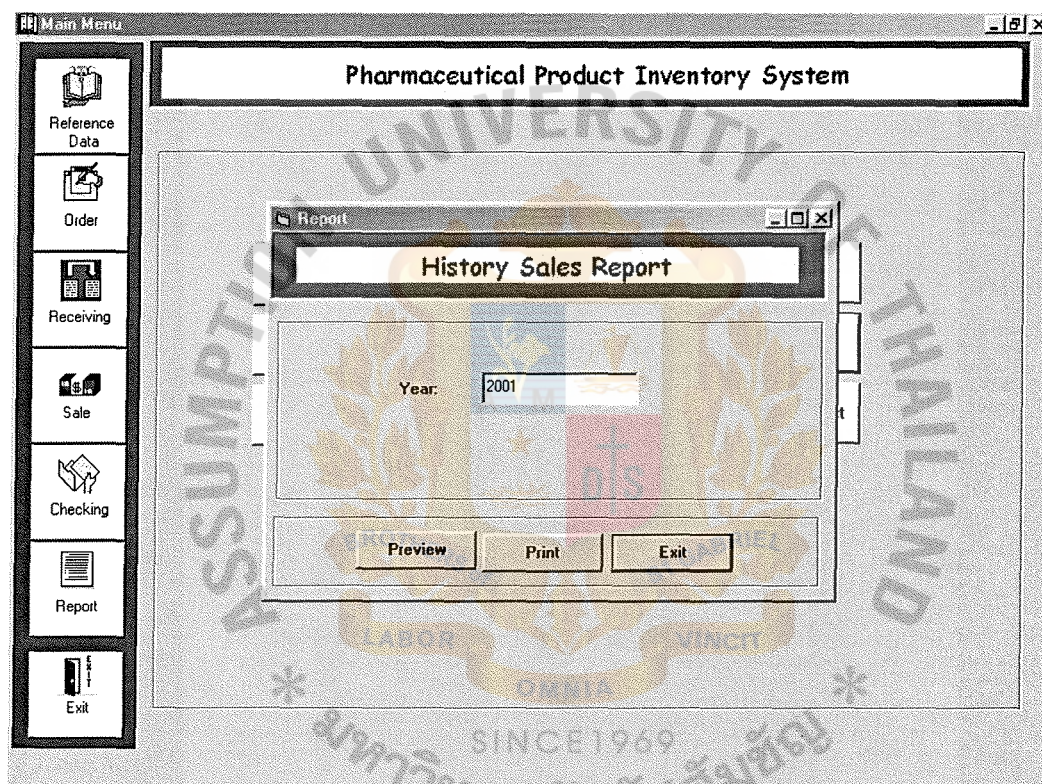


Figure A.27. History Sales Report Screen.

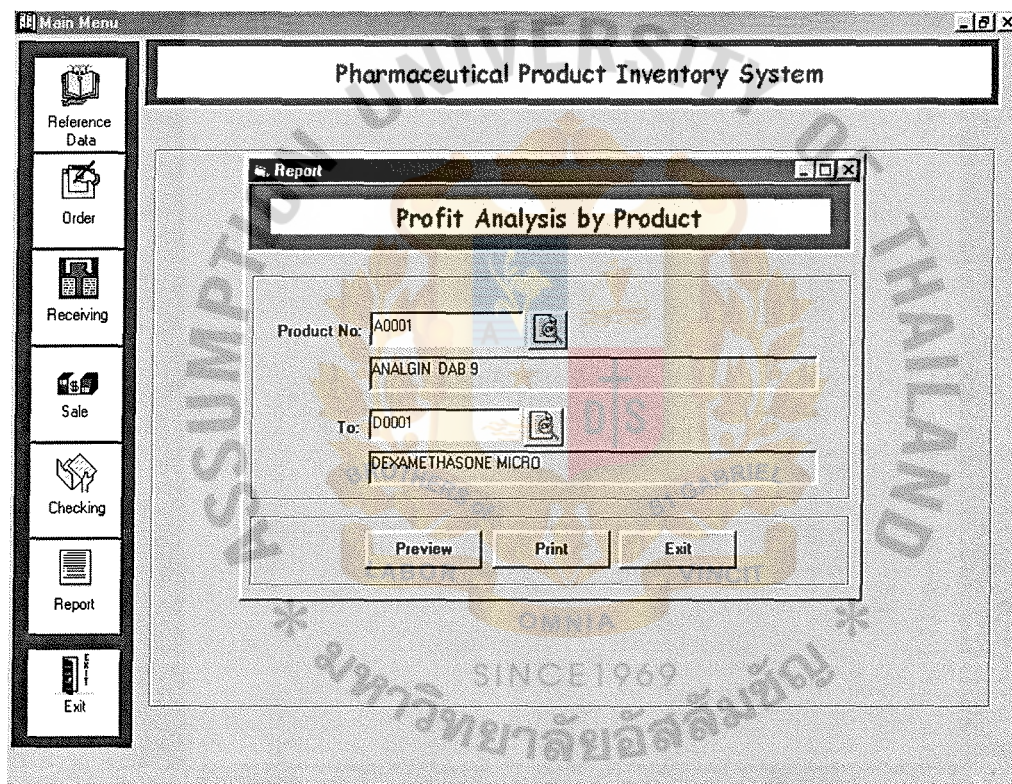


Figure A.28. Profit Analysis by Product Screen.





## APPENDIX B

### REPORT DESIGN

Central Chemi-Pharm Ltd., Part

Product Information Report

Product Code From : A0001 To: F0002

| Product Code | Product Name Thai                   | Product Name Eng                      | Unit Code | Unit Price | Reorder Point |
|--------------|-------------------------------------|---------------------------------------|-----------|------------|---------------|
| A0001        | อะมัลลิน แด็พ 9                     | ANALGIN DAB 9                         | KG        | 350        | 20            |
| A0002        | อะมิตริปไทน์ ไตรโคลอไรด์            | AMITRIPTYLINE HCL                     | KG        | 1200       | 10            |
| A0003        | อะมโนดาโซล                          | ALBENDAZOLE                           | KG        | 540        | 5             |
| A0004        | อะม็อกซิซิลลิน ไตรไฮเดรต คอมแพคต์   | AMOXYCILLIN TRIHYDRATE COMP           | KG        | 2300       | 20            |
| B0001        | เบต้าเมทาโซน 17 วรีเรท ไมโครไนท์    | BETAMETHASONE 17-VALERATE MICRONIZED  | GM        | 140        | 0             |
| B0002        | เบต้าเมทาโซน ไดโพรไพโอเนต ไมโครไนท์ | BETAMETHASONE DIPROPIONATE MICRONIZED | GM        | 600        | 0             |
| C0001        | C0001ไซโปรฟลอกซาซิน ไฮโดรคลอไรด์    | CIPROFLOXACIN HYDROCHLORIDE           | KG        | 5500       | 10            |
| C0002        | คลอแรมเฟนิคอล ไซเดียม 500           | CHLORAMPHENICOL SODIUM SUCCINATE      | KG        | 2100       | 20            |
| D0001        | เด็กซามิทาโซน ไมโครไนท์             | DEXAMETHASONE MICRO                   | GM        | 550        | 1000          |
| E0001        | อีริโทรไมซิน สเตอรา                 | ERYTHROMYCIN STEARATE                 | KG        | 4500       | 20            |
| F0001        | ฟูราโซลิโดน                         | FURAZOLIDONE                          | KG        | 270        | 10            |
| F0002        | ฟลูเฟนาซีน ดีคาโนเอท                | FLUPHENAZINE DECANOATE                | KG        | 400        | 10            |

Figure B.1. Product Information Report.

Central Chemi-Pharm Ltd., Part

## Supplier Information Report

Supplier Code from : AD001 To : SU001

| Supplier Code | Company                              | Address  | Tel No.        | Fax No.       |
|---------------|--------------------------------------|--|----------------|---------------|
| AD001         | ADE CHEMICALS INTERNATIONAL CO., LTD | 115/45 SOI LADPRAW 128, LADPRAW RD, BANGKAPI, BANGKOK, THAILAND        | 662-3760805    | 662-3760806-9 |
| CI001         | CID PHARMACEUTICAL INDUSTRIES LTD.   | 45 MOO 4, BANGPLA RD. T. BANKHOH, A MUANG, SAMUTSAKHON, THAILAND       | 034 422600-4   | 034 422605-6  |
| CO001         | COS INDUSTRIES LTD.                  | 50 THESABAN SAMRONGTAL 21, POOCHAOSMINGPRAI RD, SAMUTPRAKARN, THAILAND | 662-385-9020   | 662-3859300   |
| ES001         | ESSENCE CHEMICALS CO., LTD           | COMMERCIAL BLDG, FL16, OFTRINGEN SCHWEIZ, SWITZERLAND                  | 062-250000-5   | 062-2500006-7 |
| JA001         | JAP INTERNATIONAL CORP.              | 100 HIGASHI 20, DOTONBORI-5, CHUO-KU, OSAKA, JAPAN                     | 2137000        | 2137001       |
| ST001         | STANDARD CHEMICALS CO., LTD          | 115/20 SOI LADPHRAO 53, LADPHRAO RD., WANGTHONGLANG, BANGKOK, THAILAND | 662-719510-2   | 662-7195103   |
| SU001         | SUAHOU MEDICINES & HEALTH PRODUCTS   | SU XU HIGHWAY NO. 15, SUAHO, CHINA                                     | 86 512 845000- | 86 512 845005 |

Figure B.2. Supplier Information Report.

Central Chemi-Pharm Ltd., Part

**Customer Information Report**

Customer Code From: B0001 To: W0001

| Customer Code | Company                        | Address  | Tel No.          | Fax No. |
|---------------|--------------------------------|--|------------------|---------|
| A0001         | Alpha Chemical Ltd., Part      | 104/22 Sukhumvit Rd, Soi 14, Bangkok, 10110                | 2294555, 2294600 | 2294557 |
| B0001         | Best Pharmaceutical Ltd., Part | 110 Soi Saree 3 Ramkamhang 24 Rd, Huamark, Bangkok, 10240  | 7191001, 7191006 | 7191000 |
| B0002         | Bio Chemical Co., Ltd          | 15/50 Patthanakarn, Suanlaung, Bangkok, 10250              | 3144501-4        | 3144500 |
| L0001         | LON Pharmaceutical Co.,Part    | 45 Ladpraw 122, Wangtonglang, Bangkok, 10310               | 9343500, 9343571 | 9343503 |
| P0001         | Pisan Chemical Co., Ltd        | 105 Pattanakarn Road, Suanlung, Bangkok, 10250             | 7193000-2        | 7193003 |
| S0001         | Siri Chemical Co., Ltd         | 95 Nanglinchee Rd., Chongnonsee, Yannawa, Bangkok, 10120   | 6790000-5        | 6790006 |
| W0001         | White Chemical Co., Ltd        | 54 Soi Sukhumvit 50, Phakhanong, Klongtoey, Bangkok, 10250 | 3312001-2        | 3312006 |

Figure B.3. Customer Information Report.



Central Chemi-Pharm Ltd., Part

### Order Report

Order date From : 10/01/2001 To : 10/02/2001

| Order Date P/O No.    | Supplier                           | Product Code | Product Name                     | Order Qty. | Order Price | Total         |
|-----------------------|------------------------------------|--------------|----------------------------------|------------|-------------|---------------|
| 01/15/2001 P200101001 | SUAHOU MEDICINES & HEALTH PRODUCTS | A0004        | AMOXICYCLIN TRIHYDRATE COMP      | 200        | 60.00       | 12,000.00 USD |
|                       |                                    | D0001        | DEXAMETHASONE MICRO              | 4,000      | 12.00       | 48,000.00 USD |
| 01/18/2001 P200101002 | ESSENCE CHEMICALS CO., LTD         | A0002        | AMITRIPTYLINE HCL                | 1,000      | 30.00       | 30,000.00 USD |
|                       |                                    | C0001        | CIPROFLOXACIN HYDROCHLORIDE      | 500        | 135.00      | 67,500.00 USD |
|                       |                                    | C0002        | CHLORAMPHENICOL SODIUM SUCCINATE | 1,000      | 50.00       | 50,000.00 USD |

Figure B.4. Order Report.

