



Order Processing System for Garment Business

by

Ms. Narumon Chongputtipanich

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 Order Processing System for Garment Business


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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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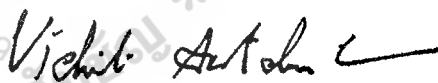
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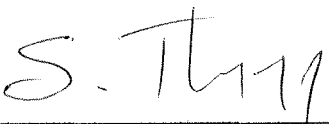
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March 2001

ABSTRACT

Lui Knitting Factory Ltd., Part. manufactures and sells men's shirts to many customers in Thailand. In order to improve the order processing system, a lot of processes are required, and it has to deal with several departments. Therefore, this project is to develop the effective information system to facilitate the process of order processing.

The current existing Order Processing System is based on the manual system. All data are stored on paper. The existing system requires many staffs to operate and maintain the system, and this leads to high labor costs. In addition, it also faces many general problems of the manual system that makes the system less effective.

The new proposed system will be developed to replace the existing system with an Intranet system. All data are kept in the database server, Microsoft SQL Server 7.0, and are accessed through the web server, Microsoft Internet Information Server 4.0 on Microsoft Windows NT 4.0. The user interfaces, moreover, are implemented on web browser, Microsoft Internet Explorer. It will reduce the number of staffs required in the process, solve the problems of manual system, and decrease the high maintenance cost. Moreover, it can support the management in making decision by providing reliable and accurate information and producing monthly reports.

ACKNOWLEDGEMENTS

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Finally, the writer is grateful to her parents and her friends for their supports throughout this course work.

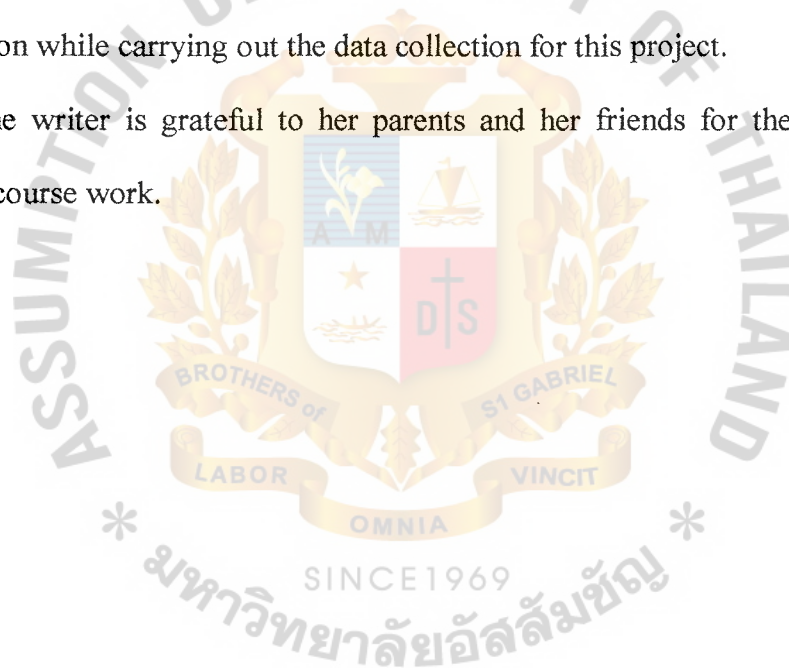


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I. INTRODUCTION

1.1 Background of the Project

The report is done according to the requirements of MS(CIS) program. CS 6998 System Development Project, which includes studying and analyzing the problems of the existing system, defining user requirements, and designing the appropriate computerized system for a company. This report concerns replacing the manual system of Lui Knitting Factory Ltd., Part. with the computerized system.

Lui Knitting Factory Ltd., Part was established in 1976, and is located on Charansanitwongse Road, Tapra, Bangkokyai Bangkok. The mission of the company is manufacturing and selling men's shirts with either long or short sleeves and with various sizes and color.

This report entails the Order Processing System of Lui Knitting Factory Ltd., Part., because all of the works in the existing system of the company are done manually and information that flows among departments cannot be done effectively. Additionally, each department does not have any computers to ease their jobs. This leads to many problems such as inconsistencies of data, incorrect pricing, inefficient reporting system, obsolete inventory data, and inability to keep track of customers.

In addition, the data are not kept in computers, so they are not in the utilized format. Users cannot simply retrieve the specific information and are having difficulty in searching data to meet their requirements. The company has to use a lot of pieces of paper in the working processes and has to keep a lot of those paper documents.

While the company has been growing, the data that are necessary to be kept are increasing as well. The company needs to change the system into more effective ways. Now Lui Knitting Factory Ltd., Part. has planned to expand the business to sell more products. Therefore, the company needs a new Order Processing System that can help

achieve their jobs faster, easier, more effective, and also decrease the amount of paper used in the working process.

1.2 Objectives of the Project

The objectives of developing the Order Processing System project for Lui Knitting Factory Ltd., Part. are as follows:

- (1) To study the existing system in order to understand the current working procedures and design the new computerized Order Processing System for future development.
- (2) To design database in the form of computer-based information for the projected Order Processing System.
- (3) To arrange and generate reports for management level in order to make a good strategic planning and system controlling.
- (4) To increase efficiency and effectiveness of the organization as a whole.

1.3 Scope of the Project

The project covers mainly the following parts of the Order Processing System of Lui Knitting Factory Ltd., Part.:

- (1) To analyze the system and design a computerized system for the projected Order Processing System.
- (2) To analyze the hardware and software for the projected Order Processing System.
- (3) To analyze and design the database for the projected Order Processing System.
- (4) To describe process specifications for the new system.
- (5) To design screen layouts and report layouts for users.

1.4 Deliverables

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

- (1) Screen Layouts or Interface for users
- (2) Report Layouts for users
- (3) Design of the new system
- (4) Design of the database

1.5 Project Plan

The plan of the project can be illustrated as follows:



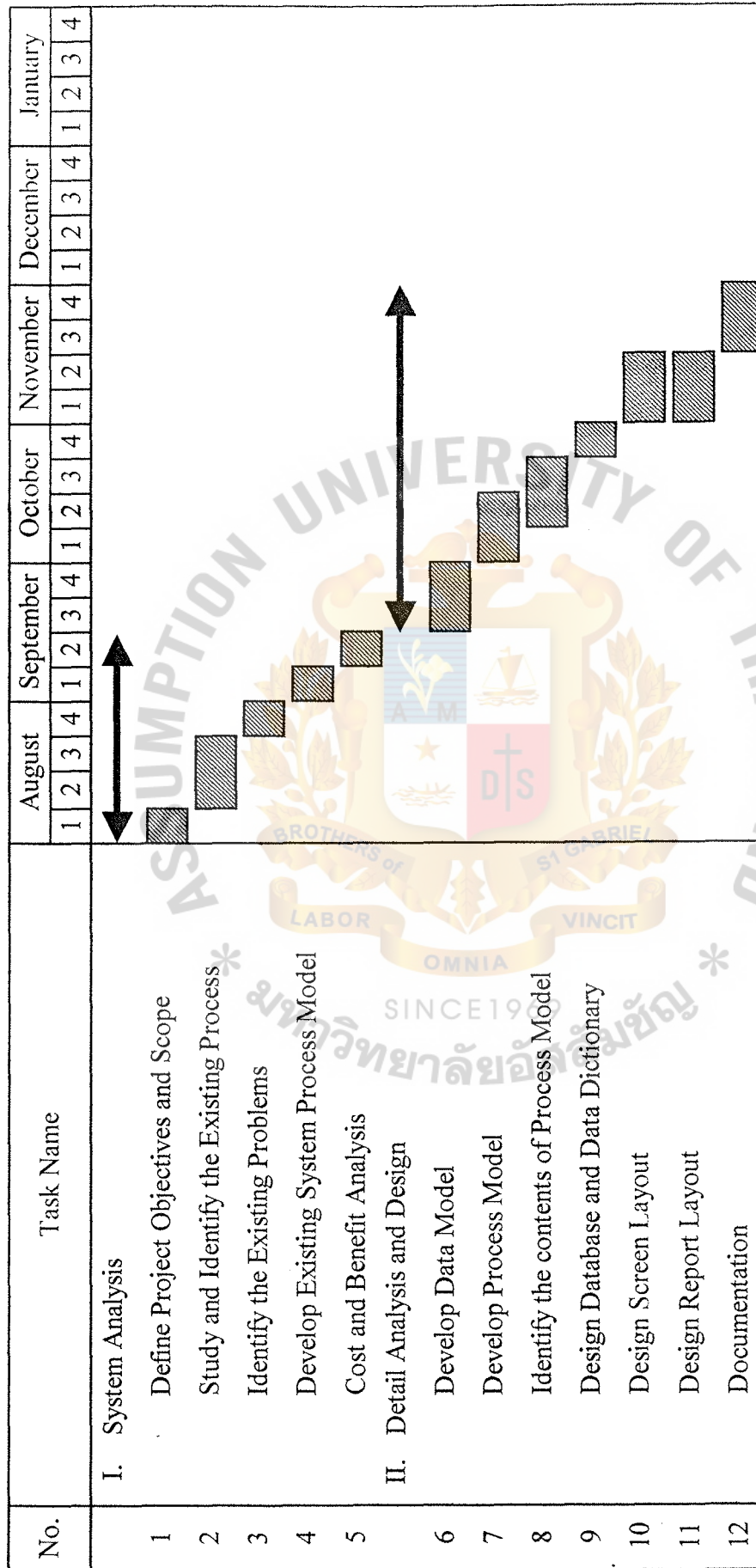


Figure 1.1. Project Plan of Order Processing System.

II. EXISTING SYSTEM

2.1 Background of Organization

Lui Knitting Factory Ltd., Part. was established in 1976, and is located on Charansanitwongse Road, Tapra, Bangkokyai, Bangkok. It has been a company selling good quality men's shirts with either short or long sleeves. The company manufactures various sizes and colors of products to meet the market demand. The company consists of three departments as follows:

- (1) Operation Department
- (2) Personnel & Accounting Department
- (3) Manufacturing & Warehouse Department

The job descriptions of each department are briefly described below:

- (1) Operation Department

The department consists of Salespersons and Operation Staffs.

- (a) Salespersons: As most of the customers are regular customers, the Salespersons have to keep in touch with the customers in order to get regular orders from them. At the same time, the Salespersons may approach potential customers to increase their sales volumes.

- (b) Operation Staffs: The orders, placed by customers, are processed mainly by Operation Staffs. The Operation Staffs are also responsible for collecting, and updating customer records.

- (2) Personnel & Accounting Department

The department consists of Personnel Staffs and Accounting Staffs.

- (a) Personnel Staffs: they are in charge of recruiting new employees, collecting, and updating employee records.

- (b) Accounting Staffs: Their major responsibilities are to handle the revenue and the expense transactions of the company. They are also responsible for costing and pricing the products, and customer payment transaction against invoice.

(3) Manufacturing & Warehouse Department

The department consists of Designers, Manufacturing Workers, and Warehouse Staffs.

- (a) Designers: The responsibilities of designers are to design and make pattern of products. They also have to select and make purchase of all material, such as fabric, button, thread, etc., for producing the products.
- (b) Manufacturing Workers: Manufacturing Workers are skilled labors who produce products for the company.
- (c) Warehouse Staffs: All finished products are kept in warehouse and the finished product records are handled by Warehouse Staffs. It is also the responsibility of the Warehouse Staffs to arrange and deliver the products to customers.

The organization structure of Lui Knitting Factory Ltd., Part. consists of:

- | | | | |
|-----|---------------|--------------------|---|
| (1) | Mr. Chalhuay | Jaru-arpornprateep | as the President |
| (2) | Mr. Sutud | Jaru-arpornprateep | as the Manager of Operation
Department |
| (3) | Ms. Vanna | Jaru-arpornprateep | as the Manager of Personnel &
Accounting Department |
| (4) | Ms. Valailuck | Jaru-arpornprateep | as the Manager of Manufacturing
& Warehouse Department |

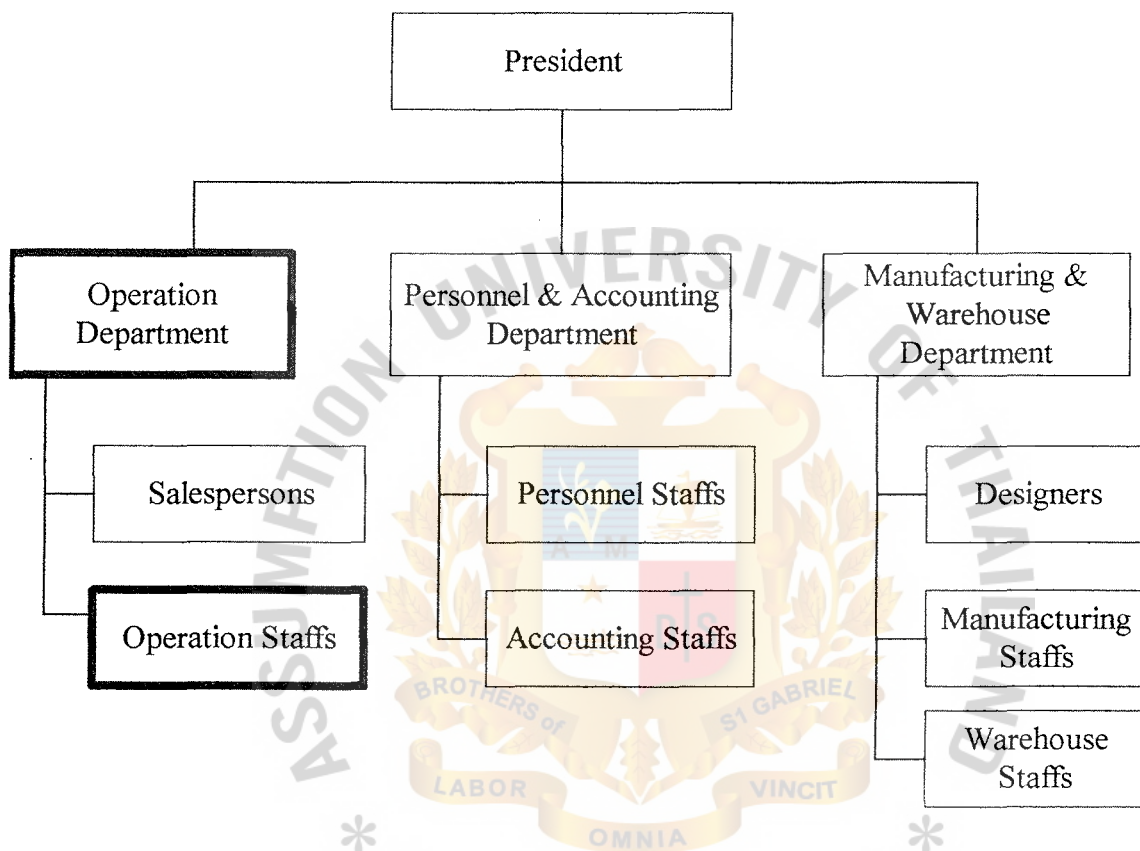


Figure 2.1. Organization Chart of Lui Knitting Factory Ltd., Part.

2.2 Current Problems and Areas of Improvement

The current problems of the existing system of Lui Knitting Factory Ltd., Part. are as follows:

- (1) Workflow is quite slow due to manual operation in the existing system.
- (2) The order response time is too high due to slow processing of the existing manual system.
- (3) Many staffs are needed to process the orders. This leads to high labor costs.
- (4) Many mistakes have occurred in ordering and tracking an order. This leads to delay in product delivery and customer payment.
- (5) The Operation Staffs have to handle too much paper documents, as the working procedures are done manually.
- (6) Data cannot be shared easily among different departments. This leads to the problems of data duplication, data redundancy, and data inconsistency.
- (7) Salespersons cannot know the accurate quantity of products in stock when customers place an order. Therefore, it is difficult for salespersons to set the appropriate delivery schedule.
- (8) A lot of duplicated information exists in each department, and the information is not up-to-date. This leads to information conflict among departments.
- (9) It is difficult to do the long-run sales planning because there is no accurate and up-to-date information about customers and sales records.
- (10) Delivery Order and Invoice issued manually are untidy.
- (11) It takes too much time to generate the reports.

The problems mentioned above focus on the following areas of improvement:

- (1) Data entry process should require the Operation Staffs to type or key in the details of order as less as possible. It should also be easy for them to retrieve customer details and product details that have already been kept in the system.
- (2) Data maintenance for updating the status of each order.
- (3) Automatically generating and printing the Delivery Order and Tax Invoice/Receipt for the company and the customers.
- (4) Generating and printing the reports for the management people.



2.3 Existing Business Function

Operation Department consists of Sales section and Operation section. In brief, the major responsibilities of Sales section are receiving and verifying orders from customers. The major responsibility of Operation section is issuing Delivery Order and Tax Invoice/Receipt. Delivery Order is forwarded to Warehouse Staff for making delivery. Accounting Staffs are taking care of customer payment against invoice. The detailed processes of the existing system are as follows:

- (1) A customer asks for product information such as price, description, and availability of products from Salesperson.
- (2) The customer places, as well as confirms, the order with Salesperson.
- (3) The Salesperson prepares and issues an order memo to Warehouse Staff. At the same time, the order is sent to Operation Staff who waits for the confirmed order memo from Warehouse Staff.
- (4) The Warehouse Staff checks the product in stock according to the order memo. If any product items are out of stock, the Warehouse Staff will inform the Manufacturing & Warehouse Manager that such product items should urgently be produced as they have already been ordered by customer. On the other hand, if all the items are available, Warehouse Staff will prepare delivery of products.
- (5) The Warehouse Staff confirms the order memo and forward it back to Operation Department to confirm delivery schedule to customer.
- (6) Operation Department approves the order memo and issue Delivery Order and Tax Invoice/Receipt to Warehouse Staff and Accounting Staff respectively.
- (7) Warehouse Staff delivers ordered products to customer.

- (8) Customer signs the Delivery Order to confirm that all products are received in good condition and correct quantity.
- (9) Warehouse Staff passes the signed Delivery Order to Operation Staff.
- (10) Accounting Staff collects money from customers according to their credit terms on each invoice.
- (11) Accounting Staff summarizes all cash collection transactions and submits the monthly customer payment report to the Management.
- (12) Operation Department summarizes all sales transactions, and submits monthly and annual sales report to the Management.
- (13) Manufacturing & Warehouse Department summarizes quantity of products in stock.



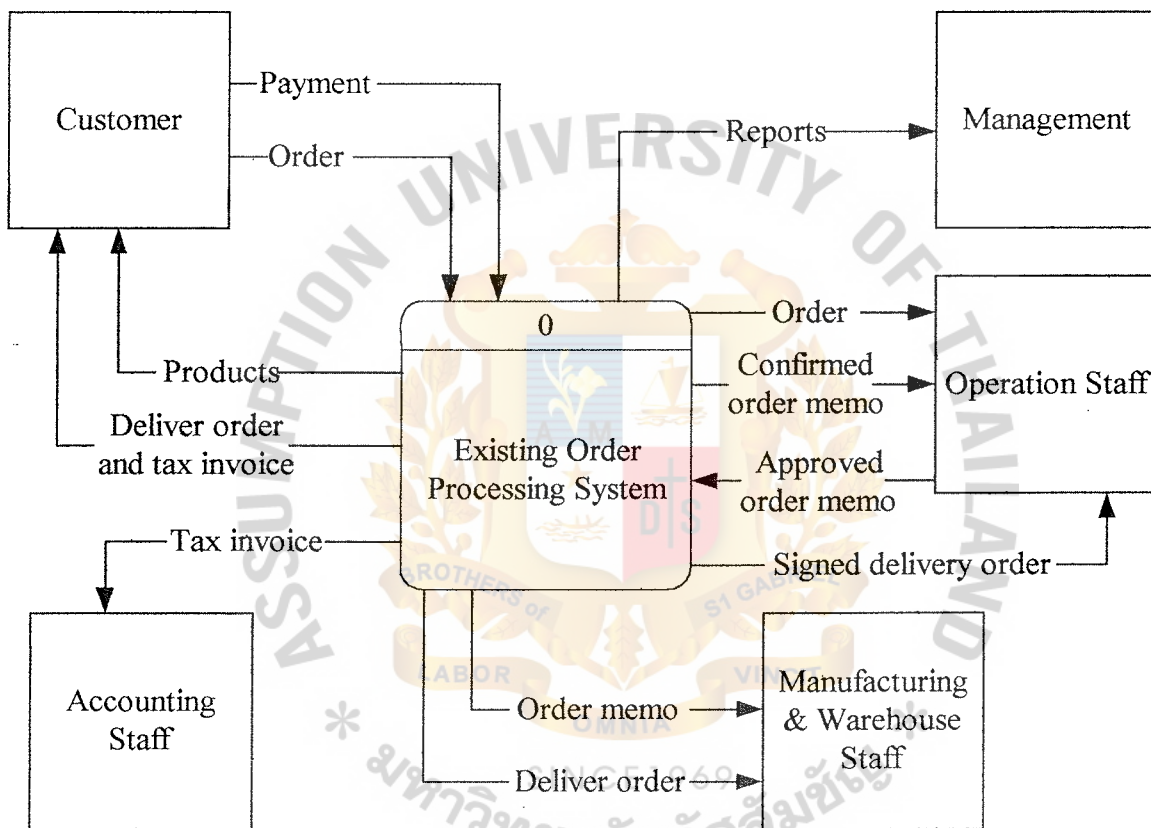


Figure 2.2. Context Level Data Flow Diagram of Existing Order Processing System.

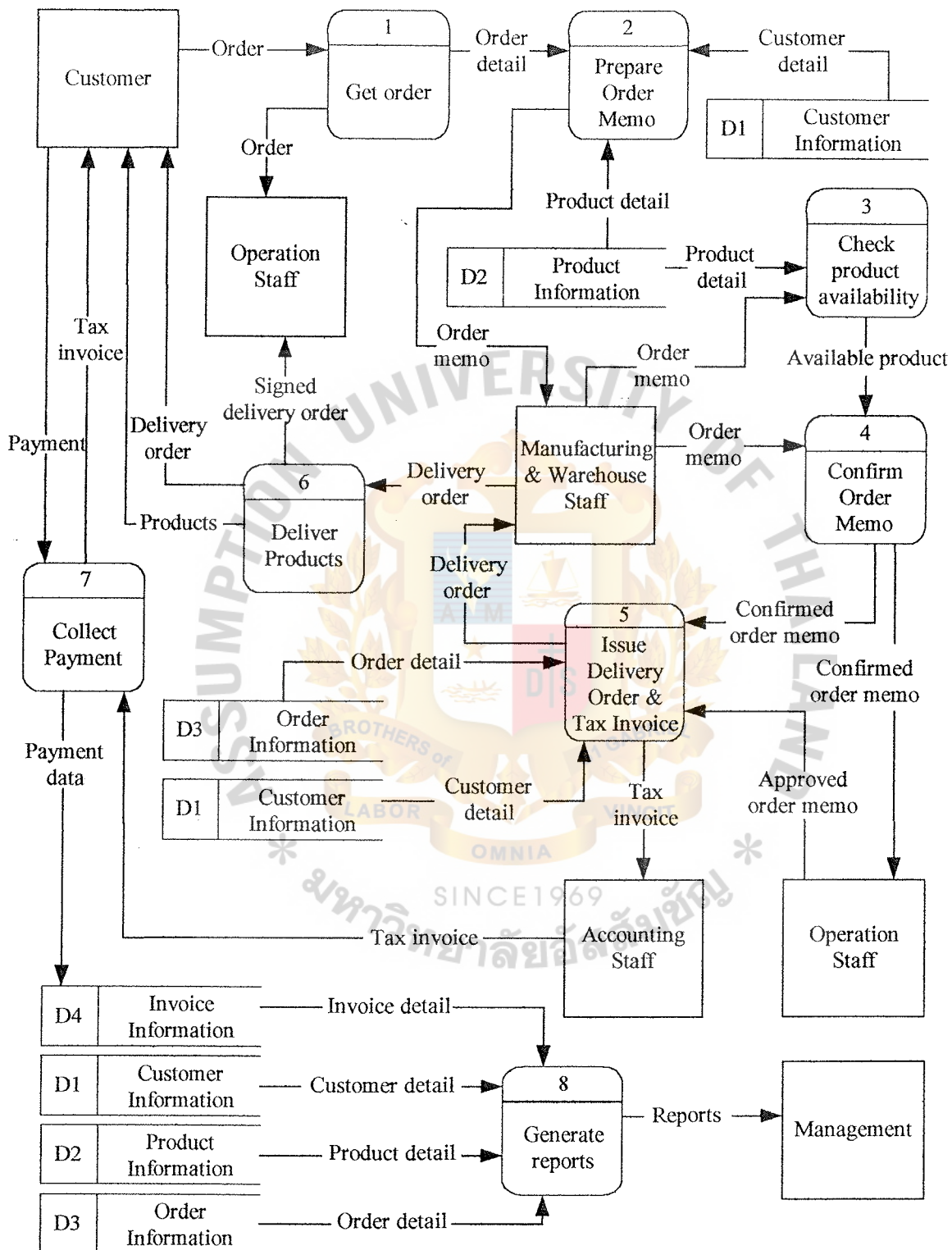


Figure 2.3. Level 0 Data Flow Diagram of Existing Order Processing System.

III. PROPOSED SYSTEM

3.1 System Specification

Application Architecture serves as the framework for general design. It defines the technologies used to build and used in the information systems of the project in terms of Network Architecture, Data Architecture, Interface Architecture, and Process Architecture. The proposed system selected is the Candidate 3, which is described in Appendix F. Followings are its application architecture.

3.1.1 Network Architectures

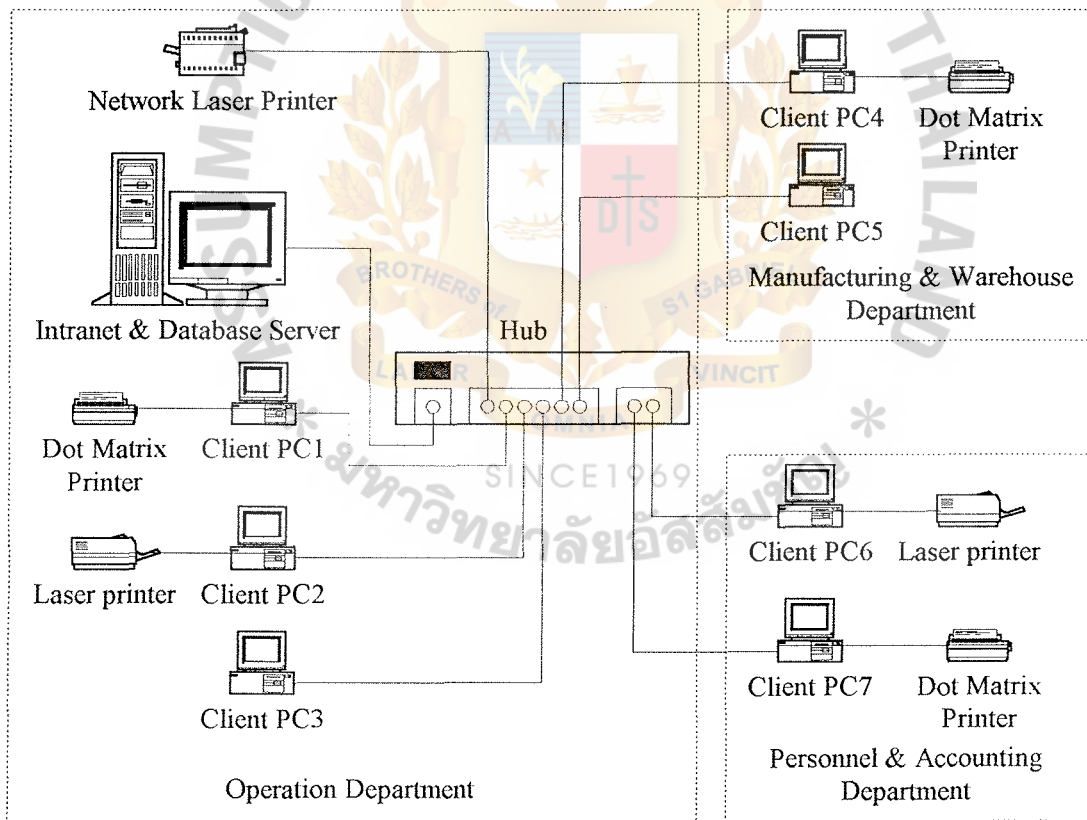


Figure 3.1. Network Architectures of Order Processing System.

Server : Intranet and Database Server

Client : Personal Computers

Topology : Star

The server and the client machines, PC1 – PC3, are installed at Operation Department. PC4 – PC5 are installed at Manufacturing & Warehouse Department, and PC6 – PC7 are installed at Personnel & Accounting Department.

Network Architecture for the proposed system is Intranet Client/Server that mainly consists of an Intranet & Database Server, and client machines. Star topology is used to link multiple computers through a computer server. The significant protocols to be used are TCP/IP and IPX.

All data are stored in the database server. Some appropriate business logic is programmed to execute on the server. Some may be downloaded from the server to execute on the client.

User interfaces are implemented on web browser. System interfaces will be controlled by the server. All database commands and instructions will be executed on the server.

Users can simply retrieve the data in the database via the network. When the system starts processing, all client machines will connect to the server. When client machines want to access the data in the database, the client machines only send database commands to be executed on the server. Then, the results will be sent from the server to the client machine. This can decrease the network traffic, as not all data in the database are sent through the network. Instead, only selected data are sent to the client machine as needed. Therefore, the amount of data passed through the network is not large.

3.1.2 Data Architecture

Relational Database Model is applied to the system. All data will be stored in the form of tables or relations that are integrated as the relational database. MS SQL Server is used to handle access and maintenance of the stored data and also to facilitate backup, recovery and security of data.

The database language to be used is SQL (Structured Query Language). SQL facilitates data definition, query, and update. Hence, it is both the DDL (Data Definition Language) and DML (Data Manipulation Language). In addition, it has facilities for defining views on the database, creating and dropping indexes on the files that represent relations, and embedding SQL statements into the programming language such as ASP.

3.1.3 Interface Architecture

The interface architecture is Online Processing since there are not many client machines and not many users using this system. Since we would like to keep track of customers, orders and products, online processing is suitable for this system. With online processing, when the user uses program on the client machine and if the work concerns update, insert, or delete data in the database, the program will send the database command to the database server to manipulate that data immediately. Online processing will always keep the data in the system up-to-date.

Online system enables business transactions and inquiries to be processed immediately when they occur. It permits greater human interaction in making decision. The required Delivery Order, Invoice, and reports can be generated immediately. In addition, updating the data online can increase the validation of data.

Graphical User Interfaces (GUIs) will be used. The user interface created must be common and user friendly. Microsoft Internet Explorer is used as the client software

tool or browser. User interface is created in the form of web page base with hypertext and hyperlinks. These links enable the users to navigate from page to page and application to application easily.

The client machines will be installed at the Operation Department to access and update records of customers and order transactions, and be installed at the Manufacturing & Warehouse Department to access and update inventory records and some product information. The client machines will also be installed at the Accounting Department to access and update some product information, including cost, price, and customer payment of each order transaction.

3.1.4 Process Architecture

Software Development Environments (SDEs) are software languages and tools that will be used to develop the business logic and application programs for the system. For the proposed Order Processing System, SDEs consist of MS Windows Server 2000, MS Internet Information Server (IIS), MS Active Server Pages, MS SQL Server, MS Internet Explorer, MS Visual InterDev, HTML, MS Windows ME, and MS Office 2000 Professional.

SDEs for Intranet client/server applications also consist of a client-based programming language with built-in SQL connectivity to one or more server database engines. These SDEs provide the following capabilities:

- (1) Rapid application development (RAD) for quickly building and testing the graphical user interface.
- (2) Automatic generation of the template code for the GUI and associated system events. Programmers only add the code for the business logic.
- (3) A programming language is compiled for replication and execution on client PCs.

- (4) Connectivity for various relational database engines and interoperability with those engines. Interoperability is achieved by including SQL database commands that will be sent to the database engine for execution on the server, for example, create, read, and update.



3.2 System Design

The proposed system is designed with the aim to solve the problems of the existing system as stated previously and to meet all user requirements as well.

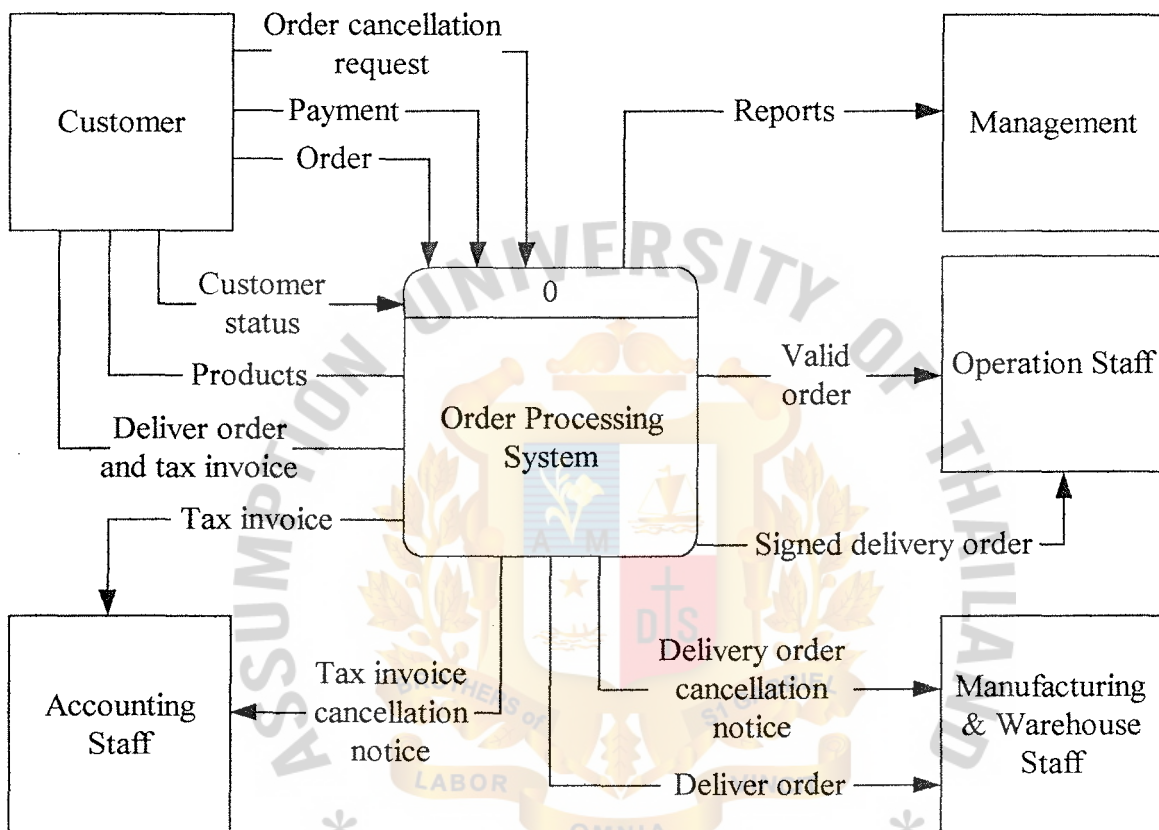


Figure 3.2. Context Level Data Flow Diagram of Order Processing System.

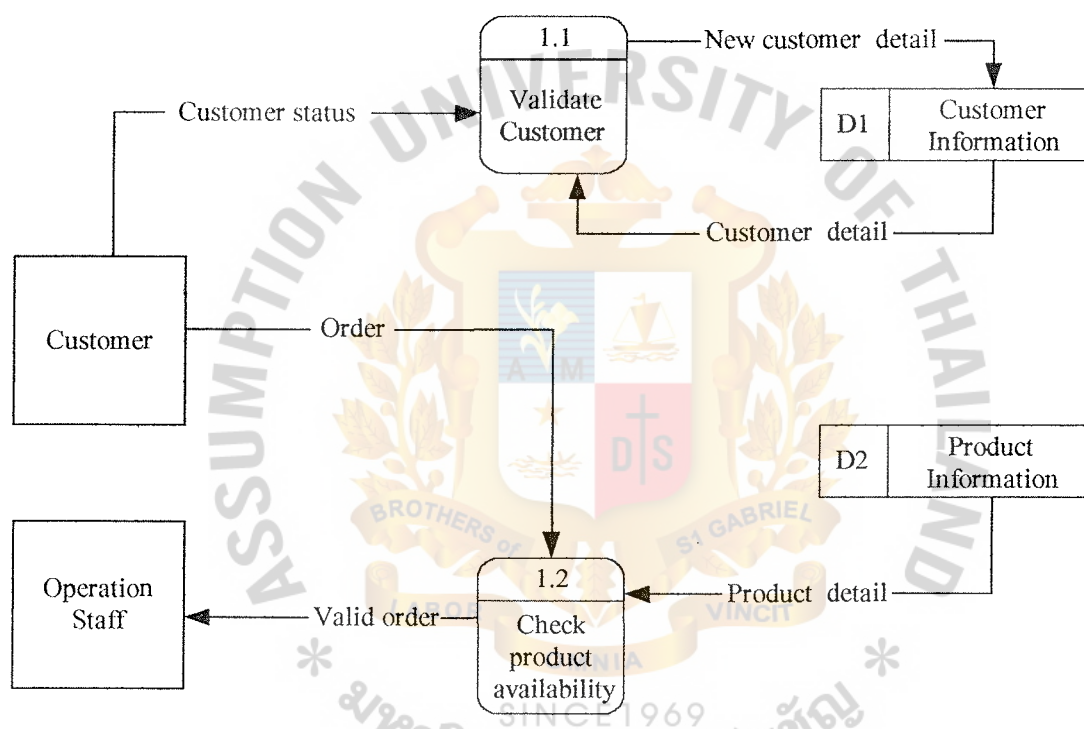


Figure 3.4. Level 1 Data Flow Diagram of Check Order Process of Order Processing System.

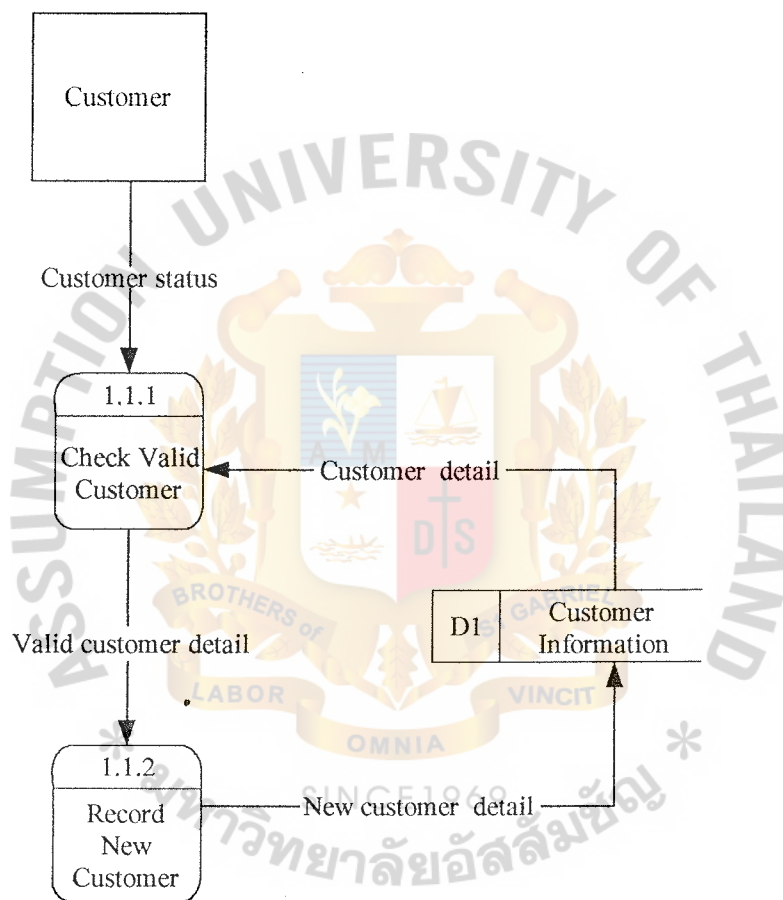


Figure 3.5. Level 2 Data Flow Diagram of Validate Customer Process of Order Processing System.