Central Chemi-Pharm Ltd., Part

Receiving Report

| Date       | Receiving No. | Supplier Name                      | Product Code | Product Name                     | Received Qty. | Price  | Amount     |
|------------|---------------|------------------------------------|--------------|----------------------------------|---------------|--------|------------|
| 02/10/2001 | R200101001    | SUAHOU MEDICINES & HEALTH PRODUCTS | D0001        | DEXAMETHASONE MICRO              | 4,000         | 12.00  | 48,000.00  |
|            |               |                                    | A0004        | AMOXYCILLIN TRIHYDRATE COMP      | 200           | 60.00  | 12,000.00  |
|            |               | SubTotal                           |              |                                  |               |        | 60,000.00  |
| 02/11/2001 | R200101002    | ESSENCE CHEMICALS CO., LTD         | A0002        | AMITRIPTYLINE HCL                | 1,000         | 30.00  | 30,000.00  |
|            |               |                                    | C0001        | CIPROFLOXACIN HYDROCHLORIDE      | 500           | 135.00 | 67,500.00  |
|            |               |                                    | C0002        | CHLORAMPHENICOL SODIUM SUCCINATE | 1,000         | 50.00  | 50,000.00  |
|            |               | SubTotal                           |              |                                  |               |        | 147,500.00 |
|            |               | Grand Total                        |              |                                  |               |        | 207,500.00 |

Figure B.5. Receiving Report.

Central Chemi-Pharm Ltd., Part

Order and Receiving Report

Purchase Order From: P200101001 To: P200101002

| P/O No.    | Order Date | Supplier Name                        | Product Code | Product Name                | Order Qty. | Receiving No. | Received Qty. |
|------------|------------|--------------------------------------|--------------|-----------------------------|------------|---------------|---------------|
| P200101001 | 01/15/2001 | SUAHOU MEDICINES & HEALTH PRODUCTS   | A0004        | AMOXICYCLIN TRIHYDRATE COMP | 200        | R200102001    | 200           |
|            |            |                                      | D0001        | DEXAMETHASONE MICRO         | 4,000      | R200102001    | 4,000         |
|            |            |                                      | A0002        | AMITRIPTYLINE HCL           | 1,000      | R200102002    | 1,000         |
| P200101002 | 01/18/2001 | ESSENCE CHEMICALS CO., LTD           | C0001        | CIPROFLOXACIN HYDROCHLORIDE | 500        | R200102002    | 500           |
|            |            |                                      | C0002        | CIPROFLOXACIN HYDROCHLORIDE | 1,000      | R200102002    | 1,000         |
| P200101003 | 01/25/2001 | ADE CHEMICALS INTERNATIONAL CO., LTD | C0001        | CIPROFLOXACIN HYDROCHLORIDE | 500        | R200102003    | 500           |
|            |            |                                      | C0002        | CIPROFLOXACIN HYDROCHLORIDE | 500        | R200102003    | 500           |

Figure B.6. Order and Receiving Report.

Central Chemi-Pharm Ltd., Part

Debtors Report

Customer Code From: A0001 To: W0001

| Customer Code | Company                        | Amount     |
|---------------|--------------------------------|------------|
| A0001         | Alpha Chemical Ltd., Part      | 0.00       |
| B0001         | Best Pharmaceutical Ltd., Part | 250,000.00 |
| B0002         | Bio Chemical Co., Ltd          | 24,000.00  |
| L0001         | LON Pharmaceutical Co.,Part    | 150,000.00 |
| P0001         | Pisan Chemical Co., Ltd        | 12,000.00  |
| S0001         | Siri Chemical Co., Ltd         | 0.00       |
| W0001         | White Chemical Co., Ltd        | 60,000.00  |
| Total         |                                | 496,000.00 |

Figure B.7. Debtors Report.



Central Chemi-Phar Ltd., Part  
Stock Checking Form

| Product Code | Product Name                          | Location | Balanced Qty. | Checking Qty. | Different Qty. | Remark |
|--------------|---------------------------------------|----------|---------------|---------------|----------------|--------|
| A0001        | ANALGIN DAB 9                         | AC001    | 120           |               |                |        |
| A0002        | AMITRIPTYLINE HCL                     | AC004    | 50            |               |                |        |
| A0003        | ALBENDAZOLE                           | BW004    | 60            |               |                |        |
| A0004        | AMOXYCILLIN TRIHYDRATE COMP           | GP001    | 200           |               |                |        |
| B0001        | BETAMETHASONE 17-VALERATE             | AC002    | 4,000         |               |                |        |
| B0002        | BETAMETHASONE DIPROPIONATE MICRONIZED | AC003    | 5,000         |               |                |        |
| C0001        | CIPROFLOXACIN HYDROCHLORIDE           | BW001    | 500           |               |                |        |
| C0002        | CIPROFLOXACIN HYDROCHLORIDE           | BW002    | 100           |               |                |        |
| D0001        | DEXAMETHASONE MICRO                   | GP002    | 5,000         |               |                |        |
| E0001        | ERYTHROMYCIN STEARATE                 | GP003    | 400           |               |                |        |
| F0001        | FURAZOLIDONE                          | BW003    | 200           |               |                |        |
| F0002        | FLUPHENAZINE DECANOATE                | GP004    | 40            |               |                |        |

Figure B.8. Stock Checking Form.

Central Chemi-Phar Ltd., Part

## Summary Stock Checking Report

Product Code From: A0001 To: F0002

| Product Code                | Product Name                          | Balanced Qty. | Checked Qty. | Total Error | Unit Cost | Total Amount    |
|-----------------------------|---------------------------------------|---------------|--------------|-------------|-----------|-----------------|
| A0001                       | ANALGIN DAB 9                         | 120           | 150          | 30          | 60.00     | 1,800.00        |
| A0002                       | AMITRIPTYLINE HCL                     | 50            | 49           | -1          | 1,000.00  | -1,000.00       |
| A0003                       | ALBENDAZOLE                           | 60            | 60           | 0           | 500.00    | 0.00            |
| A0004                       | AMOXICILLIN TRIHYDRATE COMP           | 200           | 200          | 0           | 2,000.00  | 0.00            |
| B0001                       | BETAMETHASONE 17-VALERATE             | 4,000         | 4,000        | 0           | 120.00    | 0.00            |
| B0002                       | BETAMETHASONE DIPROPIONATE MICRONIZED | 5,000         | 5,000        | 0           | 500.00    | 0.00            |
| C0001                       | CIPROFLOXACIN HYDROCHLORIDEC          | 500           | 480          | -20         | 5,000.00  | -100,000.00     |
| C0002                       | CIPROFLOXACIN HYDROCHLORIDEC          | 100           | 115          | 15          | 2,000.00  | 30,000.00       |
| D0001                       | DEXAMETHASONE MICRO                   | 5,000         | 5,000        | 0           | 500.00    | 0.00            |
| E0001                       | ERYTHROMYCIN STEARATE                 | 400           | 420          | 20          | 4,000.00  | 80,000.00       |
| F0001                       | FURAZOLIDONE                          | 200           | 185          | -15         | 250.00    | -3,750.00       |
| F0002                       | FLUPHENAZINE DECANOATE                | 40            | 40           | 0           | 350.00    | 0.00            |
| <b>Total Product Amount</b> |                                       |               |              |             |           | <b>7,050.00</b> |

Figure B.9. Summary Stock Checking Report.

Central Chemi-Pharm Ltd., Part

Summary Order Report

| Product Code | Product Name                | P/O No.    | Order Date | Supplier                             | Order Qty. | Order Price | Total         |
|--------------|-----------------------------|------------|------------|--------------------------------------|------------|-------------|---------------|
| A0002        | AMITRIPTYLINE HCL           | P200101002 | 18/01/2001 | ESSENCE CHEMICALS CO., LTD           | 1,000      | 30.00       | 30,000.00 USD |
| A0004        | AMOXICYCLIN TRIHYDRATE COMP | P200101001 | 15/01/2001 | SUAHOU MEDICINES & HEALTH PRODUCTS   | 200        | 60.00       | 12,000.00 USD |
| C0001        | CIPROFLOXACIN HYDROCHLORIDE | P200101002 | 18/01/2001 | ESSENCE CHEMICALS CO., LTD           | 500        | 135.00      | 67,500.00 USD |
|              |                             | P200101003 | 25/01/2001 | ADE CHEMICALS INTERNATIONAL CO., LTD | 500        | 125.00      | 62,500.00 USD |
| C0002        | CIPROFLOXACIN HYDROCHLORIDE | P200101002 | 18/01/2001 | ESSENCE CHEMICALS CO., LTD           | 1,000      | 50.00       | 50,000.00 USD |
|              |                             | P200101003 | 25/01/2001 | ADE CHEMICALS INTERNATIONAL CO., LTD | 500        | 45.00       | 22,500.00 USD |
| D0001        | DEXAMETHASONE MICRO         | P200101001 | 15/01/2001 | SUAHOU MEDICINES & HEALTH PRODUCTS   | 4,000      | 12.00       | 48,000.00 USD |

Figure B.10. Summary Order Report.

Central Chemi-Phar Ltd., Part

# Stock Balanced Amount Report

Product Code From: A0001 To: F0002

| Product Code         | Product Name                          | Balanced Quantity | Unit Price | Total Amount  |
|----------------------|---------------------------------------|-------------------|------------|---------------|
| A0001                | ANALGIN DAB 9                         | 120               | 80.00      | 9,600.00      |
| A0002                | AMITRIPTYLINE HCL                     | 50                | 1,200.00   | 60,000.00     |
| A0003                | ALBENDAZOLE                           | 60                | 540.00     | 32,400.00     |
| A0004                | AMOXYCILLIN TRIHYDRATE COMP           | 200               | 2,300.00   | 460,000.00    |
| B0001                | BETAMETHASONE 17-V-VALERATE           | 4,000             | 140.00     | 560,000.00    |
| B0002                | BETAMETHASONE DIPROPIONATE MICRONIZED | 5,000             | 600.00     | 3,000,000.00  |
| C0001                | CIPROFLOXACIN HYDROCHLORIDE           | 500               | 5,500.00   | 2,750,000.00  |
| C0002                | CIPROFLOXACIN HYDROCHLORIDE           | 100               | 2,100.00   | 210,000.00    |
| D0001                | DEXAMETHASONE MICRO                   | 5,000             | 550.00     | 2,750,000.00  |
| E0001                | ERYTHROMYCIN STEARATE                 | 400               | 4,500.00   | 1,800,000.00  |
| F0001                | FURAZOLIDONE                          | 200               | 270.00     | 54,000.00     |
| Total Product Amount |                                       |                   |            | 11,686,000.00 |

Figure B.11. Stock Balanced Amount Report.