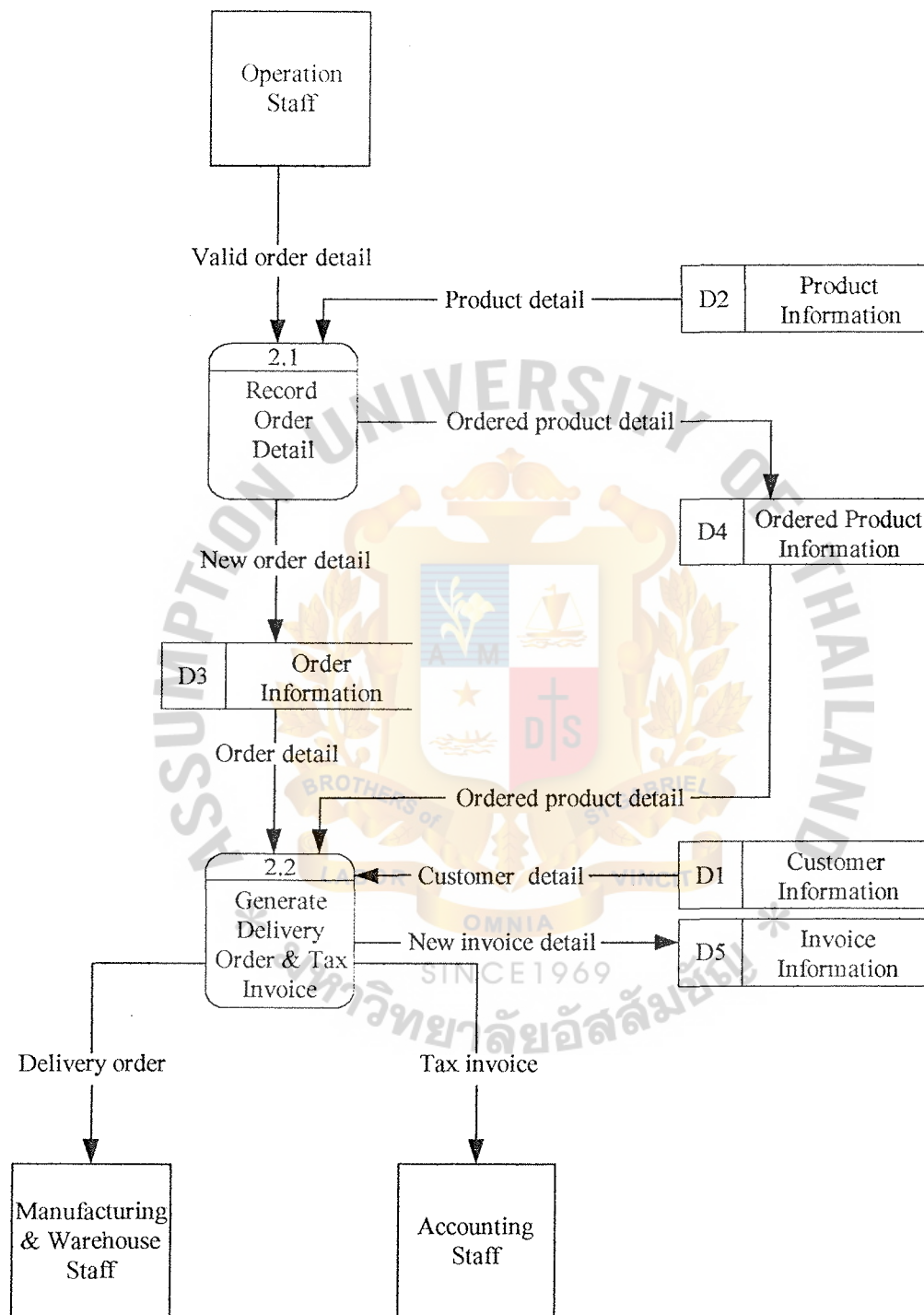


Figure 3.6. Level 1 Data Flow Diagram of Process Order Process of Order Processing System.

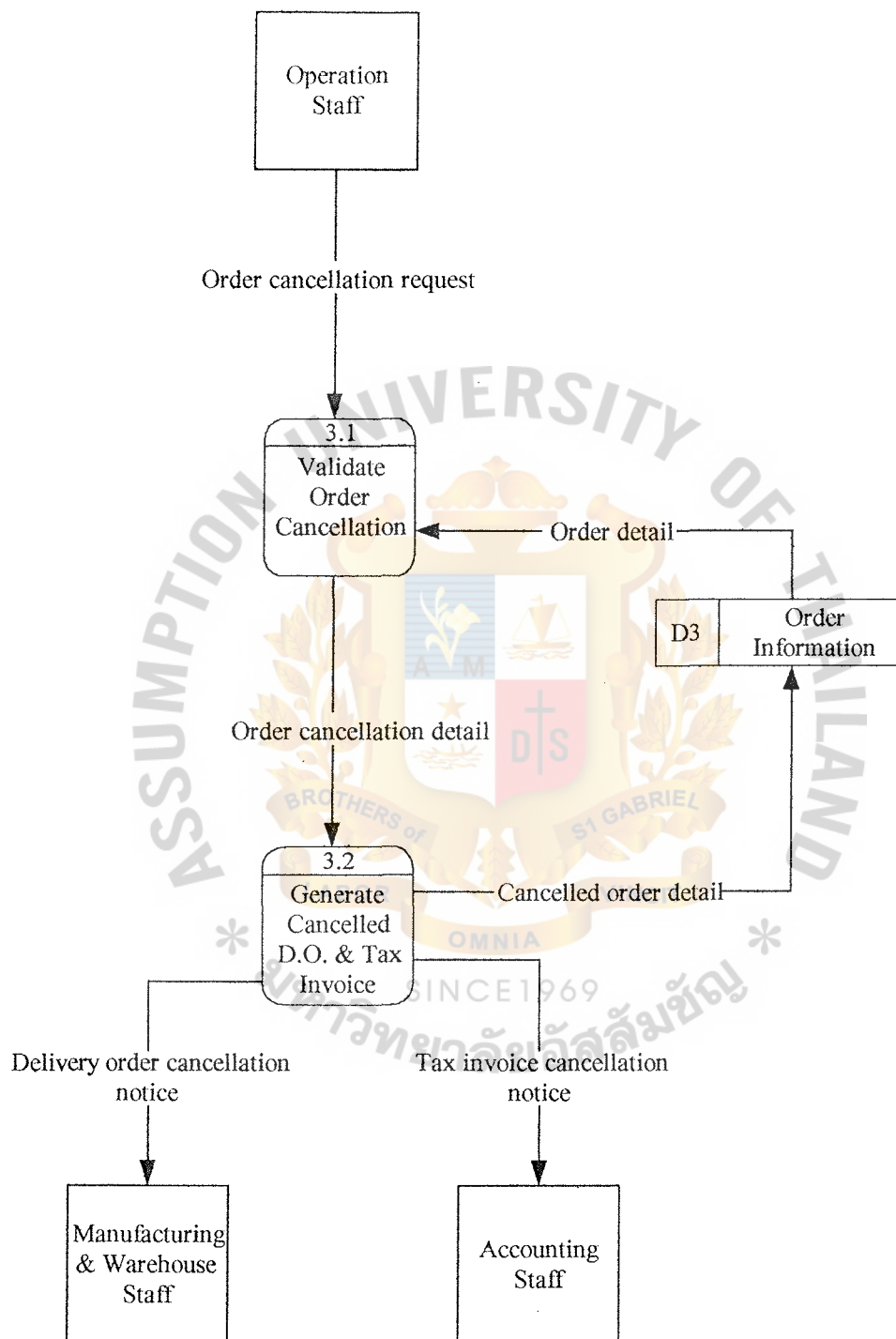


Figure 3.7. Level 1 Data Flow Diagram of Cancel Order Process of Order Processing System.

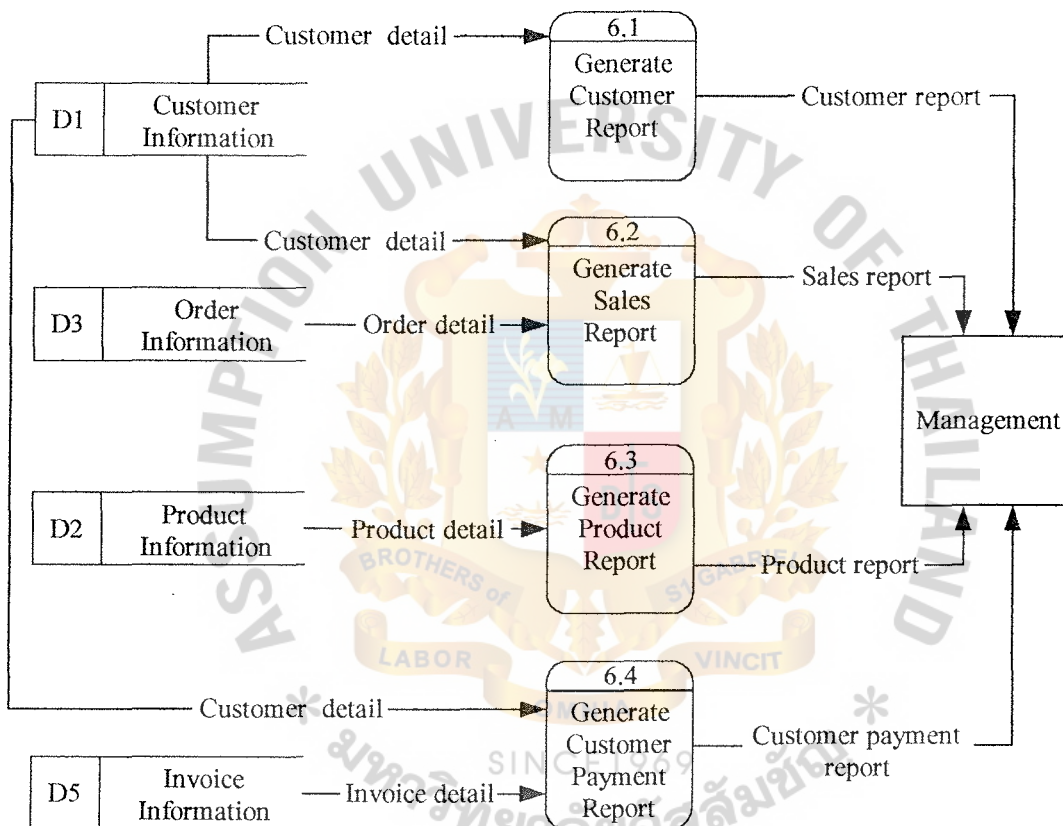


Figure 3.8. Level 1 Data Flow Diagram of Product Reports of Order Processing System.

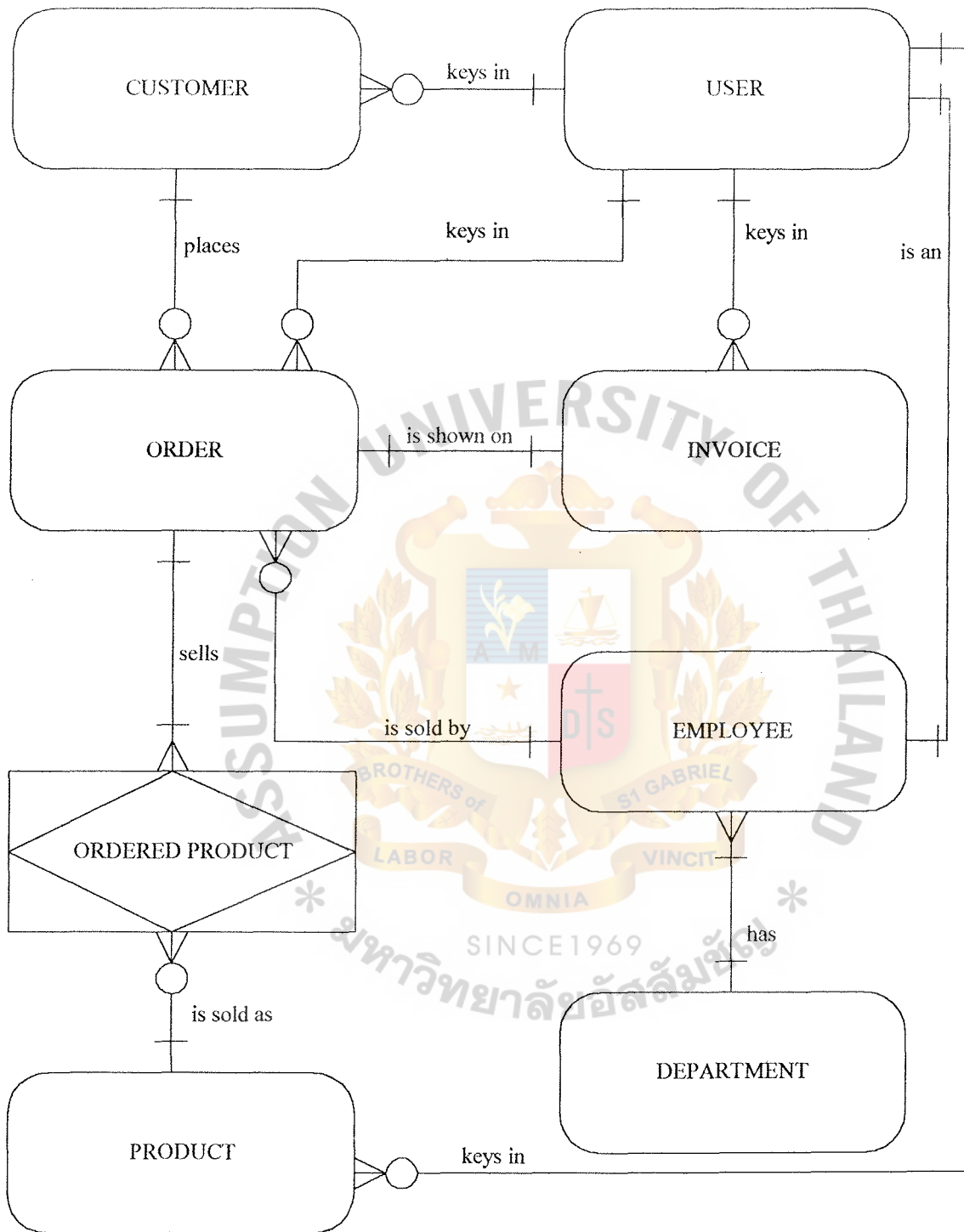


Figure 3.9. Context Diagram of Entity Relationship Diagram.

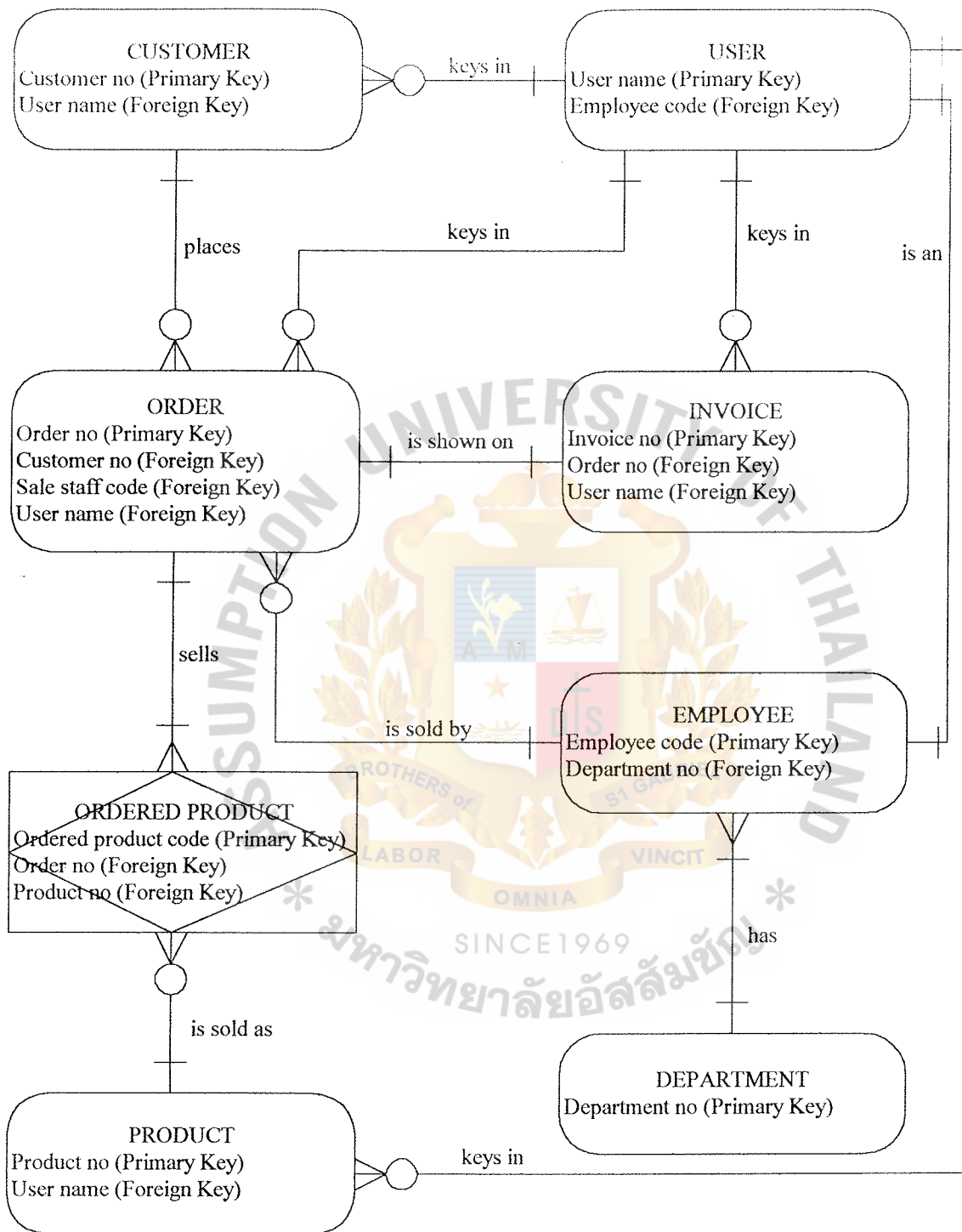


Figure 3.10. Key-based Diagram of Entity Relationship Diagram.

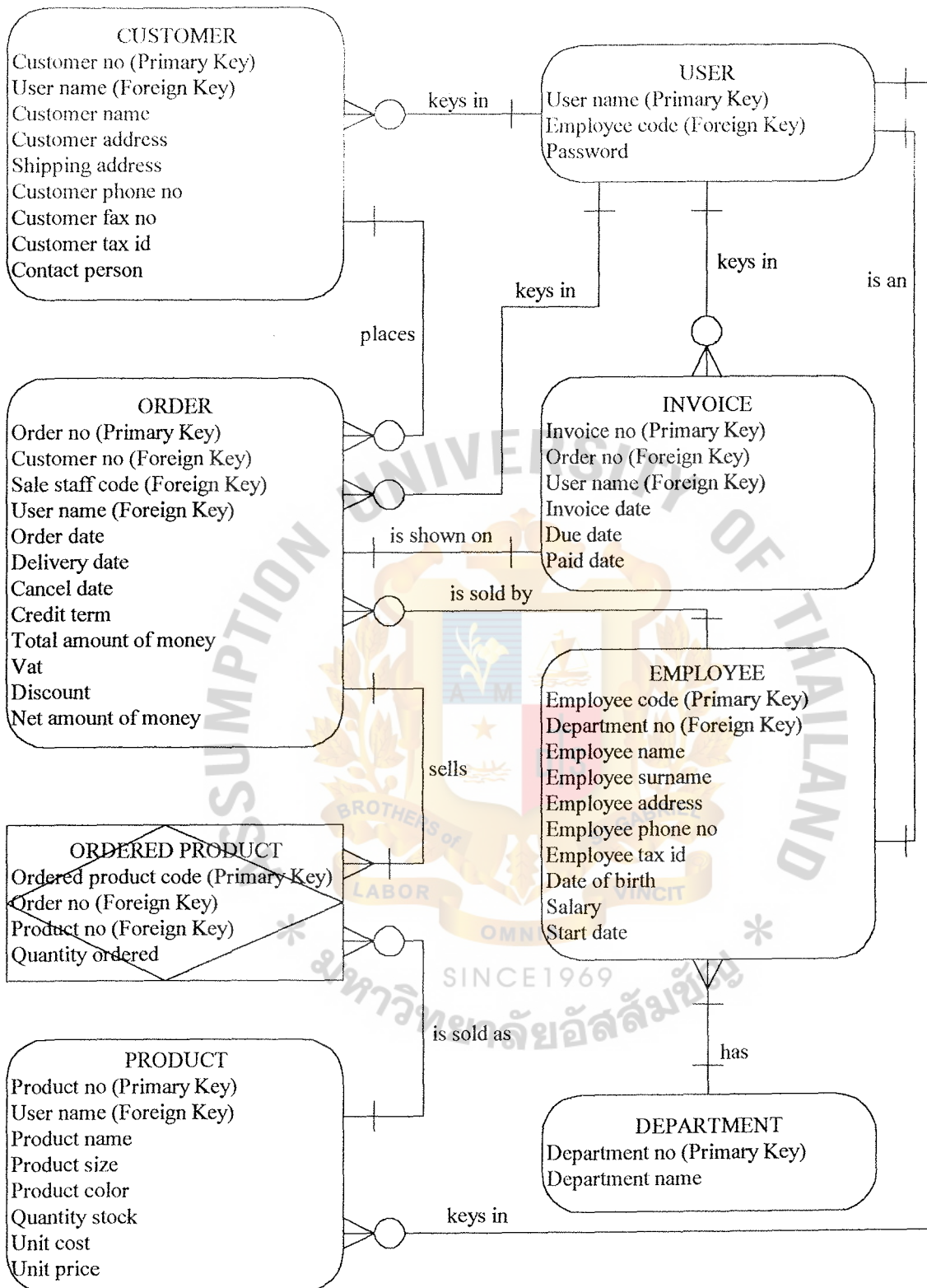


Figure 3.11. Fully Attribute Diagram of Entity Relationship Diagram.

3.3 Hardware and Software Requirement

3.3.1 Hardware and Software Requirement for Server

The proposed Order Processing System will be developed in the form of web page base. Microsoft Visual InterDev 6.0 is major software tool used to develop the input and output design of the system by using HTML and ASP languages. Microsoft Windows Server 2000 will be used as the server's operating system. Therefore, the hardware specification of server must support Microsoft Windows Server 2000 and all other softwares in the suite. The hardware and software specifications for the proposed Intranet & Database Server are shown in Tables 3.1 and 3.2 respectively.

Table 3.1. The Hardware Specification for the Intranet & Database Server.

Hardware	Specification
CPU	Pentium III 600 MHz support 2 CPU or higher
Cache	512 KB or higher
Memory	256 MB or higher
Hard Disk	SCSI RAID 5 18 GBX3
CD-Writer Drive	4X4X32 or higher
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10/100 UTP-Connect
Display Adapter	SVGA Card
Display	15" monitor
UPS	UPS 650VA

Table 3.2. The Software Requirement for the Intranet & Database Server.

Software	Specification
Operating System	Microsoft Windows Server 2000
Web Server	Microsoft Internet Information Server
Application Server	Microsoft Active Server Pages
Database	Microsoft SQL Server 7.0 or higher

3.3.2 Hardware and Software Requirement for Clients

For the Order Processing System, the client machines have to possess capabilities to run the programs developed by Microsoft Visual InterDev. One of the most significant softwares needed for the client is browser. In the proposed system, Microsoft Internet Explorer 5.0 or higher is recommended. The client machines' specification should also be good enough to run other office automation softwares, such as spread sheet, word processing, etc. As the standard, the hardware specification of client machines must therefore be good enough to support Microsoft Windows ME, and Microsoft Office 2000 Professional. The hardware and software specifications for the client machines are shown in Tables 3.3 and 3.4 respectively.

Table 3.3. The Hardware Specification for Client Machines.

Hardware	Specification
CPU	Pentium III 450 MHz or higher
Cache	256 KB or higher
Memory	64 MB or higher
Hard Disk	8 GB or higher
CD-ROM Drive	50X
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10/100 UTP-Connect
Display Adapter	SVGA Card
Display	15" monitor
Printer	Laser and Dot Matrix
Scanner	600x1200 dpi or higher with SCSI card

Table 3.4. The Software Requirement for Client Machines.

Software	Specification
Operating System	Microsoft Windows ME
Developer Software	Microsoft Visual InterDev 6.0
Web Browser	Microsoft Internet Explorer 5.0 or higher
Application Software	Microsoft Office 2000 Professional

3.3.3 Other Hardware Requirements

Other important hardware needed for the proposed system are hub, network printer, and cable. The specification of these hardware is illustrated in Table 3.5 as below:

Table 3.5. Other Hardware Requirements.

Hardware	Specification
Hub	Share Hub 24 ports
Printer	Laser (Print Server)
Cable	LAN Cable UTP



3.4 Security and Control

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

- (1) The user's password is a must for log-in security control in order to prevent unauthorized users from accessing the system.
- (2) There must be security checking for each menu and program by using the password authority file.
- (3) There must be back up diskettes or CD-ROM for data and programs.
- (4) Data correction must be done immediately after errors in the data listing report are found.
- (5) The report must be produced upon the predetermined schedule or the management request, as needed.
- (6) Data must be inputted, created, updated, and deleted during working hours only.

3.5 Cost/Benefit Analysis

The cost and benefit analysis is used to determine whether the project is worthwhile. The average inflation rate is forecasted to be 10% throughout the next 5 years. Followings are the details of cost for the new computerized system compared to the existing manual system.

3.5.1 Cost of Manual System

Table 3.6. Manual System Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Type Writer 2 units@6,000	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00
Calculator 17 units@500	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00
Total Fixed Cost	4,100.00	4,100.00	4,100.00	4,100.00	4,100.00
Operating Cost					
Salary Cost:					
Operation Manager 1 person@40,000	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Operation Staff 6 persons@19,000	114,000.00	125,400.00	137,940.00	151,734.00	166,907.40
Sales Staff 10 persons@15,000	150,000.00	165,000.00	181,500.00	199,650.00	219,615.00
Total Monthly Salary Cost	304,000.00	334,400.00	367,840.00	404,624.00	445,086.40
Total Annual Salary Cost	3,648,000.00	4,012,800.00	4,414,080.00	4,855,488.00	5,341,036.80
Office Supplies & Miscellaneous Cost:					
Stationery 1,700 per month	20,400.00	22,440.00	24,684.00	27,152.40	29,867.64
Paper 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Miscellaneous 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Total Annual Office Supplies & Miscellaneous Cost	116,400.00	128,040.00	140,844.00	154,928.40	170,421.24
Utility Cost:					
Electricity 40,000 per month	480,000.00	528,000.00	580,800.00	638,880.00	702,768.00
Water 6,000 per month	72,000.00	79,200.00	87,120.00	95,832.00	105,415.20
Telephone 20,000 per month	240,000.00	264,000.00	290,400.00	319,440.00	351,384.00
Total Utility Cost	792,000.00	871,200.00	958,320.00	1,054,152.00	1,159,567.20
Total Operating Cost	4,556,400.00	5,012,040.00	5,513,244.00	6,064,568.40	6,671,025.24
Total Manual System Cost	4,560,500.00	5,016,140.00	5,517,344.00	6,068,668.40	6,675,125.24

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

Year	Total Manual Cost	Accumulated Cost
1	4,560,500.00	4,560,500.00
2	5,016,140.00	9,576,640.00
3	5,517,344.00	15,093,984.00
4	6,068,668.40	21,162,652.40
5	6,675,125.24	27,837,777.64
Total	27,837,777.64	-

3.5.2 Cost of Computerized System

Table 3.8. Computerized System Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost (Development Cost)					
Hardware Cost:					
Computer Server Cost	19,000.00	19,000.00	19,000.00	19,000.00	19,000.00
Personal Computer Cost	49,000.00	49,000.00	49,000.00	49,000.00	49,000.00
Laser Printer 2 units@25,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Laser Print Server 1 unit@50,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Dot Matrix Printer 3 units@25,000	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Scanner 1 unit@14,000	2,800.00	2,800.00	2,800.00	2,800.00	2,800.00
UPS 1 unit@8,000	1,600.00	1,600.00	1,600.00	1,600.00	1,600.00
Total Hardware Cost	107,400.00	107,400.00	107,400.00	107,400.00	107,400.00
Software Cost	82,600.00	82,600.00	82,600.00	82,600.00	82,600.00
Network Cost	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
System Construction Cost	150,000.00	-	-	-	-
Training Cost	20,000.00	-	-	-	-
Maintenance Cost	-	50,000.00	55,000.00	60,500.00	66,550.00
Total Fixed Cost	369,600.00	249,600.00	254,600.00	260,100.00	266,150.00
Operating Cost					
Salary Cost:					
Operation Manager 1 person@42,000	42,000.00	46,200.00	50,820.00	55,902.00	61,492.20
Operation Staff 4 persons@21,000	84,000.00	92,400.00	101,640.00	111,804.00	122,984.40
Sales Staff 8 persons@16,000	128,000.00	140,800.00	154,880.00	170,368.00	187,404.80
System Engineer 1 person@27,000	27,000.00	29,700.00	32,670.00	35,937.00	39,530.70
Total Monthly Salary Cost	281,000.00	309,100.00	340,010.00	374,011.00	411,412.10
Total Annual Salary Cost	3,372,000.00	3,709,200.00	4,080,120.00	4,488,132.00	4,936,945.20
Office Supplies & Miscellaneous Cost:					
Stationery 1,200 per month	14,400.00	15,840.00	17,424.00	19,166.40	21,083.04
Paper 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Miscellaneous 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Total Annual Office Supplies & Miscellaneous Cost	72,000.00	79,200.00	87,120.00	95,832.00	105,415.20
Utility Cost:					
Electricity 44,000 per month	528,000.00	580,800.00	638,880.00	702,768.00	773,044.80
Water 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Telephone 17,500 per month	210,000.00	231,000.00	254,100.00	279,510.00	307,461.00
Total Utility Cost	786,000.00	864,600.00	951,060.00	1,046,166.00	1,150,782.60
Total Operating Cost	4,230,000.00	4,653,000.00	5,118,300.00	5,630,130.00	6,193,143.00
Total Computerized System Cost	4,599,600.00	4,902,600.00	5,372,900.00	5,890,230.00	6,459,293.00

Table 3.9. Five Years Accumulated Computerized Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	4,599,600.00	4,599,600.00
2	4,902,600.00	9,502,200.00
3	5,372,900.00	14,875,100.00
4	5,890,230.00	20,765,330.00
5	6,459,293.00	27,224,623.00
Total	27,224,623.00	-

3.5.3 Cost Comparison and Breakeven Analysis

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

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	4,560,500.00	4,599,600.00
2	9,576,640.00	9,502,200.00
3	15,093,984.00	14,875,100.00
4	21,162,652.40	20,765,330.00
5	27,837,777.64	27,224,623.00

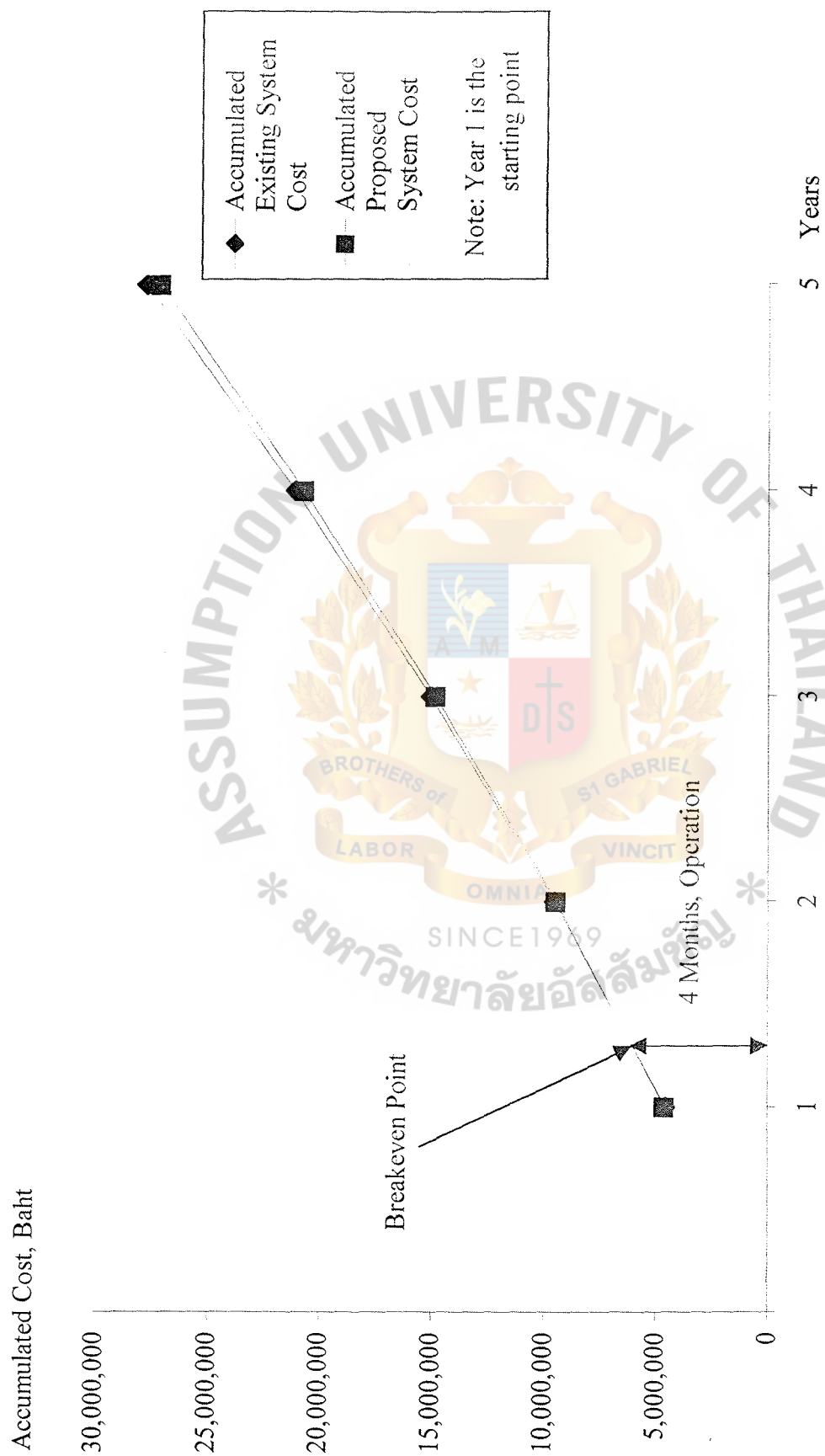


Figure 3.12. Cost Comparison between Manual and Proposed System.

3.5.4 Benefit Analysis

(1) Tangible Benefits

Cost reduction is the major benefit of the proposed system. In addition, the resource utilization will be more efficient. Salary cost, office supplies and miscellaneous cost, and utility cost are saved as shown below:

$$\begin{aligned}\text{Benefit for the 1}^{\text{st}} \text{ year} &= (3,648,000 - 3,372,000) + (116,400 - 72,000) \\ &\quad + (792,000 - 786,000) \\ &= 326,400 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 2}^{\text{nd}} \text{ year} &= (4,012,800 - 3,709,200) + (128,040 - 79,200) \\ &\quad + (871,200 - 864,600) \\ &= 359,040 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 3}^{\text{rd}} \text{ year} &= (4,414,080 - 4,080,120) + (140,844 - 87,120) \\ &\quad + (958,320 - 951,060) \\ &= 394,944 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 4}^{\text{th}} \text{ year} &= (4,855,488 - 4,488,132) + (154,928.40 - \\ &\quad 95,832) + (1,054,152 - 1,046,166) \\ &= 434,438.40 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 5}^{\text{th}} \text{ year} &= (5,341,036.80 - 4,936,945.20) + (170,421.24 - \\ &\quad 105,415.20) + (1,159,567.20 - 1,150,782.60) \\ &= 477,882.24 \text{ Baht/year}\end{aligned}$$

(2) Intangible Benefits

- (a) Providing more accurate information than that of the existing system.
- (b) Reducing work processing time and improving the efficiency of the operation.
- (c) Reducing human error in doing documentation.
- (d) Providing fast and efficient service to customers.
- (e) Providing up-to-date information and reports to support the management's decision making.
- (f) Making it easier and faster to search the required information.
- (g) Making it easier and faster to produce the reports.

3.5.5 Payback Analysis

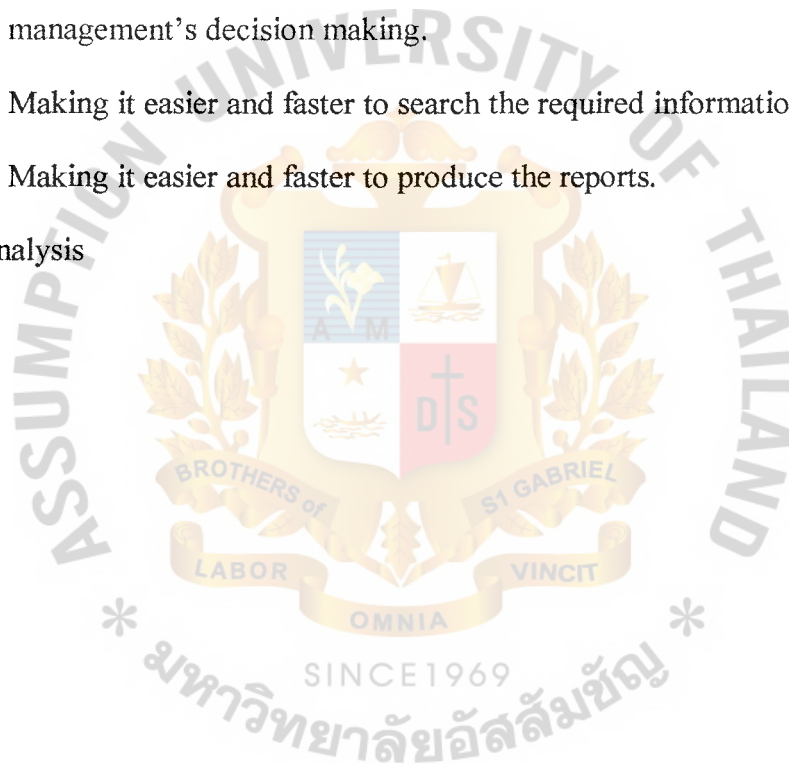


Table 3.11. Cost and Benefit Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Total Cost Invested for the Proposed System	369,600.00	249,600.00	254,600.00	260,100.00	266,150.00
Accumulated Cost Invested for the Proposed System	369,600.00	619,200.00	873,800.00	1,133,900.00	1,400,050.00
Total Benefit from the Proposed System	326,400.00	359,040.00	394,944.00	434,438.40	477,882.24
Accumulated Benefit from the Proposed System	326,400.00	685,440.00	1,080,384.00	1,514,822.40	1,992,704.64

Table 3.12. The Comparison of the Accumulated Cost Invested for the Proposed System and Accumulated Benefit from the Proposed System, Baht.

Year	Accumulated Cost	Accumulated Benefit	Accumulated (Benefit – Cost)
1	369,600.00	326,400.00	-43,200.00
2	619,200.00	685,440.00	66,240.00
3	873,800.00	1,080,384.00	206,584.00
4	1,133,900.00	1,514,822.40	380,922.40
5	1,400,050.00	1,992,704.64	592,654.64

As the accumulated (benefit-cost) is negative in the first year, but it is positive in the second year, payback period is therefore between the first year and the second year.

Payback period can be calculated as follows:

$$43,200 / (43,200 + 66,240) = 0.39 \text{ year}$$

$$0.39 \times 12 = 5 \text{ months}$$

Therefore, the payback period is about 5 months. Please note that year 1 is the starting point.