Central Chemi-Phar Ltd., Part

### Sales Report by Customer

Customer Code From: B0001 To: W0001

| Customer                       | Invoice Date | Invoice No. | Product Code | Product Name                 | Sale Qty. | Sale Price | Amount     | Vat        | Total Amount |
|--------------------------------|--------------|-------------|--------------|------------------------------|-----------|------------|------------|------------|--------------|
| Best Pharmaceutical Ltd., Part | 15/01/2001   | I200101007  | A0004        | AMOXICILLIN TRIHYDRATE COMP  | 10        | 2,300      | 23,000.00  | 1,610.00   | 24,610.00    |
|                                |              |             | C0001        | CIPROFLOXACIN HYDROCHLORIDEC | 20        | 5,500      | 110,000.00 | 7,700.00   | 117,700.00   |
|                                |              |             | Sub Total    |                              |           |            |            | 133,000.00 | 9,310.00     |
| Bio Chemical Co., Ltd          | 15/01/2001   | I200101008  | A0004        | AMOXICILLIN TRIHYDRATE COMP  | 20        | 2,300      | 46,000.00  | 3,220.00   | 49,220.00    |
|                                |              |             | B0001        | BETAMETHASONE 17-VALERATE    | 40        | 140        | 5,600.00   | 392.00     | 5,992.00     |
|                                |              |             | Sub Total    |                              |           |            |            | 51,600.00  | 3,612.00     |
| White Chemical Co., Ltd        | 20/01/2001   | I200101009  | B0001        | BETAMETHASONE 17-VALERATE    | 100       | 140        | 14,000.00  | 980.00     | 14,980.00    |
|                                |              |             | F0001        | FURAZOLIDONE                 | 50        | 270        | 13,500.00  | 945.00     | 14,445.00    |
|                                |              |             | Sub Total    |                              |           |            |            | 27,500.00  | 1,925.00     |
| Grand Total                    |              |             |              |                              |           |            | 212,100.00 | 14,847.00  | 226,947.00   |

Figure B.12. Sales Report by Customer.

Central Chemi-Phar Ltd., Part

### Summary Sales Report

Invoice Date From: 15/01/2001 To: 20/01/2001

| Invoice Date | Invoice Number | Customer                  | Product Code | Product Name                | Sales Qty. | Sales Price | Amount     | Vat       | Total Amount |
|--------------|----------------|---------------------------|--------------|-----------------------------|------------|-------------|------------|-----------|--------------|
| 01/15/2001   | 1200101007     | Best Pharmaceutical Ltd., | A0004        | AMOXICILLIN TRIHYDRATE COMP | 10         | 2,300.00    | 23,000.00  | 1,610.00  | 24,610.00    |
|              |                |                           | C0001        | CIPROFLOXACIN HYDROCHLORIDE | 20         | 5,500.00    | 110,000.00 | 7,700.00  | 117,700.00   |
|              | 1200101008     | Bio Chemical Co., Ltd     | A0004        | AMOXICILLIN TRIHYDRATE COMP | 20         | 2,300.00    | 46,000.00  | 3,220.00  | 49,220.00    |
|              |                |                           | B0001        | BETAMETHASONE 17-VALERATE   | 40         | 140.00      | 5,600.00   | 392.00    | 5,992.00     |
| SubTotal     |                |                           |              |                             |            |             | 184,600.00 | 12,922.00 | 197,522.00   |
| 01/20/2001   | 1200101009     | White Chemical Co., Ltd   | B0001        | BETAMETHASONE 17-VALERATE   | 100        | 140.00      | 14,000.00  | 980.00    | 14,980.00    |
|              |                |                           | F0001        | FURAZOLIDONE                | 50         | 270.00      | 13,500.00  | 945.00    | 14,445.00    |
| SubTotal     |                |                           |              |                             |            |             | 27,500.00  | 1,925.00  | 29,425.00    |
| Grand Total  |                |                           |              |                             |            |             | 212,100.00 | 14,847.00 | 226,947.00   |

Figure B.13. Summary Sales Report.

Central Chemi-Pharm Ltd., Part

History Sales Report  
Report of Year 2001

| Product Code | Product Name                          | Jan     | Feb     | Mar     | Apr     | May    | Jun     | Jul    | Aug     | Sep     | Oct     | Nov     | Dec     |
|--------------|---------------------------------------|---------|---------|---------|---------|--------|---------|--------|---------|---------|---------|---------|---------|
| A0001        | ANALGIN DAB 9                         | 20,000  | 25,000  | 56,000  | 79,000  | 80,000 | 15,000  | 48,000 | 125,000 | 145,000 | 24,000  | 1,500   | 14,000  |
| A0002        | AMITRIPTYLINE HCL                     | 25,000  | 2,540   | 2,500   | 36,000  | 6,000  | 5,000   | 6,000  | 7,500   | 9,500   | 10,500  | 42,000  | 56,000  |
| A0003        | ALBENDAZOLE                           | 56,000  | 240,000 | 150,000 | 540,000 | 78,000 | 950,000 | 0      | 0       | 14,550  | 154,000 | 145,000 | 485,000 |
| A0004        | AMOXYCILLIN TRIHYDRATE COMP           | 25,400  | 25,600  | 285,413 | 25,400  | 25,600 | 25,800  | 75,000 | 78,000  | 95,000  | 25,600  | 65,000  | 75,000  |
| B0001        | BETAMETHASONE 17-VALERATE MICRONIZED  | 120,000 | 0       | 45,000  | 95,000  | 87,000 | 0       | 45,000 | 78,000  | 56,000  | 45,000  | 45,200  | 87,000  |
| B0002        | BETAMETHASONE DIPROPIONATE MICRONIZED | 68,000  | 45,000  | 52,000  | 46,000  | 78,000 | 95,000  | 54,000 | 0       | 42,000  | 0       | 12,000  | 96,000  |
| C0001        | CIPROFLOXACIN HYDROCHLORIDE           | 74,000  | 98,000  | 52,000  | 10,000  | 4,650  | 50,500  | 12,000 | 45,000  | 64,000  | 78,000  | 0       | 98,000  |
| C0002        | CHLORAMPHENICOL SODIUM SUCCINATE      | 0       | 56,000  | 43,000  | 0       | 0      | 45,000  | 95,000 | 46,000  | 52,000  | 85,000  | 95,000  | 65,000  |
| D0001        | DEXAMETHASONE MICRO                   | 12,000  | 56,000  | 75,000  | 102,000 | 10,500 | 41,200  | 45,600 | 75,000  | 95,000  | 45,000  | 45,000  | 96,000  |
| E0001        | ERYTHROMYCIN STEARATE                 | 42,000  | 10,000  | 14,200  | 85,000  | 46,000 | 115,000 | 56,000 | 0       | 75,000  | 91,200  | 85,000  | 65,400  |
| F0001        | FURAZOLIDONE                          | 75,000  | 56,000  | 0       | 0       | 14,000 | 42,000  | 96,000 | 56,000  | 78,000  | 874,500 | 0       | 0       |
| F0002        | FLUPHENAZINE DECANOATE                | 65,000  | 45,000  | 85,000  | 0       | 75,000 | 85,000  | 41,000 | 415,000 | 87,203  | 87,560  | 0       | 56,000  |

Figure B.14. History Sales Report.

Central Chemi-Phar Ltd., Part

Profit Analysis by Product Report

Product Code From: A0001 To: F0002

| Product Code | Product Name                | Invoice Date | Invoice Number | Sale Qty. | Sales      | Cost       | Profit    |
|--------------|-----------------------------|--------------|----------------|-----------|------------|------------|-----------|
| A0004        | AMOXICILLIN TRIHYDRATE COMP | 01/15/200    | I200101007     | 10        | 23,000.00  | 20,000.00  | 3,000.00  |
|              | AMOXICILLIN TRIHYDRATE COMP | 01/15/200    | I200101008     | 20        | 46,000.00  | 40,000.00  | 6,000.00  |
|              | Sub Total                   |              |                |           | 69,000.00  | 60,000.00  | 9,000.00  |
| B0001        | BETAMETHASONE 17-VALERATE   | 01/15/200    | I200101008     | 40        | 5,600.00   | 4,800.00   | 800.00    |
|              | BETAMETHASONE 17-VALERATE   | 01/20/200    | I200101009     | 100       | 14,000.00  | 12,000.00  | 2,000.00  |
|              | Sub Total                   |              |                |           | 19,600.00  | 16,800.00  | 2,800.00  |
| C0001        | CIPROFLOXACIN HYDROCHLORIDE | 01/15/200    | I200101007     | 20        | 110,000.00 | 100,000.00 | 10,000.00 |
|              | Sub Total                   |              |                |           | 110,000.00 | 100,000.00 | 10,000.00 |
| F0001        | FURAZOLIDONE                | 01/20/200    | I200101009     | 50        | 13,500.00  | 12,500.00  | 1,000.00  |
|              | Sub Total                   |              |                |           | 13,500.00  | 12,500.00  | 1,000.00  |
|              | Grand Total                 |              |                |           | 212,100.00 | 189,300.00 | 22,800.00 |

Figure B.15. Profit Analysis by Product Report.



# Central Chemi-Pharm Ltd., Part

Address : 551/1 Sukhumvit 103 Sukhumvit Rd., Bangjak Prakanon,  
Bangkok 10260 Tel No.: (662) 3984952-6  
Fax No. : (662) 3984957

## PURCHASE ORDER

Purchase Date 07/09/2001

Purchase Order No. : P200101001

Supplier : SUAHOU MEDICINES & HEALTH PRODUCTS  
Address : SU XU HIGHWAY NO. 15, SUAHOU, CHINA 95000

| PO No.     | Product Code | Product Name                | Order Quantity | Order Price | Currency | Amount    | Packing    |
|------------|--------------|-----------------------------|----------------|-------------|----------|-----------|------------|
| P200101001 | A0004        | AMOXICYCLIN TRIHYDRATE COMP | 200            | 60          | USD      | 12,000.00 | 10 KG NET  |
| P200101001 | D0001        | DEXAMETHASONE MICRO         | 4,000          | 12          | USD      | 48,000.00 | 500 GM NET |
| Total      |              |                             |                |             | USD      | 60,000.00 |            |

Payment : L/C 180 Days

Shipment : JAN-2001

Your faithfully

Figure B.16. Purchase Order.

# Central Chemi-Pharm Ltd., Part

551/1 Sukhumvit 103 Sukhumvit Rd., Bangjak Prakanong,  
Bangkok 10260 Tel No.: (662) 3984952-6

Fax No.: (662) 3984957

|  |
|--|
| Customer : Best Pharmaceutical Ltd., Part                    |
| Address : 110 Soi Saree 3 Ramkamhang 24 Rd, Huamark, Bangkok |
| Bangkok 10240  |

|                         |            |
|-------------------------|------------|
| INVOICE/RECEIPT         |            |
| Invoice/Receipt Number: | I200101007 |
| Date:                   | 01/15/2001 |

## COMPANY TAX NUMBER :

|             |                 |            |
|-------------|-----------------|------------|
| P.O. NUMBER | TERM OF PAYMENT | DUE DATE   |
| 20010090    | 60 Days         | 15/03/2001 |

| No.       | DESCRIPTION                       | QUANTITY | UNIT PRICE | AMOUNT     |
|-----------|-----------------------------------|----------|------------|------------|
| 1         | A0004 AMOXYCILLIN TRIHYDRATE COMP | 10       | 2,300      | 23,000.00  |
| 2         | C0001 CIPROFLOXACIN HYDROCHLORID  | 20       | 5,500      | 110,000.00 |
| SUB TOTAL |                                   |          |            | 133,000.00 |
| VAT       |                                   |          |            | 9,310.00   |
| TOTAL     |                                   |          |            | 142,310.00 |

|  |                      |
|--|----------------------|
| RECEIVED THE ABOVE IN GOOD ORDER AND CONDITION | Authorized Signature |
| NAME _____<br>DATE _____                       |                      |
| RECEIVED PAYMENT                               |                      |
| NAME _____<br>DATE _____                       |                      |

Figure B.17. Invoice/Receipt.