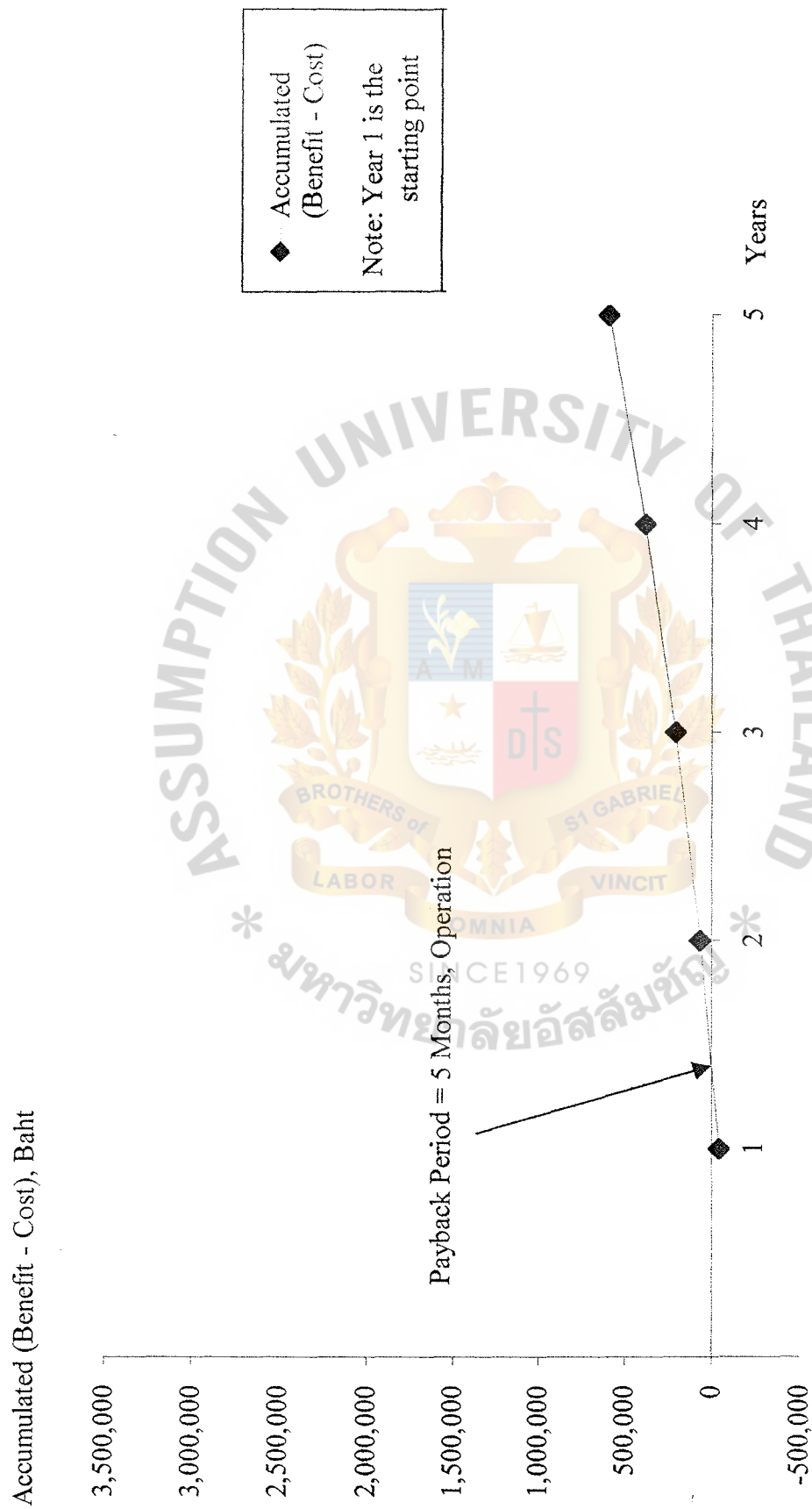


Figure 3.13. Payback Chart for the Proposed System.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The implementation process is set up basing on the parallel run concept. By applying this concept, the process will work on both the manual system and the computerized system for a period of time until the operation of the computerized system has been proved to be profitable. During that period, the users have to do double jobs on the manual system and on the computerized system everyday, so that the users can get used to the new system. It will not take a long time for the users to get used to the new system, as the new system process is designed basing on the routine jobs of the current system.

The project implementation can be divided into 3 main parts, System Analysis, Detail Analysis and Design, and Implementation.

(1) System Analysis

This major function is to gather all information about the existing system, including data flows, how data relate to each other, and how data are kept. Then the studying area must be identified, and the problems must be studied. The next function is to identify the Objectives and Scope of the project. At this stage the context diagram and the data flow diagrams of the existing system are created, and the cost/benefit analysis between the existing system and the proposed system is also done.

(2) Detail Analysis and Design

The major function is to develop the workflow of the existing system and the new workflow of the computerized system. The context diagram and the data flow diagram at many different levels will be designed with an aim to solve the problems of the existing system. The relationship of data in

each table is studied in order to define the best relation for the system. Steps of work at each process are carefully defined in order to reduce the traffic of network. All screens, such as input/output screens and various kinds of reports, are also designed.

(3) Implementation

The main function is to physically implement all the designs to become the real thing. Programs that support the workflow have to be created. All input/output screens and report layouts are also generated to support the designed workflow. After the programs have been tested by the developers, the user training has to be conducted in order to train the users how to use the system so that the users can test the system by themselves. After testing, if the users are not satisfied with the system, they can ask the system developers to correct the system until they accept it.

The project implementation schedule is shown as in the following Gantt Chart.

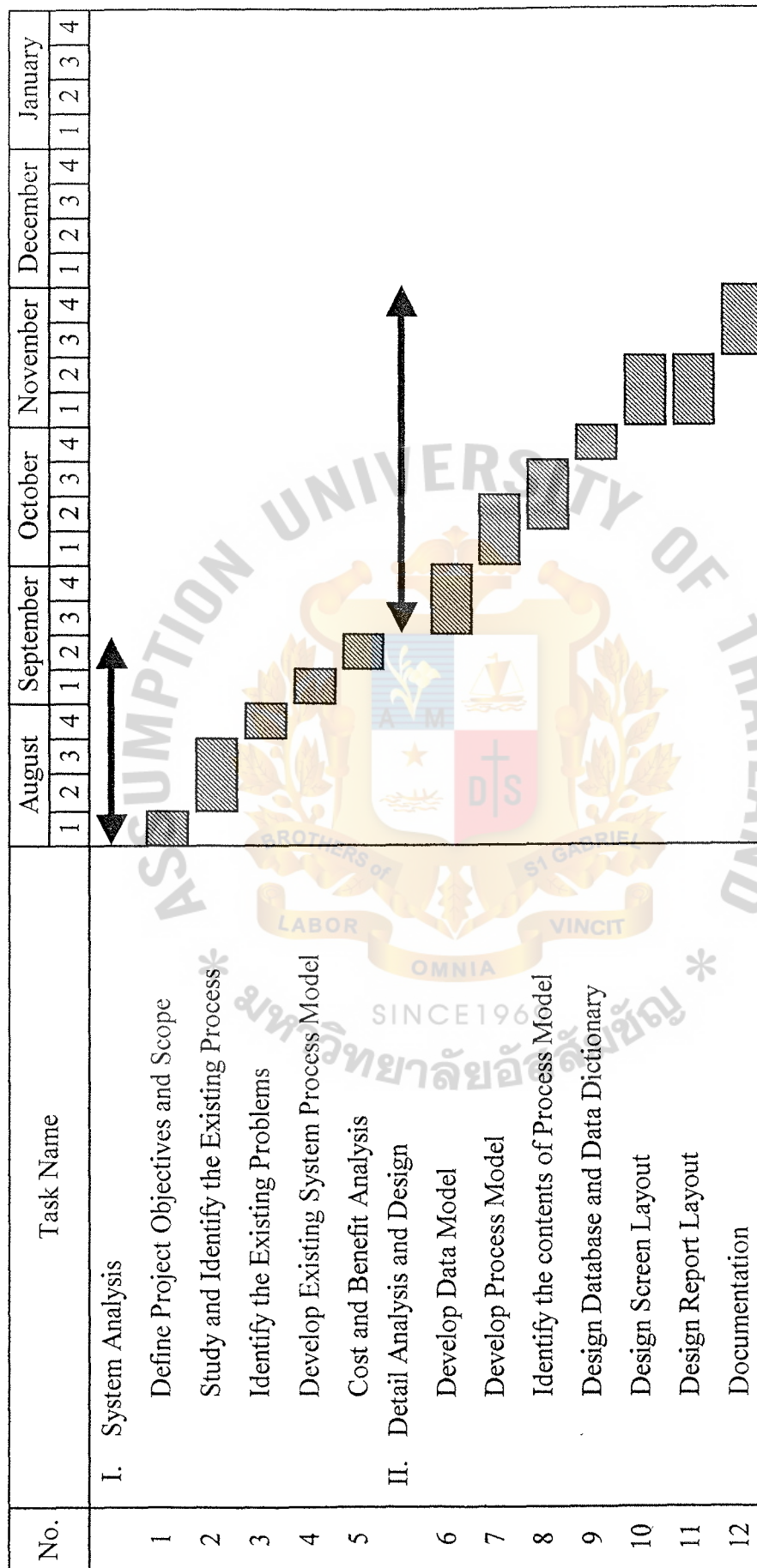


Figure 4.1. Schedule of Project Implementation of Order Processing System.

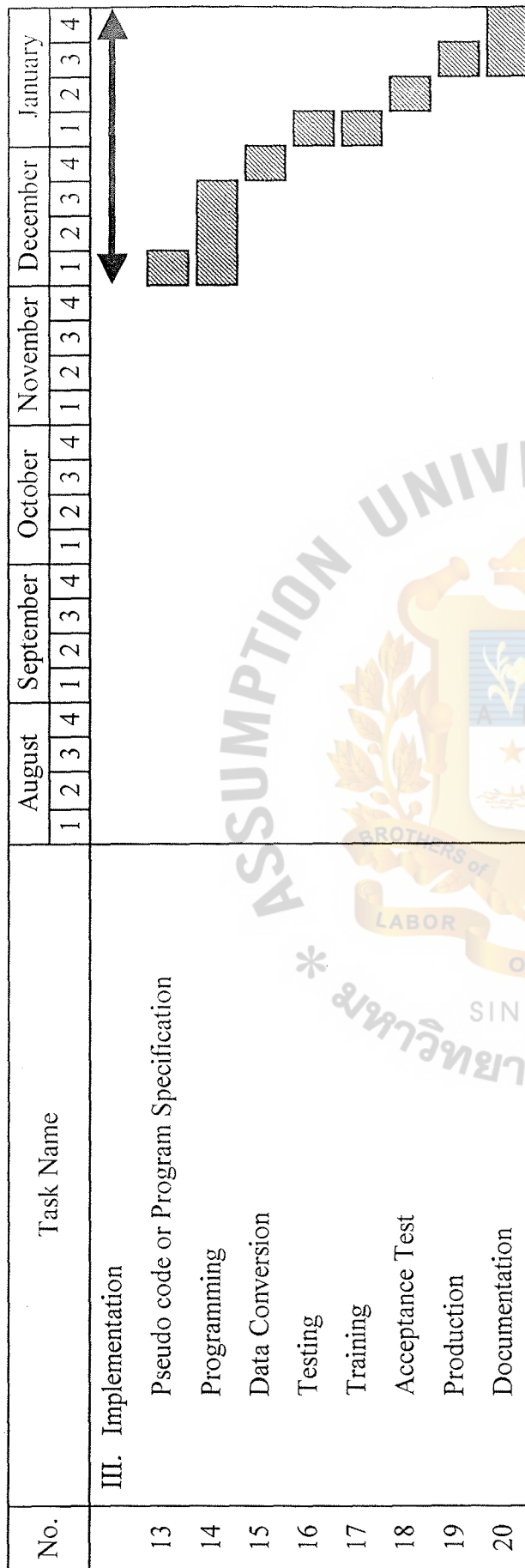


Figure 4.2. Schedule of Project Implementation of Order Processing System (Continued).

4.2 Test Plan

System testing is the critical process. Testing of programs, subsystems, and total systems is essential to the quality assurance of software. It is done to turn up the problems before the system is actually used. The common bad view of testing is that there is no error in the programs. Actually, the most important thing is the understanding that testing is the process of executing a program with the explicit intention of finding errors that make the programs fail. The tester should have really tried to find errors that make the program fails. The successful test is one that can find an error in program.

The following tests are essential and recommended:

- (1) Unit Testing (essential) ensures that the stand-alone program fixes the bug without side effects.
- (2) System Testing (essential) ensures that the entire application, of which the modified program was a part, still works.
- (3) Security and Recovery Testing (essential) ensure that the system is secured enough to protect unauthorized users to access into the system. Moreover, if failures happen to the database, the system should be able to recover those data.

The effective testing of program does not guarantee systems reliability. Therefore, reliability must be designed into the system. A test case is a set of data that the system will process as normal input. However, the data are created with the express intention of determining whether the system will process them correctly.

Each finished module will be tested separately with a test case. After having finished testing all the modules, a new test case will be prepared for the testing of the

whole program. If any errors are found at this stage, all of them have to be fixed until no error is found after performing the final test by using another test case.



V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From the Cost/Benefit Analysis in Chapter 3, the result is that the breakeven point between accumulated existing system cost and accumulated proposed system cost is 4 months. The payback analysis results in the payback period of 5 months. For both the breakeven point and the payback period, please note that year 1 is the starting point. The company's guideline is that all investments must have a payback period less than or equal to three year. The investment in proposed system is a good investment, as it has the payback period of 5 months.

The proposed system will be constructed based on the Intranet client/server configuration. All data are kept in the database server, and are accessed through the web server. The user interfaces are implemented on web browser, Microsoft Internet Explorer. So, it is very convenient for the users to input data, as interfaces and web browser are user-friendly.

Table 5.1 shows the time performance on each process of the proposed system compared with the existing system.

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

No.	Process	Existing System	Proposed System
1.	Check Order	20 minutes	10 minutes
2.	Process Order	20 minutes	10 minutes
3.	Cancel Order	15 minutes	8 minutes
4.	Deliver Product	1 hour	45 minutes
5.	Process Customer Payment	15 minutes	7 minutes
6.	Produce Reports	12 hours	40 minutes
Total		14 hours 10 minutes	2 hours

The above table shows that each process of the proposed system consumes much less time than each process of the existing system. In the existing system, as all processes are done manually, the time taken to operate all work steps is quite long. In contrast, in the proposed system, after the order is received, all the processes will be automated by the computerized system. So, it can be concluded that the proposed system is more efficient and effective than the existing system.

In conclusion, the proposed system helps reduce the number of staffs and time spent on processing an order, solve the problems of manual system, decrease the high maintenance cost, and support the management's decision making with accurate information and reports.

5.2 Recommendations

After the proposed system is utilized, the company should continuously study more about information technology as well as other new technologies. In the future, the company may apply barcode technology with the Manufacturing & Warehouse Department, so that the staffs can control the products in stock more effectively. The barcode-reader makes it faster and more accurate to input data into the system.

In the near future, the company may allow remote access for customers and salespersons. Customers may be allowed to obtain product price, inventory information, and other information from their remote sites. Salespersons may be permitted to access customer information, product information, and other information from their mobile sites, as they always have to travel from place to place to visit many customers.

In the future, the company may sell the products on the webs through the Internet. In other words, the company may start e-commerce business to allow the customers to

obtain information and order the products via Internet. Internet makes it easier for the customers to place an order. Therefore, the sales volume will certainly increase.

WAP technology can also be used by the company, in the future, to allow customer to obtain information and place an order as well as to let the salespersons obtain information just via their mobile phones. Certainly, this will raise the company's sales volume, as the increasing number of people use WAP mobile phones.

In the future, the company may want to develop the computerized systems for other departments, or extend the system to other departments. The studying, experience and results from implementing this proposed system will greatly benefit and can be applied by the company.





Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Links Address

Order Processing System
Lui Knitting Factory Ltd., Part.

User name :
Password :

Submit Reset

BROTHERS of
LABOR OMNIA VINCIT
S1 GABRIEL
SINCE 1969

Done Local intranet

Figure A.1. Login Form.

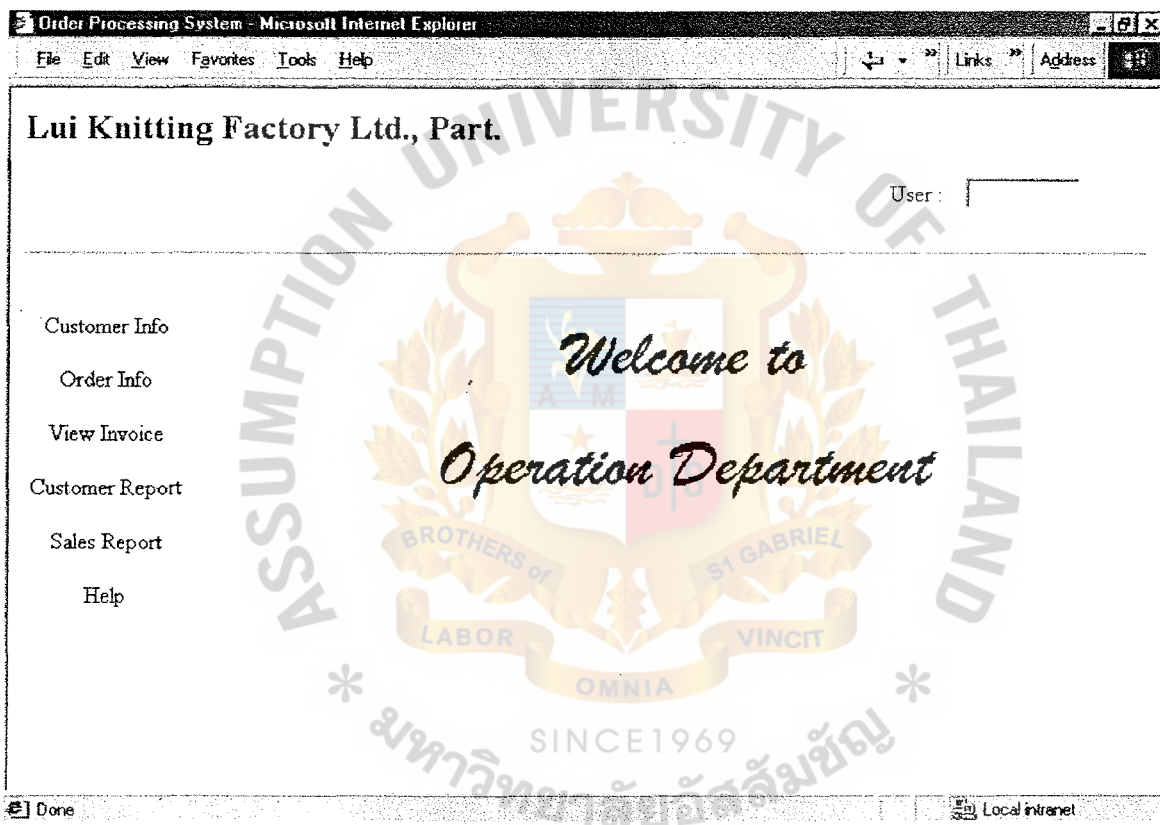


Figure A.2. Main Menu for Operation Department.

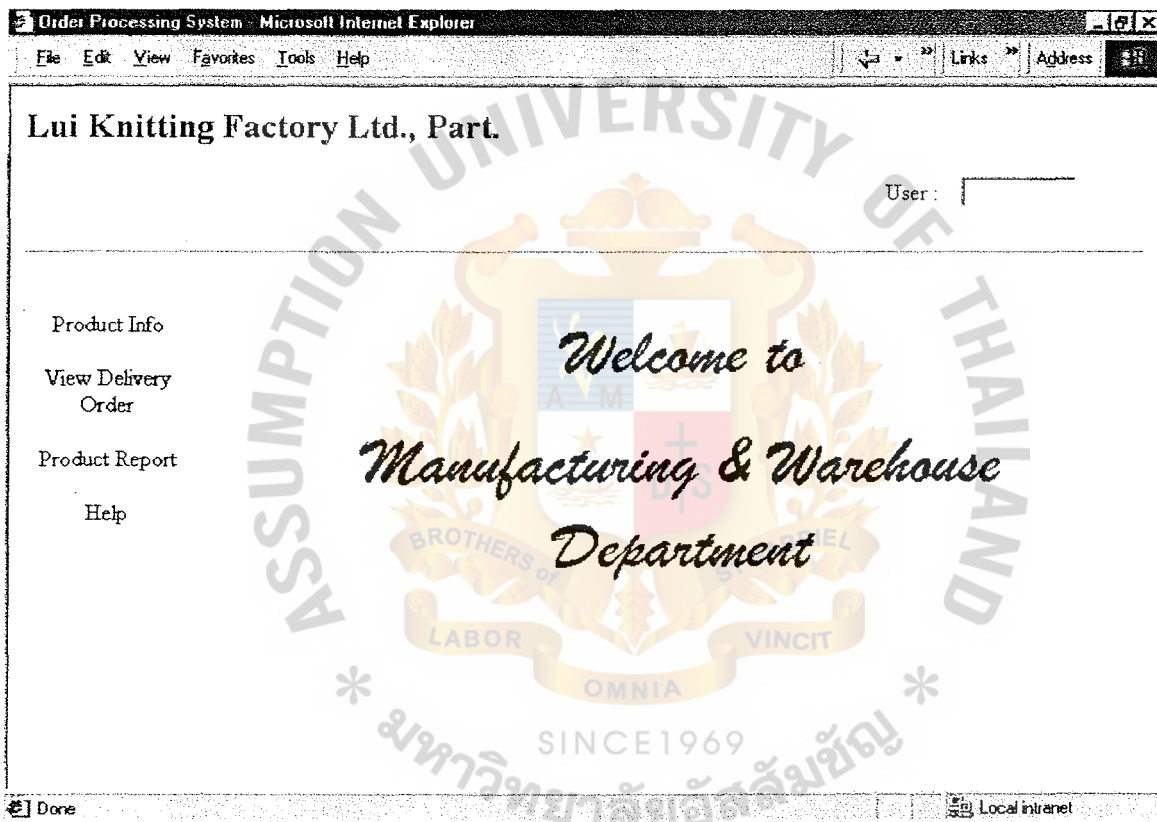


Figure A.3. Main Menu for Manufacturing & Warehouse Department.

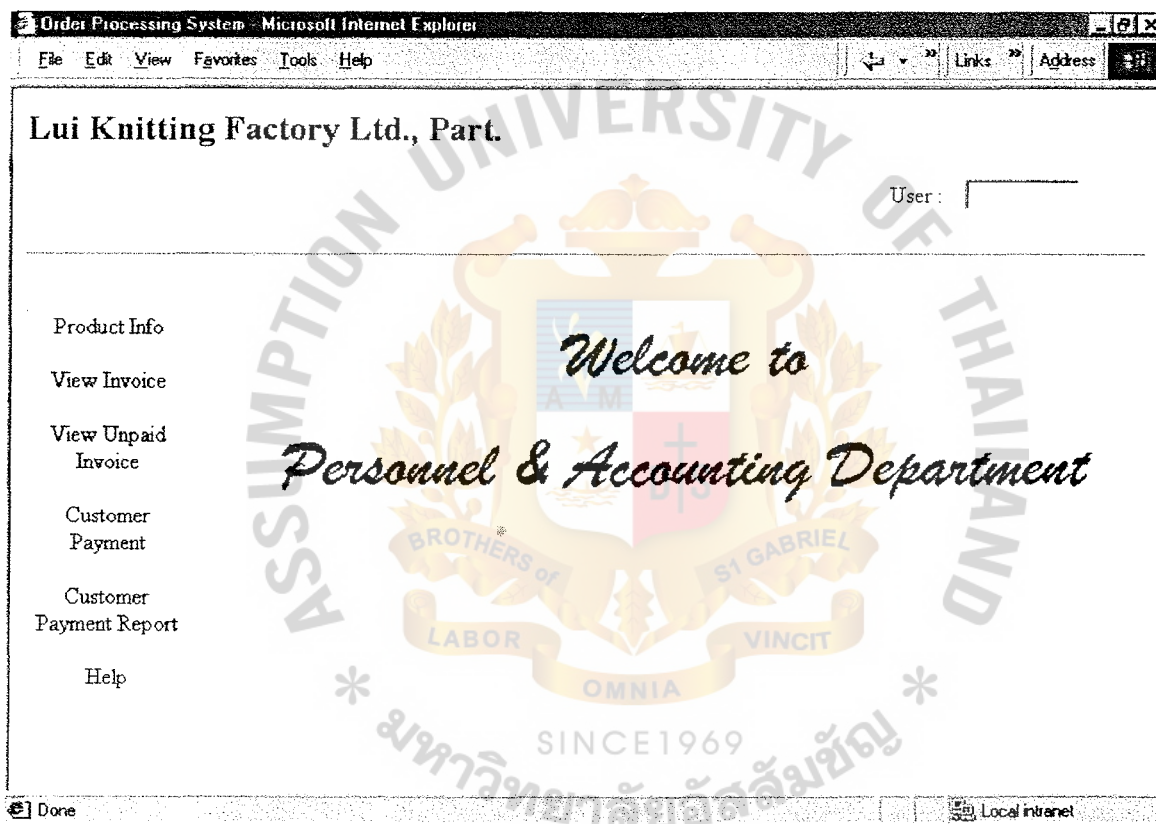


Figure A.4. Main Menu for Accounting Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Operation Department

User :

Customer Info

Order Info

View Invoice

Customer Report

Sales Report

Help

Customer no :

* มหาวิทยาลัยอัสสัมชัญ *
SINCE 1969

Done Local intranet

Figure A.5. Customer Information Form for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Operation Department

User :

Customer Info	Customer no :	<input type="text"/>
Order Info	Customer name :	<input type="text"/>
View Invoice	Address :	<input type="text"/>
Customer Report	Shipping Address :	<input type="text"/>
Sales Report	Telephone no :	<input type="text"/>
	Tax ID :	<input type="text"/>
Help	Contact Person :	<input type="text"/>
		<input type="text"/>

Add Reset

Done Local intranet

Figure A.6. New Customer Information Form for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part.

Operation Department

User :

Customer Info

Order Info

View Invoice

Customer Report

Sales Report

Help

Customer no :

Customer name :

Address :

Telephone no : Fax no :

Tax ID :

Contact Person :

Update Delete Exit

Done Local intranet

Figure A.7. Old Customer Information Form for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Operation Department

User :

Customer Info

Order Info

View Invoice

Customer Report

Sales Report

Help

Order no :

Customer no : (for new order)

SINCE 1969

Done Local intranet

Figure A.8. Order Information Form for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part.

Operation Department

User :

Customer Info

Order Info

View Invoice

Customer Report

Sales Report

Help

Customer name :

Address :

Shipping Address :

Order no :

Credit Term (days) :

Sales Staff Code :

Tel :

Order Date :

Due Date :

Delivery Date :

Products	Size	Color	Price/Unit	Stock Qty.	Qty. Ordered	Amount(฿)
<input type="checkbox"/> Long-sleeves shirt	S	White	140	100	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Long-sleeves shirt	M	White	145	150	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Long-sleeves shirt	L	White	150	200	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Long-sleeves shirt	XL	White	155	50	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	S	White	120	150	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	M	White	125	100	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	L	White	130	200	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	XL	White	130	200	<input type="text"/>	<input type="text"/>

Total Amount (฿)

Discount (%)

VAT (%)

For D.O./Invoice no :

Net Amount (฿)

Done Local intranet

Figure A.9. New Order Information Form for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part.

Operation Department

User:

Customer Info

Order Info

View Invoice

Customer Report

Sales Report

Help

Customer name:

Address:

Shipping Address:

Order no:

Credit Term (days):

Sales Staff Code:

Tel:

Order Date:

Due Date:

Delivery Date:

Products	Size	Color	Price/ Unit	Stock Qty.	Qty. Ordered	Amount(฿)
<input type="checkbox"/> Long-sleeves shirt	S	<input type="text" value="White"/>	140	100	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Long-sleeves shirt	M	<input type="text" value="White"/>	145	150	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Long-sleeves shirt	L	<input type="text" value="White"/>	150	200	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Long-sleeves shirt	XL	<input type="text" value="White"/>	155	50	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	S	<input type="text" value="White"/>	120	150	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	M	<input type="text" value="White"/>	125	100	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	L	<input type="text" value="White"/>	130	200	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Short-sleeves shirt	XL	<input type="text" value="White"/>	130	200	<input type="text"/>	<input type="text"/>

Total Amount (฿)

Discount (%)

VAT (%)

Net Amount (฿)

Cancel Date:

For D.O./Invoice no:

Done Local intranet

Figure A.10. Old Order Information Form for Operation Department.

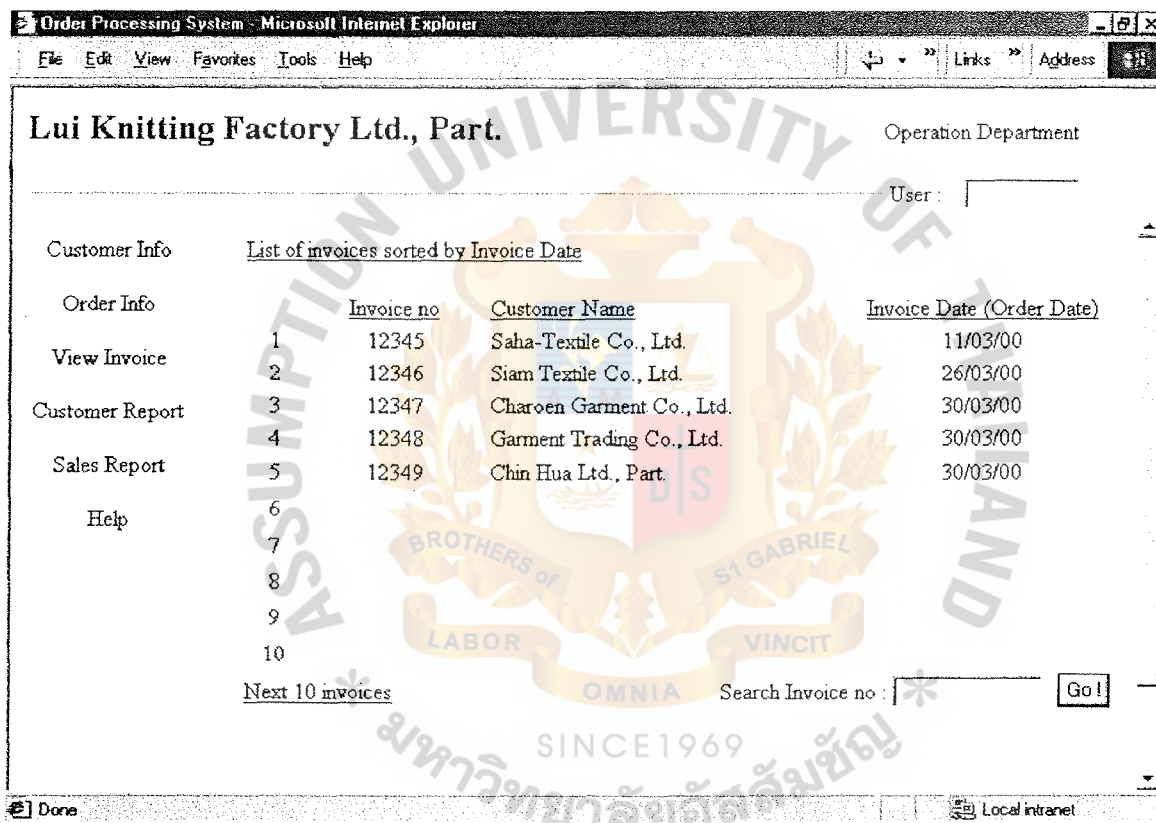


Figure A.11. Screen of View Invoice for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part.

Operation Department

User:

Customer Info

Order Info

View Invoice

Customer Report

Sales Report

Help

Tax Invoice/Receipt

Lui Knitting Factory Ltd., Part.
89/93-5 Charansanitwongse Road,
Tapra, Bangkokyai, Bangkok

Customer name: Tel:
Address:
Shipping Address:
Sales Staff Code:

No.	Product	Size	Quantity	Price/Unit	Amount(฿)
1	Long-sleeves shirt, White	L	80	150.00	12,000.00
2	Short-sleeves shirt, White	L	80	130.00	10,400.00
3					
4					
5					
6					
7					
8					

Total Amount (฿) 22,400.00
Discount (5%) (1,120.00)
VAT (7%) 1,489.60
Net Amount (฿) 22,769.60

Done Local intranet

Figure A.12. Screen of Tax Invoice/Receipt for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Manufacturing & Warehouse Department

User:

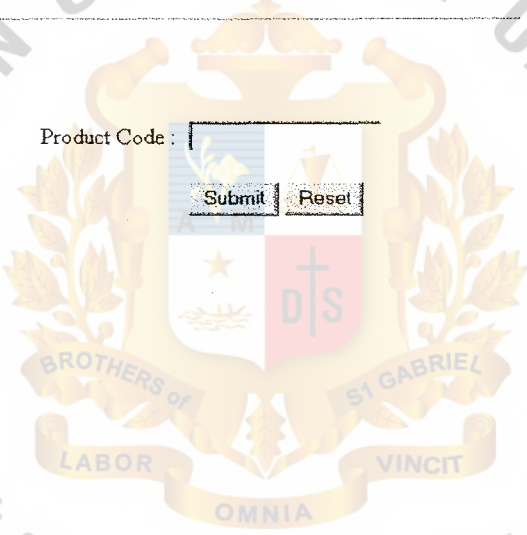
Product Info

View Delivery Order

Product Report

Help

Product Code:

The logo of Assumption University of Thailand is a central shield with a crown on top. The shield is divided into four quadrants: top-left (blue with a white star), top-right (red with a white cross), bottom-left (white with a blue star), and bottom-right (red with a white cross). The shield is flanked by two golden lions. Below the shield is a banner with the text "BROTHERS of LABOR" on the left and "SI GABRIEL VINCIT" on the right. Below the banner is another banner with the text "OMNIA". Below the logo, the text "SINCE 1969" is visible. The entire logo is surrounded by a circular border with the text "ASSUMPTION UNIVERSITY OF THAILAND" and "มหาวิทยาลัยอัสสัมชัญ" in Thai script.

Done Local intranet

Figure A.13. Product Information Form for Manufacturing & Warehouse Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Manufacturing & Warehouse Department

User:

Product Info

View Delivery Order

Product Report

Help

New Product Info

Product Code :

Product Name :

Size :

Color :

Stock Quantity :

Done Local intranet

Figure A.14. New Product Information Form for Manufacturing & Warehouse Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Manufacturing & Warehouse Department

User :

Product Info	<u>Existing Product Info</u>
View Delivery Order	Product Code : <input type="text"/>
Product Report	Product Name : <input type="text"/>
Help	Size : <input type="text"/>
	Color : <input type="text"/>
	Stock Quantity : <input type="text"/>
	<input type="button" value="Update"/> <input type="button" value="Delete"/> <input type="button" value="Exit"/>

Done Local intranet

Figure A.15. Existing Product Information Form for Manufacturing & Warehouse Department.

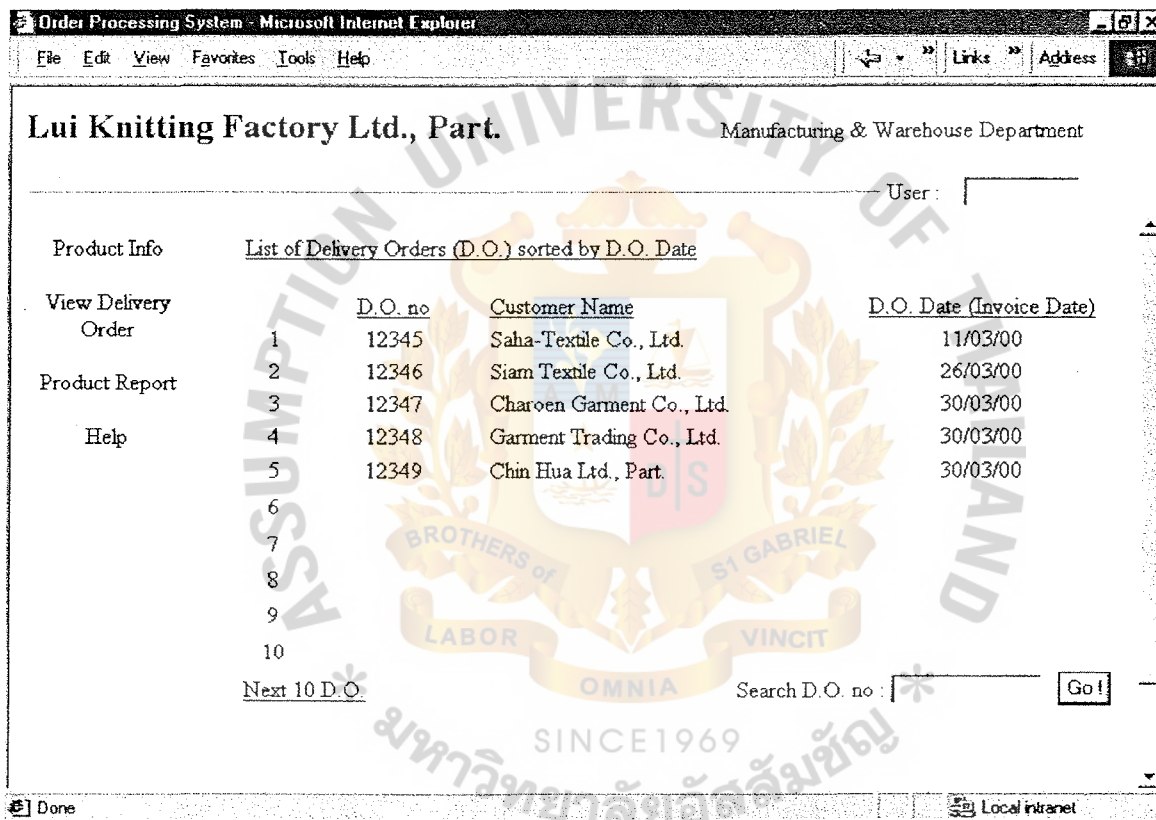


Figure A.16. Screen of View Delivery Order for Manufacturing & Warehouse Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Manufacturing & Warehouse Department

User: Janet

Product Info **Delivery Order**

View Delivery Order Lui Knitting Factory Ltd., Part. D.O. no : 91111

Product Report 89/93-5 Charansanitwongse Road, Date : 30/03/00

Help Tapra, Bangkokoiai, Bangkok

Customer name : Charoen Garment Co., Ltd Tel : 4659870-1

Address : 1/19 Taksin Rd., Thonburi Bangkok 10600

Shipping Address : 1/19 Taksin Rd., Thonburi Bangkok 10600

Sales Staff Code : 901

No.	Product	Size	Quantity	Price/Unit	Amount(฿)
1	Long-sleeves shirt, White	L	80	150.00	12,000.00
2	Short-sleeves shirt, White	L	80	130.00	10,400.00
3					
4					
5					
6					
7					
8					
Total Amount (฿)					22,400.00
Discount (5%)					(1,120.00)
VAT (7%)					1,489.60
Net Amount (฿)					22,769.60

Print Exit

Done Local intranet

Figure A.17. Screen of Delivery Order for Manufacturing & Warehouse Department.

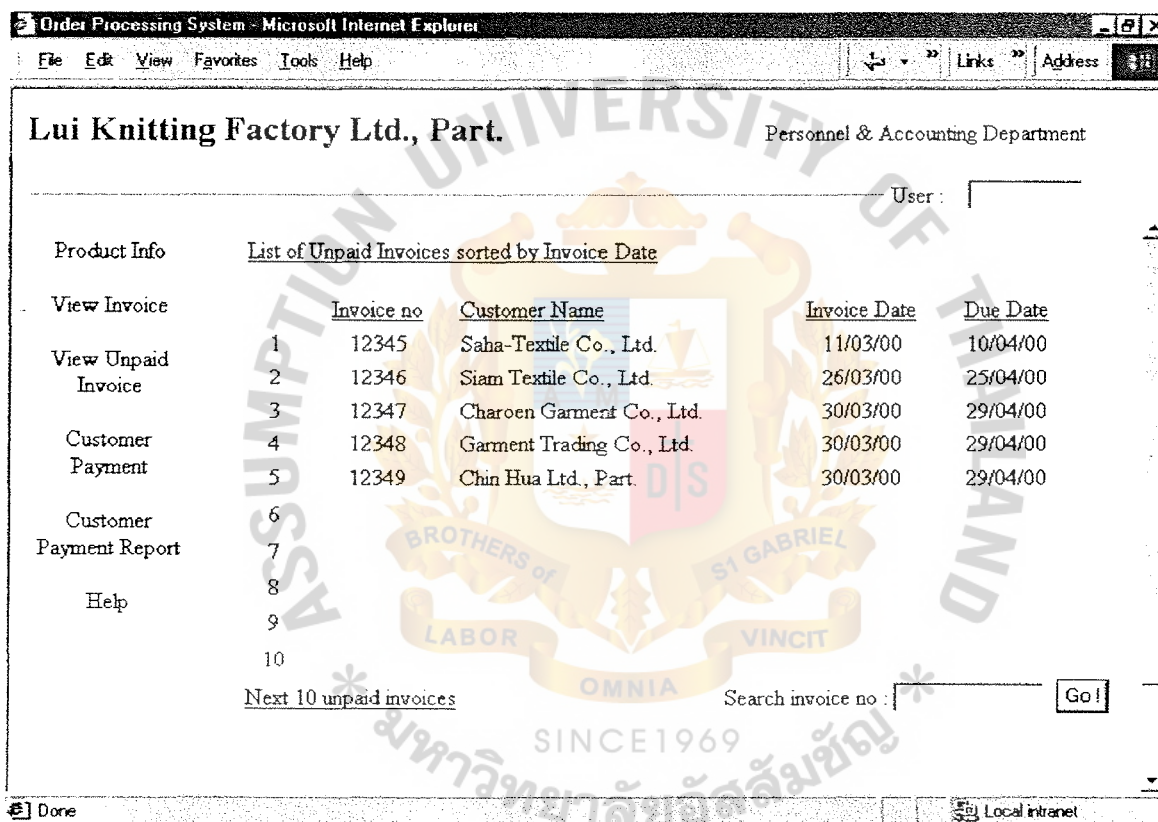


Figure A.18. Screen of View Unpaid Invoice for Personnel & Accounting Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Personnel & Accounting Department

User :

Product Info	<u>Customer Payment</u>
View Invoice	Invoice no : <input type="text"/>
View Unpaid Invoice	Customer name : <input type="text"/>
Customer Payment	Amount Dued (฿) : <input type="text"/>
Customer Payment Report	Due Date : <input type="text"/>
Help	Paid Date : <input type="text"/>
	<input type="button" value="Submit"/> <input type="button" value="Reset"/>

Done Local intranet

Figure A.19. Customer Payment Information Form for Personnel & Accounting Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Personnel & Accounting Department

User:

Product Info

View Invoice

View Unpaid Invoice


Customer Payment

Customer Payment Report

Help

Product no:

Update Exit

The logo of Assumption University of Thailand is a central shield with a crown on top. The shield is divided into four quadrants: top-left (blue with a white star), top-right (red with a white cross), bottom-left (white with a blue star), and bottom-right (red with a white cross). The shield is flanked by two golden lions. Below the shield is a banner with the text "BROTHERS of LABOR OMNIA VINCIT". Below the banner is the text "SINCE 1969". The entire logo is surrounded by a circular border with the text "ASSUMPTION UNIVERSITY OF THAILAND" and Thai text "มหาวิทยาลัยอัสสัมชัญ" at the bottom.