**APPENDIX C**  
**DATABASE DESIGN**

Table C.1. Structure of Customer Table.

| No. | Field Name        | Field Type | Description          |
|-----|-------------------|------------|----------------------|
| 1   | CustomerCode (PK) | Char(5)    | Customer Code        |
| 2   | Company           | Char(40)   | Company              |
| 3   | CustName          | Char(25)   | Customer Name        |
| 4   | CustSname         | Char(30)   | Customer Surname     |
| 5   | Address           | Char(80)   | Address              |
| 6   | Province          | Char(30)   | Province             |
| 7   | ZipCode           | Number     | Zip Code             |
| 8   | TelNo             | Char(20)   | Tel. Number          |
| 9   | FaxNo             | Char(20)   | Fax Number           |
| 10  | CustDate          | Date       | Customer Date        |
| 11  | BalAmt            | Number     | Balanced Amount      |
| 12  | CustDesc          | Char(50)   | Customer Description |

Table C.2. Structure of Product Table.

| No. | Field Name       | Field Type | Description       |
|-----|------------------|------------|-------------------|
| 1   | ProductCode (PK) | Char(5)    | Product Code      |
| 2   | ProductNameT     | Char(35)   | Product Name Thai |
| 3   | ProductNameE     | Char(35)   | Product Name Eng  |
| 4   | UnitCost         | Number     | Unit Cost         |
| 5   | UnitPrice        | Number     | Unit Price        |
| 6   | UnitCode         | Number     | Unit Code         |
| 7   | BalQty           | Number     | Balanced Quantity |
| 8   | MinQty           | Number     | Minimum Quantity  |
| 9   | LastDate         | Date       | Last Active Date  |
| 10  | Location         | Char(5)    | Location          |



Table C.3. Structure of Supplier Table.

| No. | Field Name    | Field Type | Description              |
|-----|---------------|------------|--------------------------|
| 1   | SuppCode (PK) | Char(5)    | Supplier Code            |
| 2   | Company       | Char(40)   | Company                  |
| 3   | SuppName      | Char(25)   | Supplier Name            |
| 4   | SuppSName     | Char(30)   | Supplier Surname         |
| 5   | Address       | Char(80)   | Address                  |
| 6   | Province      | Char(30)   | Province                 |
| 7   | ZipCode       | Number     | Zip Code                 |
| 8   | Country       | Char(35)   | Country                  |
| 9   | TelNo         | Char(20)   | Telephone Number         |
| 10  | FaxNo         | Char(20)   | Fax Number               |
| 11  | SuppDate      | Date       | Supplier Date            |
| 12  | SuppBal       | Number     | Supplier Balanced Amount |

Table C.4. Structure of Order Table.

| No. | Field Name | Field Type | Key Type                           |
|-----|------------|------------|------------------------------------|
| 1   | PONo (PK)  | Char(10)   | Purchase Order Number              |
| 2   | PODate     | Date       | Purchase Order Date                |
| 3   | SuppCode   | Char(5)    | Supplier Code                      |
| 4   | ConfirmNo  | Char(15)   | Confirmation Number                |
| 5   | PriceCond  | Char(30)   | Price Condition                    |
| 6   | Shipment   | Char(20)   | Shipment                           |
| 7   | InOut      | Char(1)    | 1 = Local (In)<br>2 = Abroad (Out) |
| 8   | Currency   | Char(3)    | Currency                           |
| 9   | Remark     | Char(30)   | Remark                             |
| 10  | Cancel     | Char(1)    | 0= No, 1=Cancel                    |
| 11  | PayType    | Char(20)   | Type of Payment                    |

Table C.5. Structure of Ordered Product Table.

| No. | Field Name       | Field Type | Key Type              |
|-----|------------------|------------|-----------------------|
| 1   | PONo (PK)        | Char(10)   | Purchase Order Number |
| 2   | ProductCode (PK) | Char(5)    | Product Code          |
| 3   | OrderQty         | Number     | Order Quantity        |
| 4   | OrderPrice       | Number     | Order Price           |
| 5   | Packing          | Char(30)   | Packing               |

Table C.6. Structure of Receiving Table.

| No. | Field Name     | Field Type | Description             |
|-----|----------------|------------|-------------------------|
| 1   | ReceiveNo (PK) | Char(10)   | Receiving Number        |
| 2   | PONo           | Char(10)   | Purchase Order Number   |
| 3   | ReceiveDate    | Date       | Received Date           |
| 4   | Currency       | Char(3)    | Currency                |
| 5   | Rate           | Number     | Currency Rate           |
| 6   | SuppInvNo      | Char(15)   | Supplier Invoice Number |
| 7   | Remark         | Char(100)  | Remark                  |

Table C.7. Structure of Received Product Table.

| No. | Field Name       | Field Type | Key Type          |
|-----|------------------|------------|-------------------|
| 1   | ReceiveNo (PK)   | Char(10)   | Receiving Number  |
| 2   | ProductCode (PK) | Char(5)    | Product Code      |
| 3   | RecQty           | Number     | Received Quantity |
| 4   | RecPrice         | Number     | Received Price    |
| 5   | RecAmt           | Number     | Received Amount   |
| 6   | RecVat           | Number     | Received Vat      |

Table C.8. Structure of Cancellation Table.

| No. | Field Name  | Field Type | Key Type              |
|-----|-------------|------------|-----------------------|
| 1   | PONo (PK)   | Char(10)   | Purchase Order Number |
| 2   | ProductCode | Char(5)    | Product Code          |
| 3   | CancelQty   | Number     | Cancel Quantity       |
| 4   | CancelDate  | Date       | Cancel Date           |
| 5   | Remark      | Char(100)  | Remark                |

Table C.9. Structure of Sales Table.

| No. | Field Name     | Field Type | Key Type                       |
|-----|----------------|------------|--------------------------------|
| 1   | InvoiceNo (PK) | Char(10)   | Invoice Number                 |
| 2   | InvoiceDate    | Date       | Invoice Date                   |
| 3   | CustomerCode   | Char(5)    | Customer Code                  |
| 4   | CreditTerm     | Char(25)   | Credit Term                    |
| 5   | CustPONo       | Char(15)   | Customer Purchase Order Number |
| 6   | Remark         | Char(100)  | Remark                         |

Table C.10. Structure of Sales Product Table.

| No. | Field Name       | Field Type | Key Type       |
|-----|------------------|------------|----------------|
| 1   | InvoiceNo (PK)   | Char(10)   | Invoice Number |
| 2   | ProductCode (PK) | Char(5)    | Product Code   |
| 3   | SaleQty          | Number     | Sales Quantity |
| 4   | UnitPrice        | Number     | Unit Price     |
| 5   | SaleAmt          | Number     | Sales Amount   |
| 6   | SaleVat          | Number     | Sales Vat      |

Table C.11. Structure of Credit Note Table.

| No. | Field Name    | Field Type | Key Type           |
|-----|---------------|------------|--------------------|
| 1   | CreditNo (PK) | Char(10)   | Credit Note        |
| 2   | InvoiceNo     | Char(10)   | Invoice Number     |
| 3   | CustCode      | Char(5)    | Customer Code      |
| 4   | CreditDesc    | Char(50)   | Credit Description |
| 5   | CreditDate    | Date       | Credit Date        |
| 6   | Remark        | Char(100)  | Remark             |

Table C.12. Structure of Credit Note Detail Table.

| No. | Field Name    | Field Type | Key Type        |
|-----|---------------|------------|-----------------|
| 1   | CreditNo (PK) | Char(10)   | Credit Number   |
| 2   | ProductCode   | Char(5)    | Product Code    |
| 3   | CreditQty     | Number     | Credit Quantity |
| 4   | CreditPrice   | Number     | Credit Price    |
| 5   | CreditAmt     | Number     | Credit Amount   |
| 6   | CreditVat     | Number     | Credit Vat      |



**APPENDIX D**  
**PROCESS SPECIFICATION**



Table D.1. Process Specification of Process 1.1.

|               |   |
|---------------|---|
| Process Name: | Record Customer Info.   |
| Data In:      | Customer info.  |
| Data Out:     | Customer record   |
| Process:      | 1. Receive customer information from contact customer such as customer data, customer name, address, telephone number, fax number, etc.<br>2. Add customer record into Customer table |
| Attachment:   | 1. Customer Entity<br>2. Data Store D1  |

Table D.2. Process Specification of Process 1.2.

|               |   |
|---------------|---|
| Process Name: | Record Supplier Info.   |
| Data In:      | Supplier info.  |
| Data Out:     | Supplier record   |
| Process:      | 1. Receive supplier information from both local supplier and abroad supplier such as supplier code, supplier name, address, telephone number, fax number etc.<br>2. Add supplier record into Supplier table |
| Attachment:   | 1. Supplier Entity<br>2. Data Store D3  |

Table D.3. Process Specification of Process 1.3.

|               |   |
|---------------|---|
| Process Name: | Record Product Info.  |
| Data In:      | Product info.   |
| Data Out:     | Product record  |
| Process:      | 1. Receive product information from supplier such as product name, unit, price, quantity etc.<br>2. Add product record into Product table |
| Attachment:   | 1. Supplier Entity<br>2. Data Store D2  |

Table D.4. Process Specification of Process 1.4.

|               |   |
|---------------|---|
| Process Name: | Update Unit Cost and Unit Price                     |
| Data In:      | Product info.                                       |
| Data Out:     | Unit Cost and Unit Price                            |
| Process:      | 1. Update unit cost and unit price in Product table |
| Attachment:   | 1. Data Store D2                                    |

Table D.5. Process Specification of Process 2.1.1.

|               |   |
|---------------|---|
| Process Name: | Check Confirmation  |
| Data In:      | 1. Confirmation information from supplier<br>2. Confirmation number from Order table  |
| Data Out:     | 1. Checking Info.   |
| Process:      | 1. Check new confirmation info. from Supplier<br>2. Select confirmation number from Order table for comparison<br>3. Send checking information to generate purchase order number, if it is new confirmation |
| Attachment:   | 1. Supplier Entity<br>2. Data Store D4<br>3. Process 2.1.2  |

Table D.6. Process Specification of Process 2.1.2.

|               |  |
|---------------|--|
| Process Name: | Generate Purchase Order Number   |
| Data In:      | 1. Maximum order number from Order table<br>2. Checking info.  |
| Data Out:     | 1. Purchase order number   |
| Process:      | 1. Receive checking info. from check confirmation process<br>2. Select maximum purchase order number from Order table<br>3. Generate new purchase order number<br>4. Show new order number on the screen |
| Attachment:   | 1. Data Store D4<br>2. Process 2.1.1<br>3. Process 2.1.3   |

Table D.7. Process Specification of Process 2.1.3.

|               |  |
|---------------|--|
| Process Name: | Record Purchase Order  |
| Data In:      | <ol style="list-style-type: none"> <li>1. Purchase order number</li> <li>2. Supplier info.</li> <li>3. Product info.</li> </ol>  |
| Data Out:     | <ol style="list-style-type: none"> <li>1. Purchase order record</li> <li>2. Ordered product record</li> <li>3. Purchase order info.</li> </ol>   |
| Process:      | <ol style="list-style-type: none"> <li>1. Show new purchase order number form P 2.1.2 automatically</li> <li>2. Select supplier info. from Supplier table</li> <li>3. Select product info. from Product table</li> <li>4. Save purchase order record into Order table</li> <li>5. Save ordered product record info into Ordered Product table</li> <li>6. Sent all of purchase order information to print purchase order form</li> </ol> |
| Attachment:   | <ol style="list-style-type: none"> <li>1. Data Store D2</li> <li>2. Data Store D3</li> <li>3. Data Store D4</li> <li>4. Data Store D5</li> <li>5. Process 2.1.2</li> <li>6. Process 2.1.4</li> </ol>   |

Table D.8. Process Specification of Process 2.1.4.