Done Local intranet

Figure A.20. Product Information Form for Personnel & Accounting Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help Links Address

Lui Knitting Factory Ltd., Part. Personnel & Accounting Department

User:

Product Info	<u>Product Cost and Price Info</u>
View Invoice	Product no : <input type="text"/>
View Unpaid Invoice	Cost/Unit : <input type="text"/>
Customer Payment	Price/Unit : <input type="text"/>
Customer Payment Report	<input type="button" value="Update"/> <input type="button" value="Exit"/>
Help	

Done Local intranet

Figure A.21. Product Cost and Price Information Form for Personnel & Accounting Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Operation Department

User :

Customer Info

Order Info

View Invoice

Customer Report

Sales Report

Help

Customer Report

☒ Report by customer no :

From : To :

☐ Report by customer name :

From : To :

* มหาวิทยาลัยอัสสัมชัญ *
SINCE 1969

Done Local intranet

Figure A.22. Customer Report Form for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Operation Department

User: _____

Customer Info Customer Report by customer no

Order Info Customer no Name Address Phone no Fax no Contact Person

View Invoice

Customer Report

Sales Report

Help

Print Exit

Done Local intranet

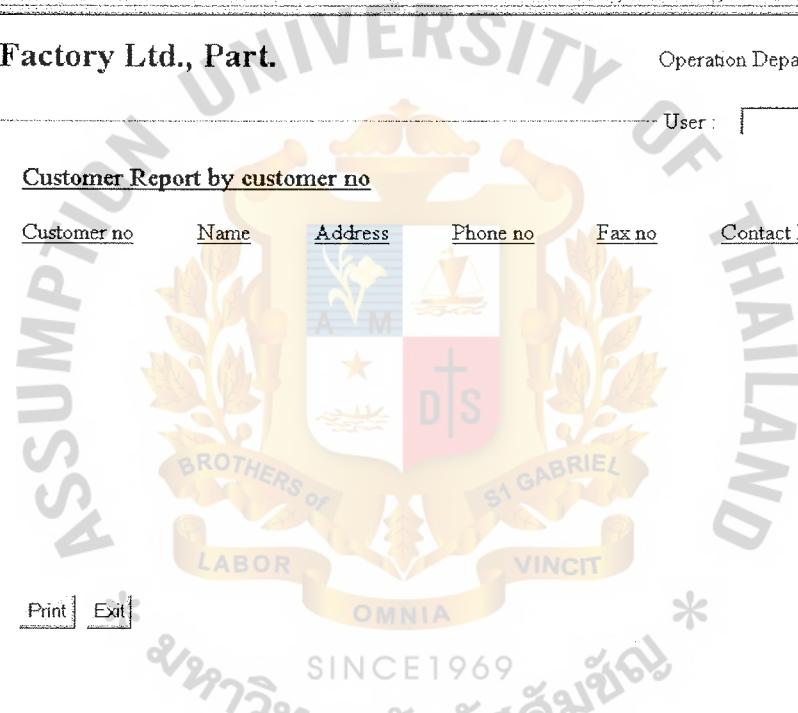


Figure A.23. Screen of Customer Report by Customer Number for Operation Department.

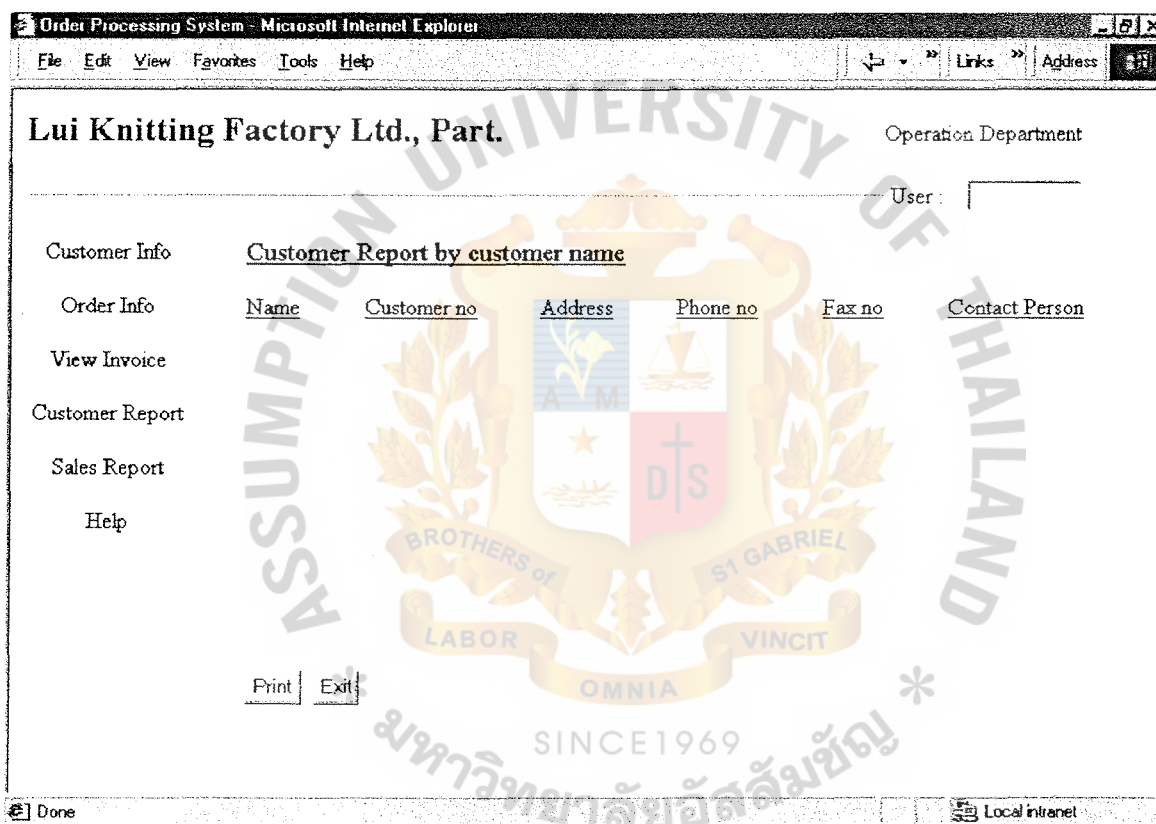


Figure A.24. Screen of Customer Report by Name for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Operation Department

User : _____

Customer Info Sales Report

Order Info Order Date : from []/[]/[] to []/[]/[]
dd mm yy dd mm yy

View Invoice

Customer Report Report by :

Sales Report ☐ Customer name

Help ☐ Order no

☐ Order date

Submit Reset

Done Local intranet

Figure A.25. Sales Report Form for Operation Department.

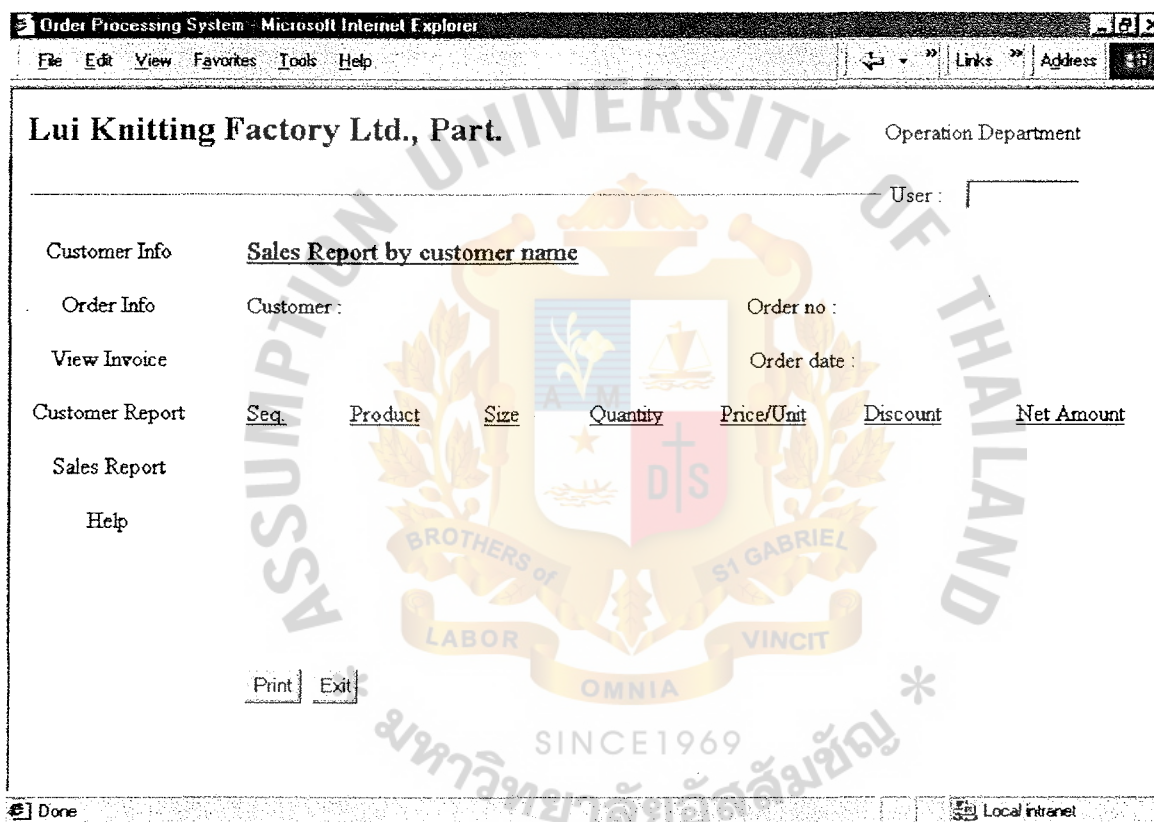


Figure A.26. Screen of Sales Report by Customer Name for Operation Department.

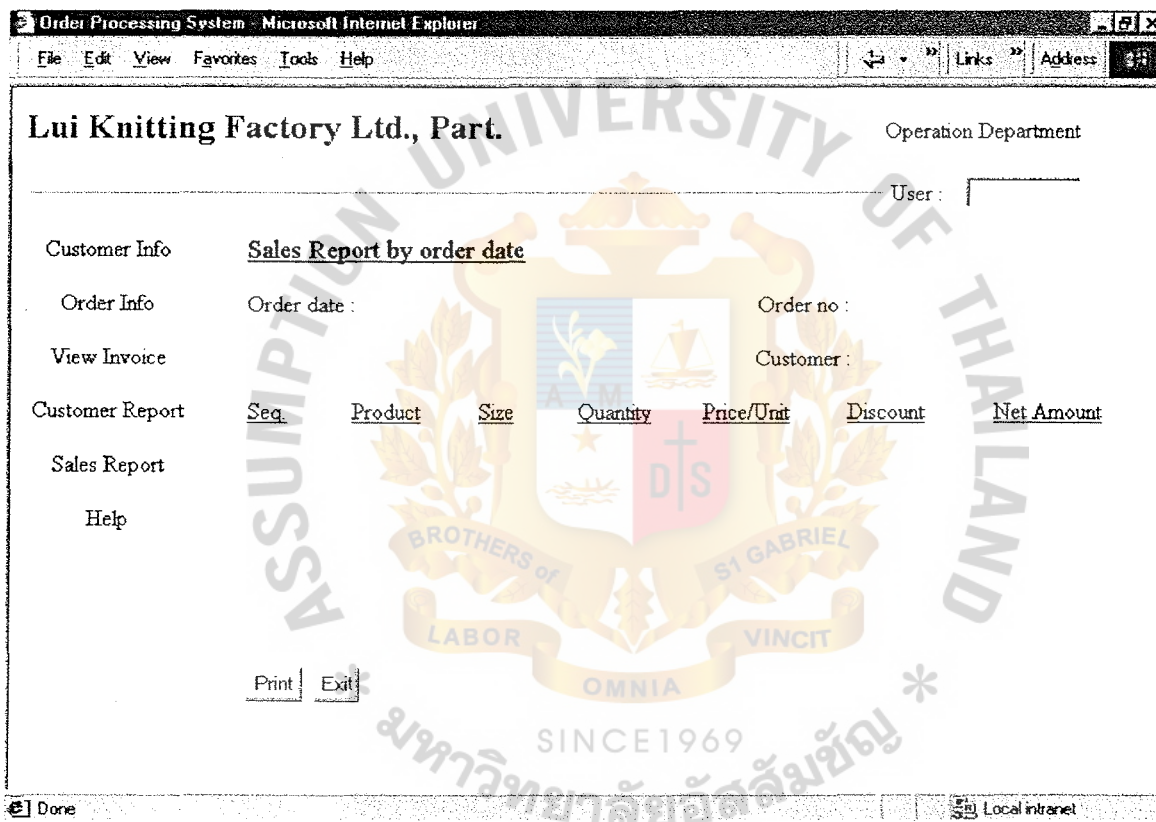


Figure A.27. Screen of Sales Report by Order Date for Operation Department.

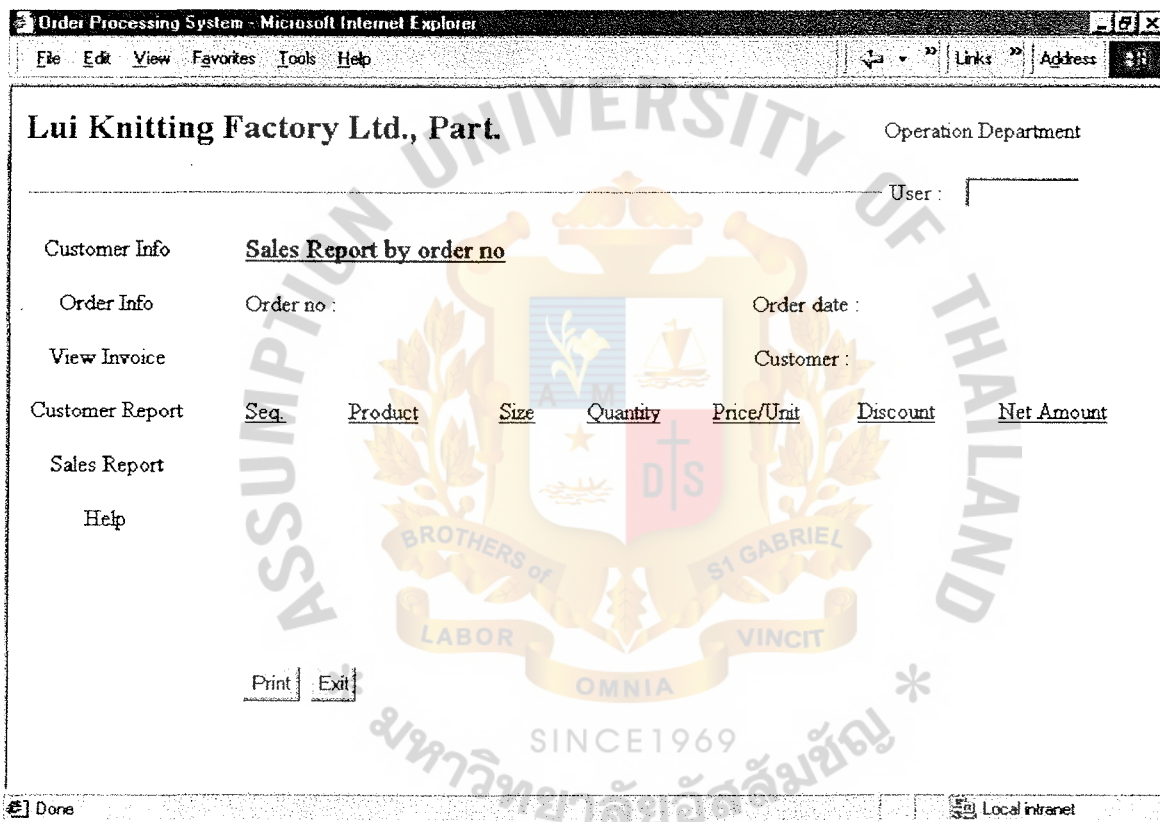


Figure A.28. Sales Report by Order Number for Operation Department.

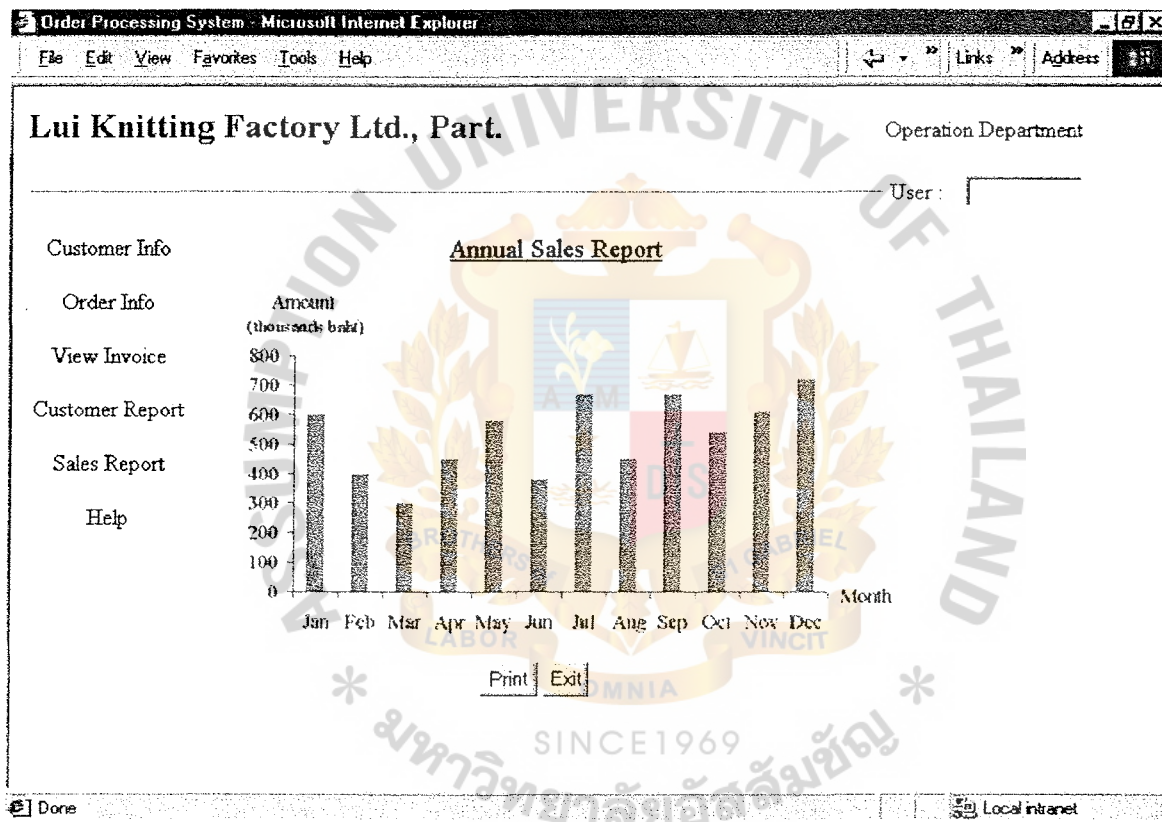


Figure A.29. Screen of Annual Sales Report for Operation Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Manufacturing & Warehouse Department

User : _____

Product Info	<u>Product Report</u>
View Delivery Order	Product no :
Product Report	From : <input type="text"/> To : <input type="text"/>
Help	<input type="button" value="Submit"/> <input type="button" value="Reset"/>

ASSUMPTION UNIVERSITY OF THAILAND

BROTHERS of S1 GABRIEL

LABOR OMNIA VINCIT

SINCE 1969

* มหาวิทยาลัยอัสสัมชัญ *

Done Local intranet

Figure A.30. Product Report Form for Manufacturing & Warehouse Department.