|               |   |
|---------------|---|
| Process Name: | Print Purchase Order  |
| Data In:      | <ol style="list-style-type: none"> <li>1. Purchase order information from P 2.1.3</li> <li>2. Ordered product info.</li> <li>3. Purchase order info.</li> </ol>   |
| Data Out:     | <ol style="list-style-type: none"> <li>1. Purchase order</li> </ol>   |
| Process:      | <ol style="list-style-type: none"> <li>1. Select ordered product info. from Ordered Product table.</li> <li>2. Select purchase order info. from Order table.</li> <li>3. Print out information into purchase order form and sent to supplier</li> </ol> |
| Attachment:   | <ol style="list-style-type: none"> <li>1. Supplier</li> <li>2. Data Store D5</li> <li>3. Process 2.1.3</li> </ol>   |

Table D.9. Process Specification of Process 2.2.1.

|               |  |
|---------------|--|
| Process Name: | Check Purchase Order Number  |
| Data In:      | 1. Purchase order cancellation info.<br>2. Purchase order number   |
| Data Out:     | 1. Checking info.  |
| Process:      | 1. Receive purchase order cancellation info. from supplier.<br>2. Select purchase order number from Order table for comparison with purchase order from supplier<br>3. Sent Checking info to P 2.2.2 |
| Attachment:   | 1. Supplier<br>2. Data Store D4  |

Table D.10. Process Specification of Process 2.2.2.

|               |  |
|---------------|--|
| Process Name: | Cancel Purchase Order  |
| Data In:      | 1. Checking info.<br>2. Supplier info.<br>3. Product info.<br>4. Purchase order info.<br>5. Ordered product info.  |
| Data Out:     | 1. Purchase order cancellation info.<br>2. Cancellation product info.  |
| Process:      | 1. Select purchase order info. from Order table<br>2. Select ordered product info. from Ordered Product table<br>3. Record purchase order cancellation info. into Order table<br>4. Record cancellation product info. into Ordered Product table<br>5. Record cancellation info. into Cancellation table |
| Attachment:   | 1. Data Store D2<br>2. Data Store D3<br>3. Data Store D4<br>4. Data Store D5<br>5. Data Store D8<br>6. Process 2.2.1   |



Table D.11. Process Specification of Process 3.1.

|               |   |
|---------------|---|
| Process Name: | Check Packing List  |
| Data In:      | 1. Packing list info.<br>2. Receiving info.   |
| Data Out:     | 1. Checking info.   |
| Process:      | 1. Receive packing list information from supplier<br>2. Select packing list number from Receiving table for comparison with packing list number from supplier<br>3. Send checking info to P 3.2 |
| Attachment:   | 1. Supplier Entity<br>2. Data Store D6  |

Table D.12. Process Specification of Process 3.2.

|               |   |
|---------------|---|
| Process Name: | Generate Receiving Number   |
| Data In:      | 1. Checking info.<br>2. Receiving number  |
| Data Out:     | 1. Receiving number   |
| Process:      | 1. Receive checking info from P 3.1<br>2. Select maximum receiving number from Receiving table<br>3. Generate new receiving number<br>4. Send receiving number to P 3.3 |
| Attachment:   | 1. Data Store D6<br>2. Process 3.1<br>3. Process 3.3  |

Table D.13. Process Specification of Process 3.3.

|               |  |
|---------------|--|
| Process Name: | Record Receiving Product   |
| Data In:      | 1. Order information<br>2. Ordered product information<br>3. Receiving number<br>4. Product info.  |
| Data Out:     | 1. Receiving record<br>2. Received product record<br>3. Receiving info.<br>4. Received quantity  |
| Process:      | 1. Select order information from Order table<br>2. Select product information of purchase order from Ordered Product table<br>3. Save receiving record into Receiving table<br>4. Save product record of receiving into Received Product table<br>5. Send received quantity to P 3.4<br>6. Send receiving information to P 3.5 |
| Attachment:   | 1. Data Store D2<br>2. Data Store D4<br>3. Data Store D5<br>4. Data Store D6<br>5. Process 3.2<br>6. Process 3.4<br>7. Process 3.5   |

Table D.14. Process Specification of Process 3.4.

|               |  |
|---------------|--|
| Process Name: | Increase Product in Stock  |
| Data In:      | 1. Received quantity from P 3.3  |
| Data Out:     | 1. Received quantity   |
| Process:      | 1. Receive product quantity from P 3.3<br>2. Update balanced quantity into Product table |
| Attachment:   | 1. Data Store D2<br>2. Process 3.3   |

Table D.15. Process Specification of Process 3.5.

|               |   |
|---------------|---|
| Process Name: | Print Receiving Report  |
| Data In:      | 1. Receiving information<br>2. Received product information   |
| Data Out:     | 1. Receiving information  |
| Process:      | 1. Select receiving information from Receiving table<br>2. Select product information of receiving from Received Product table<br>3. Generate receiving report<br>4. Sent receiving report to accounting department |
| Attachment:   | 1. Accounting Entity<br>2. Data Store D5<br>3. Data Store D6<br>4. Process 3.3  |

Table D.16. Process Specification of Process 4.1.1.

|               |  |
|---------------|--|
| Process Name: | Check Balanced Quantity  |
| Data In:      | 1. Customer order information<br>2. Balanced quantity  |
| Data Out:     | 1. Checking information  |
| Process:      | 1. Receive customer order information from customer<br>2. Retrieve balanced quantity from Product table<br>3. Check the order quantity with balanced quantity to allocate order quantity to customer<br>4. Sent checking info. P 4.1.2 |
| Attachment:   | 1. Customer Entity<br>2. Data Store D2<br>3. Process 4.1.2   |

Table D.17. Process Specification of Process 4.1.2.

|               |  |
|---------------|--|
| Process Name: | Generate Invoice Number  |
| Data In:      | 1. Checking information<br>2. Invoice number   |
| Data Out:     | 1. Invoice number  |
| Process:      | 1. Receive checking information from P 4.1.1<br>2. Select maximum invoice number from Sales table<br>3. Generate new invoice number<br>4. Send new invoice number to P 4.1.3 |
| Attachment:   | 1. Data Store D9<br>2. Process 4.1.1<br>3. Process 4.1.3   |

Table D.18. Process Specification of Process 4.1.3.

|               |   |
|---------------|---|
| Process Name: | Record Product Sales  |
| Data In:      | 1. Invoice number from P 4.1.2<br>2. Customer information<br>3. Product information<br>4. Customer order info.  |
| Data Out:     | 1. Sales record<br>2. Sales product record<br>3. Sales quantity<br>4. Sales amount  |
| Process:      | 1. Receive new invoice number from P 4.1.2<br>2. Select balanced product quantity from Product table<br>3. Select product code and name from Product table<br>4. Select customer information from Customer table<br>5. Save sales information into Sales table<br>6. Save each product record of sales into Sales Product table |
| Attachment:   | 1. Data Store D1<br>2. Data Store D2<br>3. Data Store D9<br>4. Data Store D10<br>5. Process 4.1.2<br>6. Process 4.1.4<br>7. Process 4.1.5   |

Table D.19. Process Specification of Process 4.1.4.

|               |   |
|---------------|---|
| Process Name: | Increase Customer Total Amount  |
| Data In:      | 1. Sales amount   |
| Data Out:     | 1. Sales amount   |
| Process:      | 1. Receive sales amount from P 4.1.3<br>2. Increase customer total amount in Customer table |
| Attachment:   | 1. Data Store D1<br>2. Process 4.1.3  |

Table D.20. Process Specification of Process 4.1.5.

|               |  |
|---------------|--|
| Process Name: | Reduce Balanced Quantity   |
| Data In:      | 1. Sales quantity  |
| Data Out:     | 1. Sales quantity  |
| Process:      | 1. Receive sales quantity from P 4.1.3<br>2. Reduce balanced quantity in Product table |
| Attachment:   | 1. Data Store D2<br>2. Process 4.1.3   |



Table D.21. Process Specification of Process 4.1.6.

|               |  |
|---------------|--|
| Process Name: | Print Invoice/Receipt  |
| Data In:      | 1. Sales information<br>2. Sales product information   |
| Data Out:     | 1. Invoice/Receipt   |
| Process:      | 1. Select sales information from Sales table<br>2. Select each product information of sales from Sales Product table<br>3. Print invoice information to customer |
| Attachment:   | 1. Customer Entity<br>2. Accounting Department<br>3. Data Store D9<br>4. Data Store D10  |

Table D.22. Process Specification of Process 4.2.1.

|               |  |
|---------------|--|
| Process Name: | Check Sales Information  |
| Data In:      | 1. Credit information<br>2. Sales information  |
| Data Out:     | 1. Checking information<br>2. Credit information   |
| Process:      | 1. Receive credit information from customer<br>2. Select sales information from Sales table for comparison<br>3. Check credit information with sales information |
| Attachment:   | 1. Customer Entity<br>2. Data Store D9<br>3. Process 4.2.2   |

Table D.23. Process Specification of Process 4.2.2.

|               |  |
|---------------|--|
| Process Name: | Generate Credit Note Number  |
| Data In:      | 1. Checking information<br>2. Credit note number   |
| Data Out:     | 1. Credit note number  |
| Process:      | 1. Receive checking information from P 4.2.1<br>2. Select maximum credit note number from Credit Note table<br>3. Generate new credit note number<br>4. Sent credit note number to P 4.2.3 |
| Attachment:   | 1. Data Store D11<br>2. Process 4.2.1  |

Table D.24. Process Specification of Process 4.2.3.

|               |   |
|---------------|---|
| Process Name: | Record Credit Note Information  |
| Data In:      | <ol style="list-style-type: none"> <li>1. Credit information</li> <li>2. Credit note number</li> <li>3. Sales product information</li> <li>4. Sale information</li> <li>5. Product information</li> </ol>   |
| Data Out:     | <ol style="list-style-type: none"> <li>1. Credit note record</li> <li>2. Credit product record</li> <li>3. Credit amount</li> <li>4. Return quantity</li> </ol>   |
| Process:      | <ol style="list-style-type: none"> <li>1. Receive credit info from P 4.2.1</li> <li>2. Receive credit note number from P 4.2.2</li> <li>3. Save credit note record into Credit Note table</li> <li>4. Save each product information of credit note into Credit Note Detail table</li> <li>5. Send credit amount to P 4.2.4</li> <li>6. Send return quantity to P 4.2.5</li> </ol> |
| Attachment:   | <ol style="list-style-type: none"> <li>1. Data Store D2</li> <li>2. Data Store D9</li> <li>3. Data Store D10</li> <li>4. Data Store D11</li> <li>5. Data Store D12</li> <li>6. Process 4.2.1</li> <li>7. Process 4.2.2</li> <li>8. Process 4.2.4</li> <li>9. Process 4.2.5</li> </ol>   |

Table D.25. Process Specification of Process 4.2.4.

|               |   |
|---------------|---|
| Process Name: | Reduce Customer Total Amount  |
| Data In:      | 1. Credit amount  |
| Data Out:     | 1. Credit amount  |
| Process:      | <ol style="list-style-type: none"> <li>1. Receive credit amount from P 4.2.3</li> <li>2. Reduce total amount in Customer table</li> </ol> |
| Attachment:   | <ol style="list-style-type: none"> <li>1. Data Store D1</li> <li>2. Process 4.2.3</li> </ol>  |

Table D.26. Process Specification of Process 4.2.5.

|               |   |
|---------------|---|
| Process Name: | Increase Balanced Quantity  |
| Data In:      | 1. Return quantity  |
| Data Out:     | 1. Return quantity  |
| Process:      | 1. Receive returned quantity from P 4.2.3<br>2. Increase balanced quantity in Product table |
| Attachment:   | 1. Data Store D2<br>2. Process 4.2.3  |

Table D.27. Process Specification of Process 4.2.6.

|               |   |
|---------------|---|
| Process Name: | Print Credit Note   |
| Data In:      | 1. Credit note information<br>2. Credit product information   |
| Data Out:     | 1. Credit note  |
| Process:      | 1. Retrieve credit note information from Credit Note table<br>2. Retrieve credit product information from Credit Note Detail table<br>3. Generate credit note form<br>4. Send credit note to customer and accounting department |
| Attachment:   | 1. Customer Entity<br>2. Accounting Department Entity<br>3. Data Store D2<br>4. Data Store D11<br>5. Data Store D12   |

Table D.28. Process Specification of Process 5.1.69

|               |  |
|---------------|--|
| Process Name: | Print All Product Code   |
| Data In:      | 1. Product information   |
| Data Out:     | 1. Product information   |
| Process:      | 1. Select product code, name, location and balanced quantity from Product table<br>2. Print out all selected product information to operation staff for processing P 5.2 |
| Attachment:   | 1. Data Store D2<br>2. Process 5.2   |

Table D.29. Process Specification of Process 5.2.

|               |   |
|---------------|---|
| Process Name: | Check Balanced Quantity   |
| Data In:      | 1. Product information  |
| Data Out:     | 1. Corrected balanced quantity  |
| Process:      | 1. Receive information from P 5.1<br>2. Compare actual balanced quantity in stock with report<br>3. Send corrected balanced quantity to P 5.3 |
| Attachment:   | 1. Process 5.1<br>2. Process 5.3  |

Table D.30. Process Specification of Process 5.3.

|               |   |
|---------------|---|
| Process Name: | Update Balanced Quantity  |
| Data In:      | 1. Corrected balanced quantity  |
| Data Out:     | 1. Corrected balanced quantity  |
| Process:      | 1. Receive corrected balanced quantity from P 5.2<br>2. Update corrected balanced quantity in Product table<br>3. Sent corrected balanced quantity to P 5.4 |
| Attachment:   | 1. Data Store D2<br>2. Process 5.2<br>3. Process 5.4  |

Table D.31. Process Specification of Process 5.4.

|               |   |
|---------------|---|
| Process Name: | Print Stock Checking Report   |
| Data In:      | 1. Corrected balanced quantity<br>2. Balanced quantity  |
| Data Out:     | 1. Summary stock checking report  |
| Process:      | 1. Retrieve balanced quantity from Product table<br>2. Receive corrected balanced quantity from P 5.3<br>3. Print summary report of stock checking to accounting department |
| Attachment:   | 1. Accounting Department Entity<br>2. Data Store D2<br>3. Process 5.3   |



Table D.32. Process Specification of Process 6.

|               |   |
|---------------|---|
| Process Name: | Generate Management Report  |
| Data In:      | <ol style="list-style-type: none"> <li>1. Customer info.</li> <li>2. Product info.</li> <li>3. Sales info.</li> <li>4. Sales Product info.</li> <li>5. Credit Note info.</li> <li>6. Credit Product info.</li> <li>7. Order info.</li> <li>8. Ordered Product info.</li> </ol>                              |
| Data Out:     | <ol style="list-style-type: none"> <li>1. Summary Order Report</li> <li>2. Stock Balanced Amount Report</li> <li>3. Sales Report by Customer</li> <li>4. Summary Sales Report</li> <li>5. History Sales Report</li> <li>6. Profit Analysis by Product Report</li> </ol>                                     |
| Process:      | <ol style="list-style-type: none"> <li>1. Print Summary Order Report</li> <li>2. Print Stock Balanced Amount Report</li> <li>3. Print Sales Report by Customer</li> <li>4. Print Summary Sales Report</li> <li>5. Print History Sales Report</li> <li>6. Print Profit Analysis by Product Report</li> </ol> |
| Attachment:   | <ol style="list-style-type: none"> <li>1. Management Entity</li> <li>2. Data Store D1</li> <li>3. Data Store D2</li> <li>4. Data Store D4</li> <li>5. Data Store D5</li> <li>6. Data Store D9</li> <li>7. Data Store D10</li> <li>8. Data Store D11</li> <li>9. Data Store D12</li> </ol>                   |



**APPENDIX E**  
**DATA DICTIONARY**

## DATA DICTIONARY

### Process 1. Record Master Data

Record master data process collects all data of customers, products and suppliers.

#### Data Flow Constructs

1. Customer Info. = Customer Company + Customer Name + Customer Surname + Address + Province + Zip Code + Tel. No. + Fax. No. + Customer Date + Balanced Amount + Customer Description
2. Supplier Info. = Supplier Company + Supplier Name + Supplier Surname + Address + Province + Zip Code + Country + Tel. No. + Fax No. + Supplier Date + Balanced Amount
3. Product Info. = Product Name Thai + Product Name English + Unit Cost + Unit Price + Unit Code + Balanced Quantity + Minimum Quantity + Last Active Date + Location
4. Customer Record = Customer Code + Customer Company + Customer Name + Customer Surname + Address + Province + Zip Code + Tel. No. + Fax. No. + Customer Date + Balanced Amount + Customer Description
5. Supplier Record = Supplier Code + Supplier Company + Supplier Name + Supplier Surname + Address + Province + Zip Code + Country + Tel. No. + Fax No. + Supplier Date + Balanced Amount
6. Product Record = Product Code + Product Name Thai + Product Name English + Unit Cost + Unit Price + Unit Code + Balanced Quantity + Minimum Quantity + Last Active Date + Location

## Process 2. Record Product Ordering

### Data Flow Construct

1. Confirmation Info. = Supplier Name + Confirmation Number + Price Condition +  
Note Type + Shipment + InOut + Currency Type + Product Name + Order Quantity  
+ Unit Cost + Packing
2. Product Info. = Product Code + Product Name Thai or Product Name English +  
Unit Code
3. Supplier Info. = Supplier Code + Supplier Name + Supplier Surname + Supplier  
Address
4. Purchase Order = Purchase Number + Purchase Date + Supplier Code +  
Confirmation Number + Price Condition + Note Type + Shipment + InOut +  
Currency Type + Remark + Product Code + Order Quantity + Unit Cost + Packing
5. Purchase Order Record = Purchase Number + Purchase Date + Supplier Code +  
Confirmation Number + Price Condition + Note Type + Shipment + InOut +  
Currency Type + Remark
6. Purchase Order Info. = Purchase Number + Purchase Date + Supplier Code +  
Confirmation Number + Price Condition + Note Type + Shipment + InOut +  
Currency Type + Remark
7. Order Product Record = Purchase Number + Product Code + Order Quantity +  
Unit Cost + Packing + Remark
8. Order Product Info. = Purchase Number + Product Code + Order Quantity +  
Unit Cost + Packing + Remark
9. Purchase Order Cancellation Info. = Purchase Number + Cancel
10. Cancellation Product Info. = Purchase Number + Product Code + Cancel Quantity



11. Cancellation Info. = Purchase Number + Product Code + Cancel Quantity +  
Cancel Date + Cancel Amount

12. Purchase Order Number = Purchase Order Number

13. Confirmation number = Confirmation number

### **Process 3. Receive Product**

#### **Data Flow Constructs**

1. Purchase Order Info. = Purchase Number + Purchase Date + Supplier Code +  
Confirmation Number + Price Condition + Note Type + Shipment + InOut +  
Currency Type + Remark
2. Order Product Info. = Purchase Number + Product Code + Order Quantity +  
Unit Cost + Packing + Remark
3. Packing List Info. = Supplier Invoice Number + Purchase Order Number +  
Packing Date + Currency Type + Packing Amount + Product Name + Product  
Quantity + Receive Cost
4. Received Product Record = Receive Number + Product Code + Received Qty  
Received Cost + Remark
5. Received Product Info. = Receive Number + Product Code + Received Qty  
Received Cost + Remark
6. Product Info. = Product Code + Product Name
7. Received Quantity = Received Quantity
8. Receiving Number = Receiving Number
9. Receiving Record = Receiving Number + Purchase Order Number + Received Date  
+ Currency Type + Supplier Invoice Number + Received Amount + Received Vat
10. Receiving Info. = Receiving Number + Purchase Order Number + Received Date  
+ Currency Type + Supplier Invoice Number + Received Amount + Received Vat

#### Process 4. Record Product Sales

##### Data Flow Construct

1. Customer Oder Info. = Product Name + Order Quantity
2. Sales Record = Invoice Number + Invoice Date + Delivery Date + Customer Code +  
Credit Term + Customer Purchase Order Number + Sales Amount + Sales Vat
3. Sales Info. = Invoice Number + Invoice Date + Delivery Date + Customer Code +  
Credit Term + Customer Purchase Order Number + Sales Amount + Sales Vat
4. Invoice Number = Invoice Number
5. Sales Product Record = Invoice Number + Product Code + Sales Quantity  
+ Unit Price + Remark
6. Sales Product Info. = Invoice Number + Product Code + Sales Quantity + Unit Price  
+ Remark
7. Credit Note Record = Credit Note Number + Invoice Number + Customer Code +  
Credit Amount + Credit Vat + Credit Description + Credit Date
8. Credit Note Info. = Credit Note Number + Invoice Number + Customer Code +  
Credit Amount + Credit Vat + Credit Description + Credit Date
9. Credit Product Record = Credit Note Number + Product Code + Credit Quantity +  
Credit Price + Credit Amount + Remark
10. Credit Product Info. = Credit Note Number + Product Code + Credit Quantity +  
Credit Price + Credit Amount + Remark
11. Customer Info. = Customer Code + Customer Name + Customer Surname +  
Customer Address
12. Credit Amount = Credit Amount
13. Sales Amount = Sales Amount
14. Product Info. = Product Code + Product Name

15. Sales Quantity = Product Sales Quantity
16. Return Quantity = Product Return Quantity
17. Invoice/Receipt = Invoice and receipt copy form
18. Credit Note = Credit Note
19. Credit Info. = Invoice Number + Return Quantity + Unit Price

#### **Process 5. Check Stock**

##### **Data Flow Constructs**

1. Product Info.= Product Code + Product Name + Balanced Quantity + Location
2. Corrected Balanced Quantity = Current balanced quantity from actual stock
3. Stock Checking Report = Stock Checking Form + Stocking Report

#### **Process 6. Generate Report**

##### **Data Flow Constructs**

1. Product Info = Product Code + Product Name
2. Customer Info. = Customer Code + Customer Name + Customer Surname
3. Order Info. = Purchase Order Number + Order Date + Supplier Code
4. Ordered Product Info. = Purchase Number + Product Code + Order Quantity +  
Unit Cost +
5. Sales Info. = Invoice Number + Invoice Date + Customer Code + Sales Amount +  
Sales Vat
6. Sales Product Info. = Invoice Number + Product Code + Sales Quantity + Unit Price
7. Credit Note Info. = Credit Note Number + Invoice Number + Credit Amount +  
Credit Vat
8. Credit Product Info. = Credit Note Number + Product Code + Credit Quantity +  
Credit Price + Credit Amount

9. Management Report = Summary Order Report + Stock Balanced Amount Report + Sales Report by Customer + Summary Sales Report + History Sales Report + Profit Analysis by Product Report







**APPENDIX F**  
**STRUCTURE CHART**

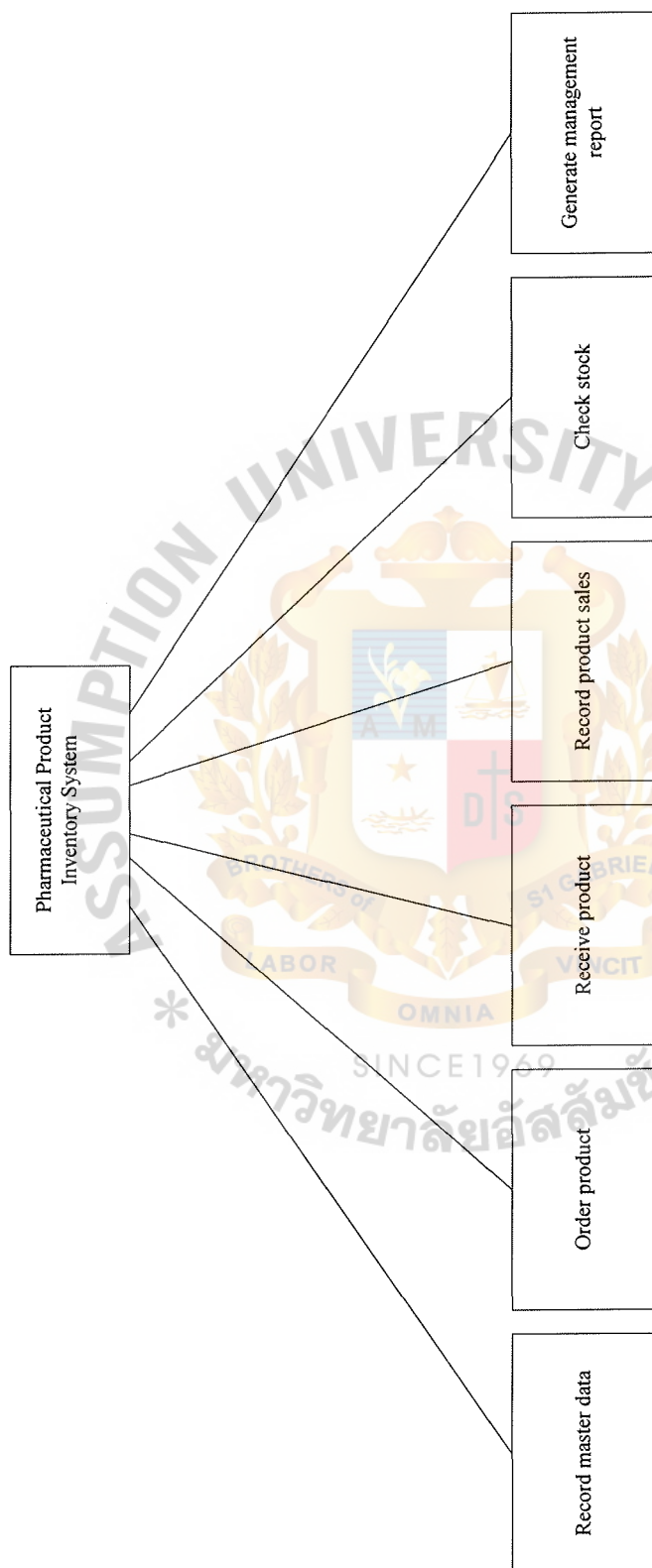


Figure F.1. Structure Chart for the Pharmaceutical Product Inventory System.

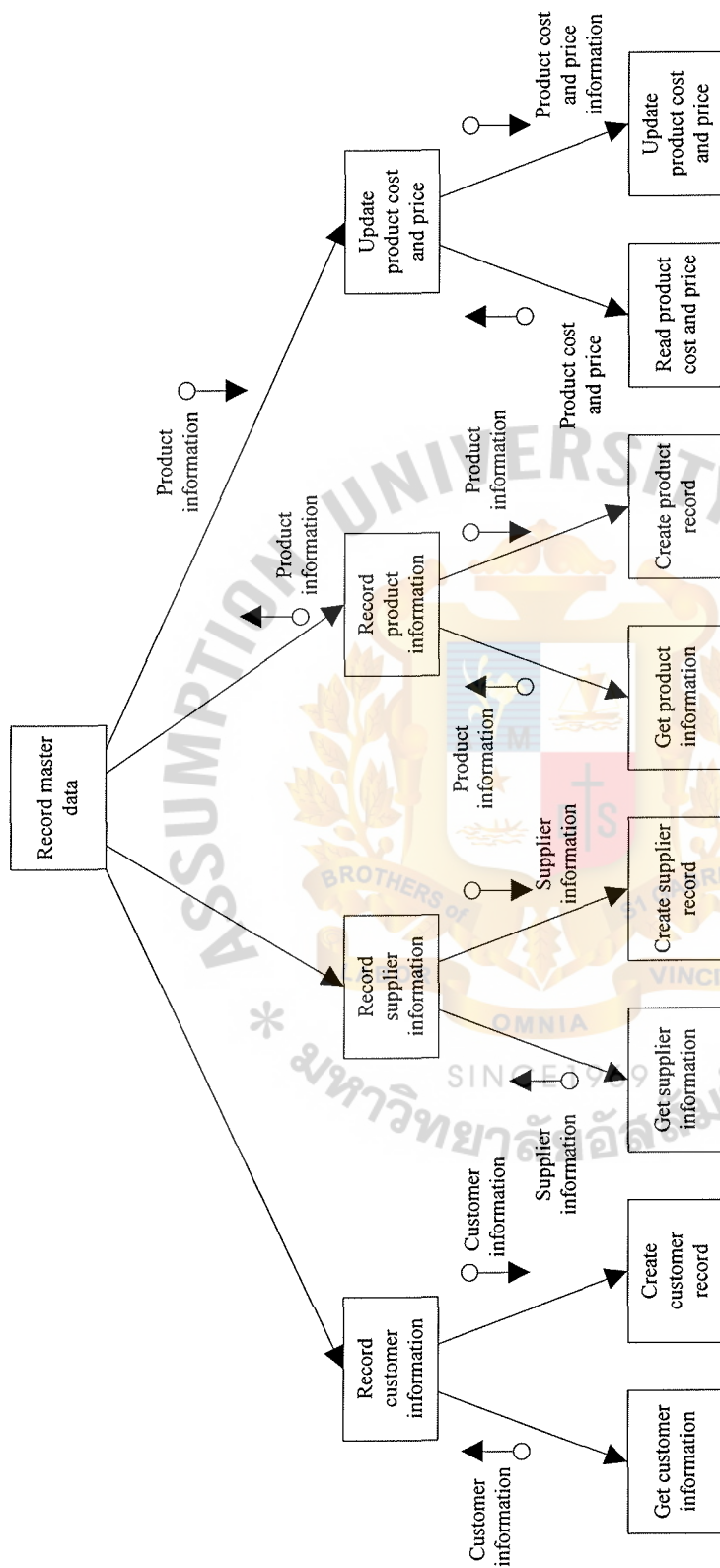


Figure F.2. Structure Chart for the Record Master Data Program.

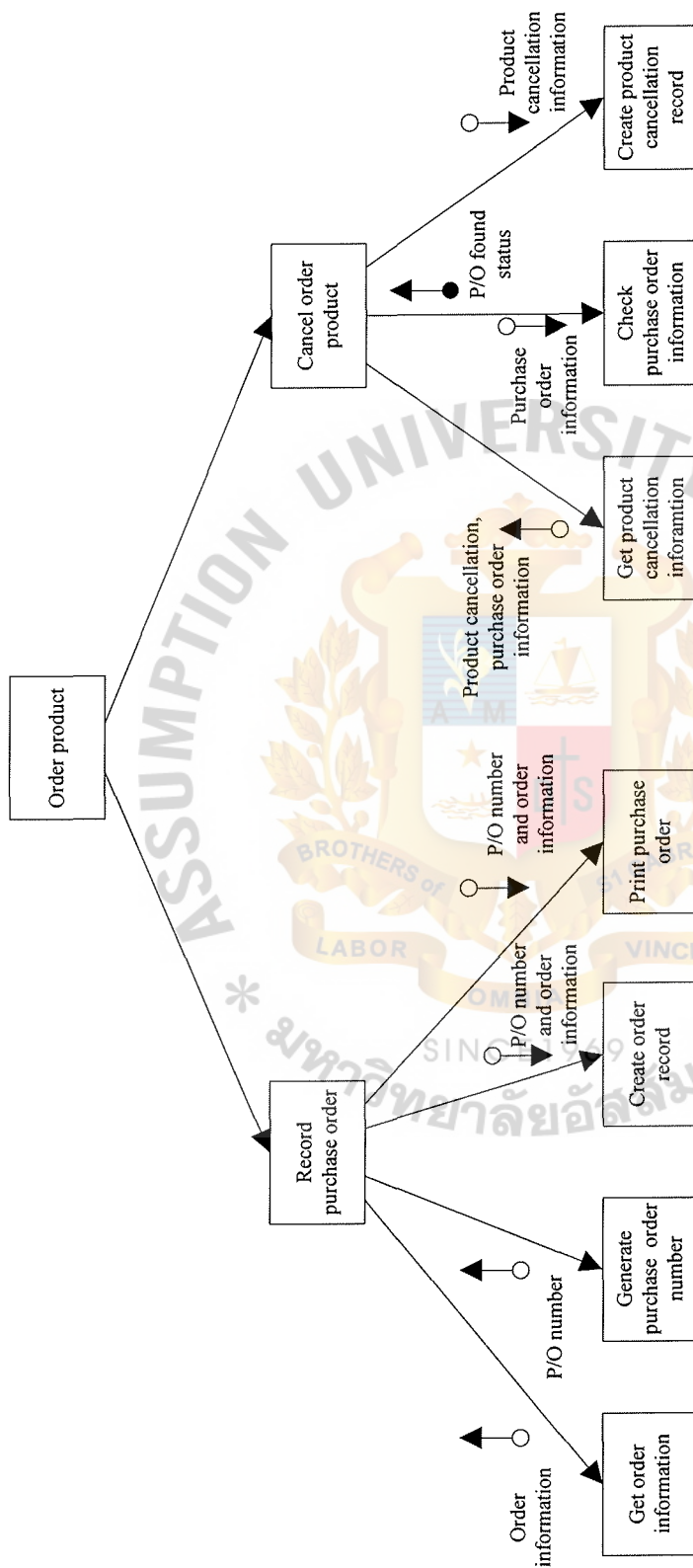


Figure F.3. Structure Chart for the Order Product Program.



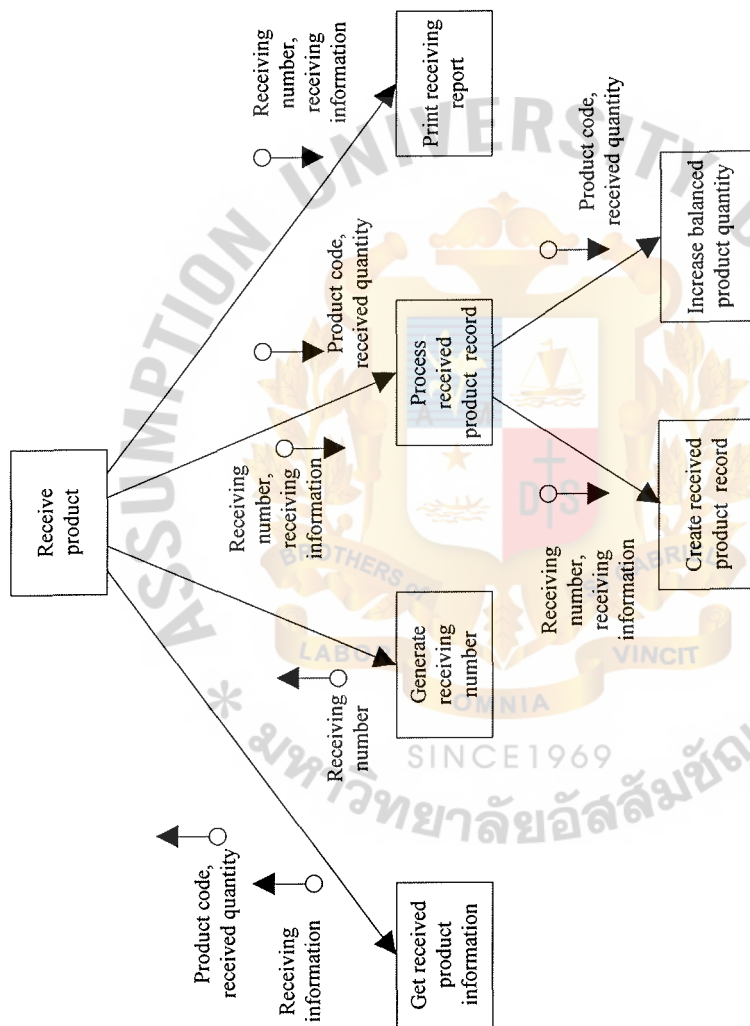


Figure F.4. Structure Chart for the Receive Product Program.

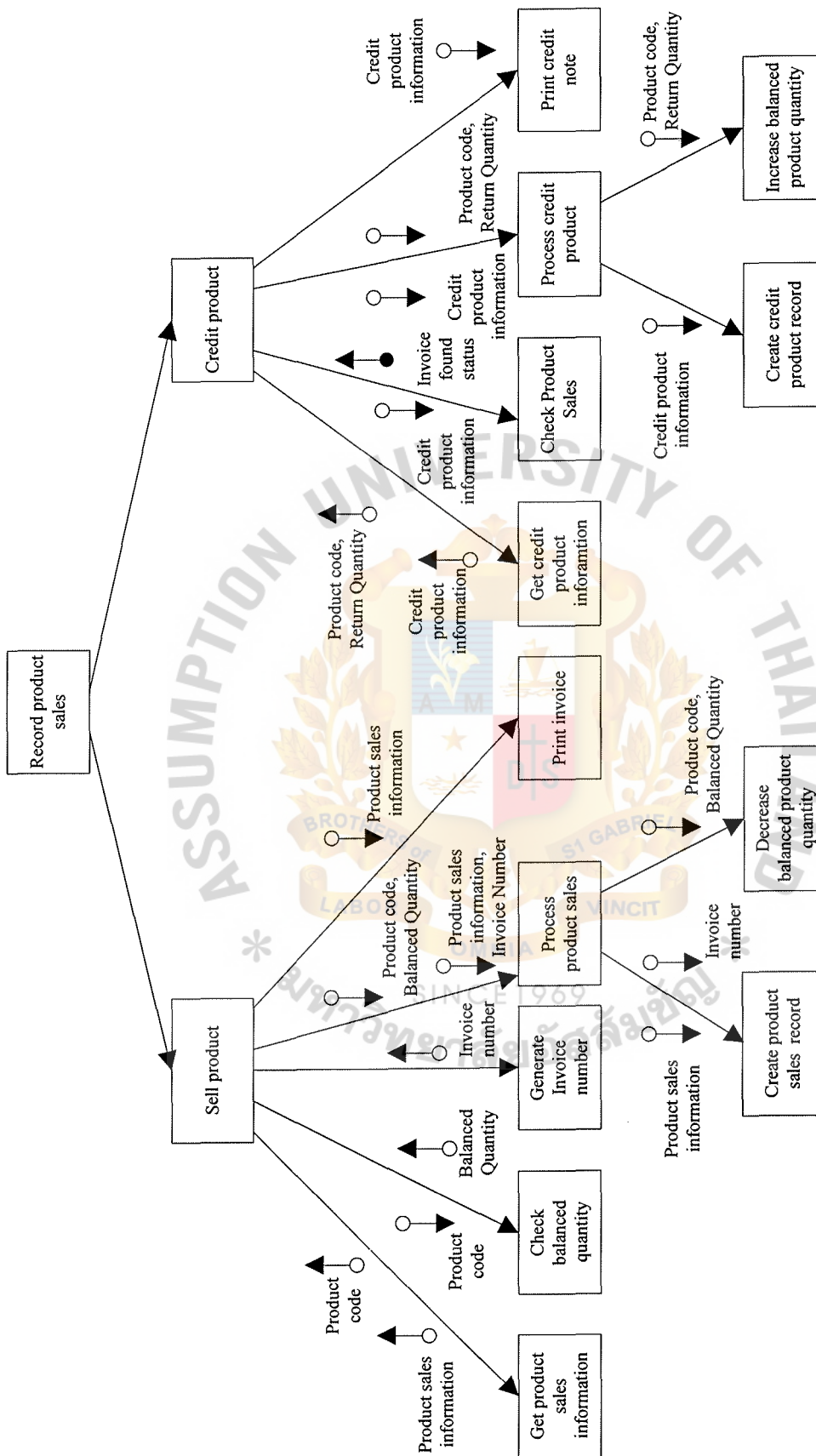


Figure F.5. Structure Chart for the Record Product Sales Program.

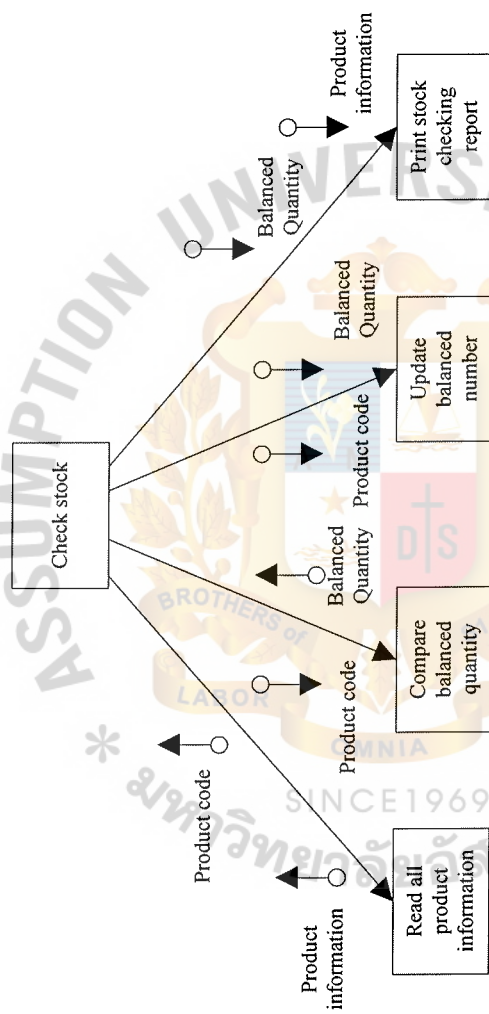


Figure F.6. Structure Chart for the Check Stock Program.

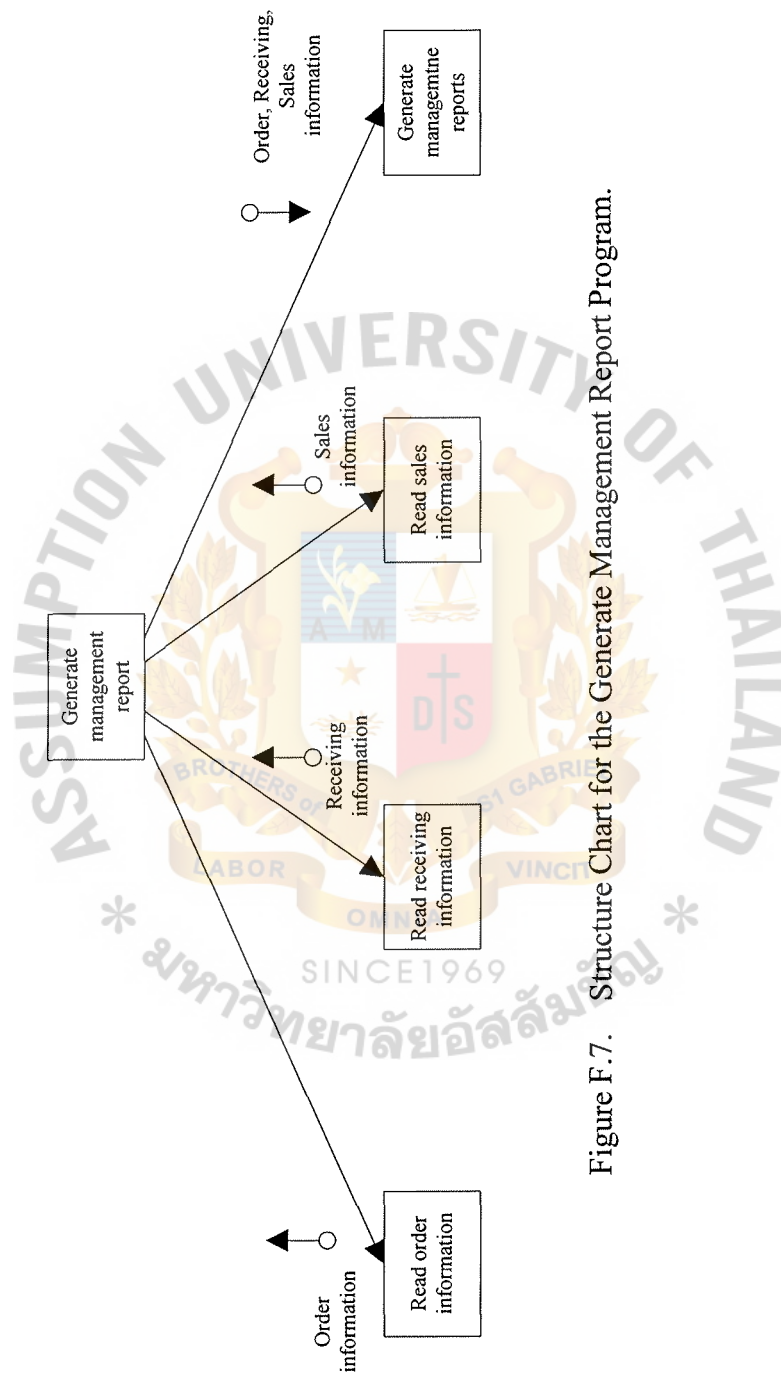


Figure F.7. Structure Chart for the Generate Management Report Program.



## BIBLIOGRAPHY

1. Carter, Gary, John Morse, Lisa Barry, Kirsten Sutton, and Mojgan Sami. Crystal Reports User's Guide. Vancouver: Seagate Software, Inc., 1996.
2. Date, C. J. An Introduction to Database System System, 6<sup>th</sup> Edition. NY: Addison-Wesley Publishing Company, 1995.
3. Fitzgerald, Jerry and Ardra Fitzgerald. Fundamentals of System Analysis. NY: John Wiley & Sons, Inc., 1987.
4. Kendall, Kenneth E. and Julie E. Kendall. System Analysis and Design, 2<sup>nd</sup> Edition. NY: Prentice Hall, Inc., 1995.
5. Laudon, Kenneth C. Management Information System, 5<sup>th</sup> Edition. NY: Prentice Hall, Inc., 1996.
6. Martin, James, Kathleen K. Chapman, and The Arben Group, Inc. Local Area Network Architectures and Implementations, International Editions. NY: Prentice Hall, Inc., 1989.
7. Page-Jones, Meilir. The Practical Guide to Structured System Design, 2<sup>nd</sup> Edition. NY: Yourdon Press, 1992.
8. Senn, James A. Analysis and Design of Information System, 2<sup>nd</sup> Edition. Georgia: McGraw Hill Publishing Company, 1989.
9. Webb, Jeff, Mike Mckelvy, Ronald R. Martinsen, Maxwell Taylor, and Regelski. Using Visual Basic 4. IN: Que Corporation, 1995.
10. Whitten, Jeffery L. and Lonnie D. Bentley, System Analysis and Design Methods. NY: McGraw Hill, 1998.
11. Yourdon, Edward. Modern Structure Analysis. NY: Prentice Hall International, Inc., 1989.