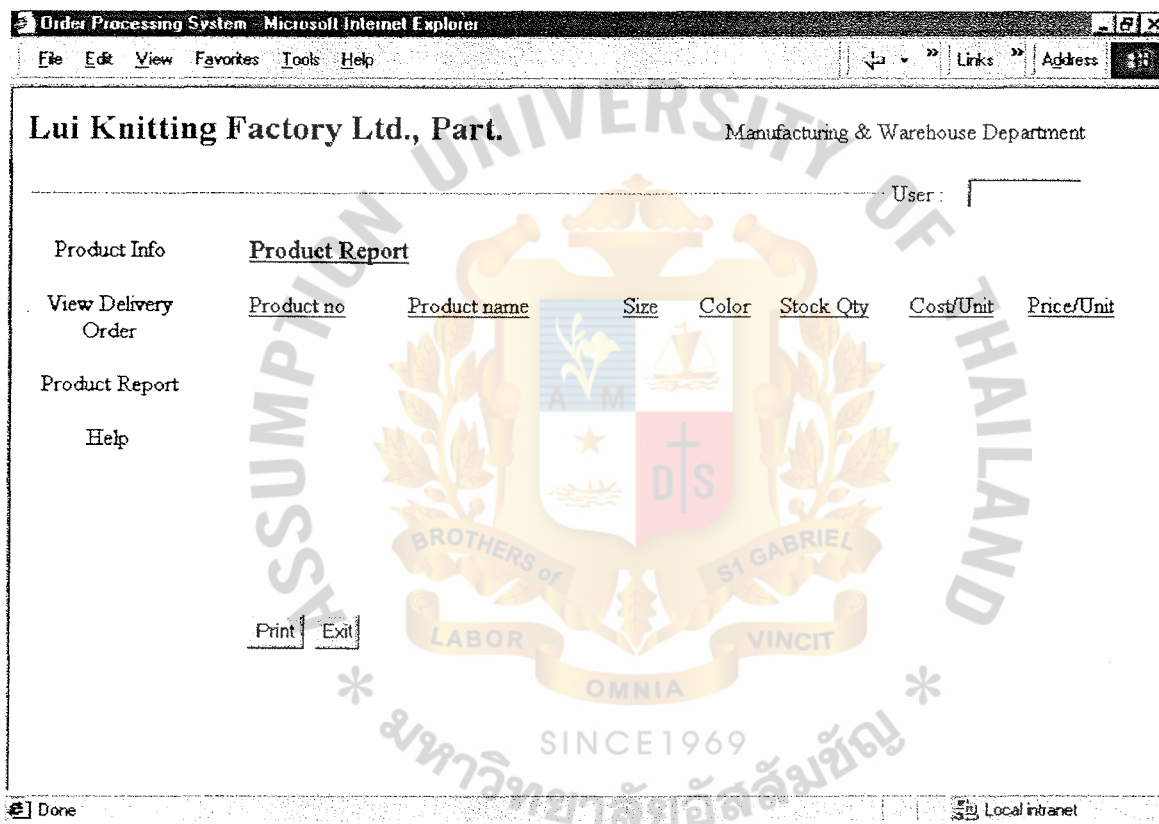


Figure A.31. Screen of Product Report for Manufacturing & Warehouse Department.

Order Processing System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links Address

Lui Knitting Factory Ltd., Part. Personnel & Accounting Department

User: _____

Product Info	<u>Customer Payment Report</u>			
View Invoice	<input type="checkbox"/> January	<input type="checkbox"/> February	<input type="checkbox"/> March	<input type="checkbox"/> April
View Unpaid Invoice	<input type="checkbox"/> May	<input type="checkbox"/> June	<input type="checkbox"/> July	<input type="checkbox"/> August
Customer Payment	<input type="checkbox"/> September	<input type="checkbox"/> October	<input type="checkbox"/> November	<input type="checkbox"/> December
Customer Payment Report	<input type="button" value="Submit"/> <input type="button" value="Reset"/>			
Help				

Done Local intranet

Figure A.32. Customer Payment Report Form for Personnel & Accounting Department.

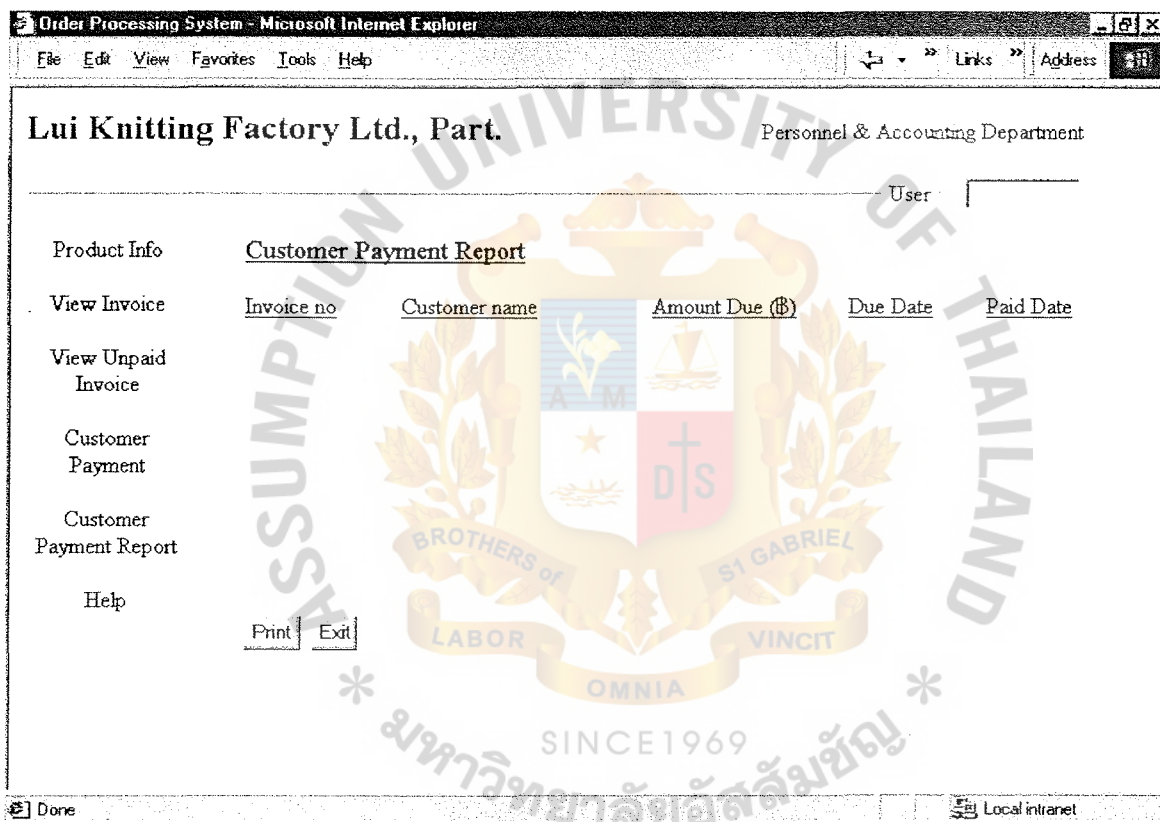


Figure A.33. Screen of Customer Payment Report for Personnel & Accounting Department.



APPENDIX B
REPORT DESIGN

Lui Knitting Factory Ltd., Part.			Report Date: 01/11/00			
			Page 1 of 1			
Monthly Sales Report by Customer Name						
Customer: 003 Charoen Garment Co., Ltd.			Order No: 01111			
			Order Date: 30/03/00			
Seq	Product	Size	Quantity	Price/Unit	Discount	Net Amount
1	Long-sleeves shirt, White	L	80	150.00	5%	12,198.00
2	Short-sleeves shirt, White	L	80	130.00	5%	10,571.60
Total Amount by Customer					Total	22,769.60
						22,769.60

Figure B.1. Sales Order Report by Customer Name.

Lui Knitting Factory Ltd., Part.		Report Date: 01/11/00				
		Page 1 of 1				
Monthly Sales Report by Customer Name						
Customer: 005 Chin Hua Ltd., Part.		Order No: 01122				
		Order Date: 30/03/00				
Seq	Product	Size	Quantity	Price/Unit	Discount	Net Amount
1	Long-sleeves shirt, White	XL	50	155.00	5%	7,877.88
2	Short-sleeves shirt, White	L	80	130.00	5%	10,571.60
Total Amount by Customer						Total
						18,449.48
						18,449.48

Figure B.2. Sales Order Report by Customer Name (Continued).

Lui Knitting Factory Ltd., Part.			Report Date : 01/11/00		
			Page 1 of 1		
Monthly Sales Report by Order Date					
Order Date : 30/03/00			Order No : 01111		
			Customer : 003 Charoen Garment Co., Ltd.		
Seq	Product	Size	Quantity	Price/Unit	Discount
1	Long-sleeves shirt, White	L	80	150.00	5%
2	Short-sleeves shirt, White	L	80	130.00	5%
				Total	
					22,769.60
			Order No : 01122		
			Customer : 005 Chin Hua Ltd., Part.		
1	Long-sleeves shirt, White	XL	50	155.00	5%
2	Short-sleeves shirt, White	L	80	130.00	5%
				Total	
					18,449.48
Total Amount as of 30/03/00					41219.08

Figure B.3. Sales Order Report by Order Date.

Report Date: 01/11/00

Page 1 of 1

Order Date: 30/03/00

Customer: 003 Charoen Garment Co., Ltd.

Order No: 01111

Order Date: 30/03/00

Customer: 005 Chin Hua Ltd., Part.

Order No: 01122

Order Date: 30/03/00

Customer: 005 Chin Hua Ltd., Part.

Seq

Product

Size

Quantity

Price/Unit

Discount

Net Amount

1

Long-sleeves shirt, White

L

80

150.00

5%

12,198.00

2

Short-sleeves shirt, White

L

80

130.00

5%

10,571.60

Total

22,769.60

1

Long-sleeves shirt, White

XL

50

155.00

5%

7,877.88

2

Short-sleeves shirt, White

L

80

130.00

5%

10,571.60

Total

18,449.48

Figure B.4. Sales Order Report by Order No.

Lui Knitting Factory Ltd., Part.

Report Date: 01/11/00

Page 1 of 1

Customer Report by Customer No

Customer no	Name	Address	Phone no	Fax no	Contact Person
001	Saha-Textile Co., Ltd.	12/6 Rama 3 Rd., Yannawa Bangkok 10120	6812203-5	6812202	Mr. Cherdchai
002	Siam Textile Co., Ltd.	138 Sukhumvit Rd., Prakanong Bangkok 10110	3900801-3	3900804	Mrs. Maleewan
003	Charoen Garment Co., Ltd.	1/19 Taksin Rd., Thonburi Bangkok 10600	4659870-1	4659821	Ms. Uthaiwan
004	Garment Trading Co., Ltd.	19/93 Sathupradit Rd., Yannawa Bangkok 10120	2845669, 2845871	2845710	Ms. Vipa
005	Chin Hua Ltd., Part.	3/46 Charunsanitwong Rd., Bangkokyai Bangkok 10600	4125122-5	4125126	Mr. Sukhum

Figure B.5. Customer Report by Customer No.

Figure B.6. Customer Report by Customer Name.

Lui Knitting Factory Ltd., Part.

Report Date: 01/11/00

Page 1 of 1

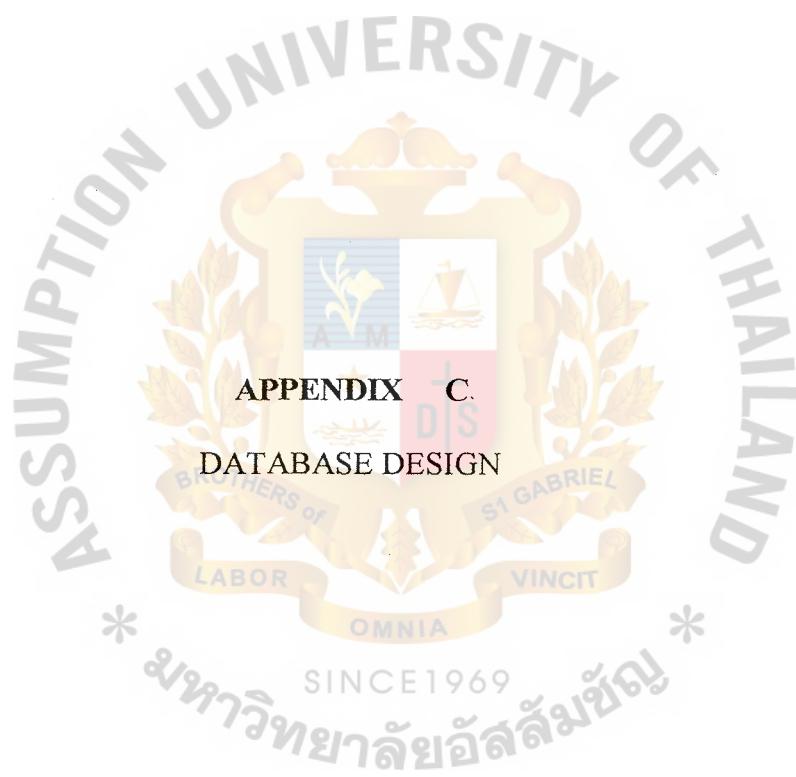
Product Report

Product no	Product name	Size	Color	Stock Qty	Cost/Unit	Price/Unit
1	Long-sleeves shirt	S	White	100	116.67	140.00
2	Long-sleeves shirt	M	White	150	120.83	145.00
3	Long-sleeves shirt	L	White	200	125.00	150.00
4	Long-sleeves shirt	XL	White	50	129.17	155.00
5	Short-sleeves shirt	S	White	150	100.00	120.00
6	Short-sleeves shirt	M	White	100	104.17	125.00
7	Short-sleeves shirt	L	White	200	108.33	130.00
8	Short-sleeves shirt	XL	White	200	108.33	130.00

Figure B.7. Product Report.

Lui Knitting Factory Ltd., Part.			Report Date: 30/04/00	
			Page 1 of 1	
Customer Payment Report				
Invoice no	Customer name	Due Date	Paid Date	Amount Due (Baht)
12345	Saha-Textile Co., Ltd.	10/04/00	10/04/00	30,156.39
12346	Siam Textile Co., Ltd.	25/04/00	25/04/00	10,256.50
12347	Charoen Garment Co., Ltd.	29/04/00	29/04/00	22,769.60
12348	Garment Trading Co., Ltd.	29/04/00	29/04/00	45,123.12
12349	Chin Hua Ltd., Part.	29/04/00	29/04/00	18,449.48
Total Customer Payment as of April				126,755.09

Figure B.8. Customer Payment Report.



APPENDIX C.

DATABASE DESIGN

Customer Database

Table C.1. Structure of Customer Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	Customer no	Char(6)	Y	Y				Primary Key
2	User name	Char(8)	Y			User		Foreign Key
3	Customer name	Char(50)						Attribute
4	Customer address	Char(200)						Attribute
5	Shipping address	Char(200)						Attribute
6	Customer phone no	Char(20)						Attribute
7	Customer fax no	Char(20)			Y			Attribute
8	Customer tax id	Char(12)						Attribute
9	Contact person	Char(30)						Attribute

Order Database

Table C.2. Structure of Order Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	Order no	Char(8)	Y	Y				Primary Key
2	Customer no	Char(6)	Y			Customer		Foreign Key
3	Sale staff code	Char(3)	Y			Employee		Foreign Key
4	User name	Char(8)	Y			User		Foreign Key
5	Order date	Date						Attribute
6	Delivery date	Date			Y			Attribute
7	Cancel date	Date			Y			Attribute
8	Credit term	Integer(3)			Y			Attribute
9	Total amount of money	Decimal(10,2)						Attribute
10	Vat	Decimal(9,2)			Y			Attribute
11	Discount	Decimal(9,2)			Y			Attribute
12	Net amount of money	Decimal(10,2)						Attribute

Product Database

Table C.3. Structure of Product Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	Product no	Char(8)	Y	Y				Primary Key
2	User name	Char(8)	Y			User		Foreign Key
3	Product name	Char(20)						Attribute
4	Product size	Char(3)						Attribute
5	Product color	Char(15)						Attribute
6	Quantity stock	Integer(7)						Attribute
7	Unit cost	Decimal(7,2)						Attribute
8	Unit price	Decimal(7,2)						Attribute

Ordered Product Database

Table C.4. Structure of Ordered Product Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	Ordered product code	Char(8)	Y	Y				Primary Key
2	Order no	Char(8)	Y			Order		Foreign Key
3	Product no	Char(8)	Y			Product		Foreign Key
4	Quantity ordered	Integer(7)						Attribute

Invoice Database

Table C.5. Structure of Invoice Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	Invoice no	Char(8)	Y	Y				Primary Key
2	Order no	Char(8)	Y			Order		Foreign Key
3	User name	Char(8)	Y			User		Foreign Key
4	Invoice date	Date						Attribute
5	Due date	Date						Attribute
6	Paid date	Date			Y			Attribute

Department Database

Table C.6. Structure of Department Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	Department no	Char(2)	Y	Y				Primary Key
2	Department name	Char(20)						Attribute

Employee Database

Table C.7. Structure of Employee Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	Employee code	Char(3)	Y	Y				Primary Key
2	Department no	Char(2)	Y			Department		Foreign Key
3	Employee name	Char(15)						Attribute
4	Employee surname	Char(35)						Attribute
5	Employee address	Char(200)						Attribute
6	Employee phone no	Char(20)		Y				Attribute
7	Employee tax id	Char(12)						Attribute
8	Date of birth	Date						Attribute
9	Salary	Decimal(7,2)						Attribute
10	Start date	Date						Attribute

User Database

Table C.8. Structure of User Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to table	Check	Key Type
1	User name	Char(8)	Y	Y				Primary Key
2	Employee code	Char(3)				Employee		Foreign Key
3	Password	Char(10)					>= 8 characters	Attribute



APPENDIX D
PROCESS SPECIFICATION

Table D.1. Process Specification of Process 1.1.1.

Process Name:	Check Valid Customer
Data In:	(1) Customer status (2) Customer detail
Data Out:	(1) Valid customer detail
Process:	(1) Get customer status, and read customer number from Customer Table (2) Check whether the customer number exists in the database or not
Attachment:	(1) Customer (2) Data Store D1 (Customer)

Table D.2. Process Specification of Process 1.1.2.

Process Name:	Record New Customer
Data In:	(1) Valid customer detail
Data Out:	(1) New customer detail
Process:	(1) Get necessary customer details including name, address, shipping address, telephone number, fax number, tax id, and contact person (2) Key in customer detail (3) Generate customer number (4) Record the customer details into Customer table
Attachment:	(1) Data Store D1 (Customer)

Table D.3. Process Specification of Process 1.2.

Process Name:	Check Product Availability
Data In:	(1) Order (2) Product detail
Data Out:	(1) Valid order
Process:	(1) Get detail from customer's order (2) Read product availability detail from Product table (3) Check products ordered against quantity in stock of those products
Attachment:	(1) Data Store D2 (Product) (2) Customer (3) Operation Staff

Table D.4. Process Specification of Process 2.1.

Process Name:	Record Order Detail
Data In:	(1) Valid order detail (2) Product detail
Data Out:	(1) New order detail (2) Ordered product detail
Process:	(1) Get order detail including order date, ordered product, and Quantity (2) Generate order number (3) Key in order detail (4) Calculate total amount and net amount (5) Record the order detail into Order table and Ordered Product Table
Attachment:	(1) Data Store D2 (Product) (2) Data Store D3 (Order) (3) Data Store D4 (Ordered Product) (4) Operation Staff

Table D.5. Process Specification of Process 2.2.

Process Name:	Generate Delivery Order and Tax Invoice
Data In:	(1) Order detail (2) Ordered product detail (3) Customer detail
Data Out:	(1) New invoice detail (2) Delivery Order (3) Tax Invoice
Process:	(1) Read order detail from Order table, ordered product detail from Ordered Product table, and customer detail from Customer table (2) Check delivery date (3) Generate and record invoice detail into Invoice table (4) Print Delivery Order and Tax Invoice (5) Send Delivery Order to Manufacturing & Warehouse Staff, and send Tax Invoice to Accounting Staff
Attachment:	(1) Data Store D1 (Customer) (2) Data Store D3 (Order) (3) Data Store D4 (Ordered Product) (4) Data Store D5 (Invoice) (5) Manufacturing & Warehouse Staff (6) Accounting Staff

Table D.6. Process Specification of Process 3.1.

Process Name:	Validate Order Cancellation
Data In:	(1) Order cancellation request (2) Order detail
Data Out:	(1) Order cancellation detail
Process:	(1) Get the detail of order cancellation request (2) Read order detail from Order table (3) Check order cancellation against order detail
Attachment:	(1) Data Store D3 (Order) (2) Customer

Table D.7. Process Specification of Process 3.2.

Process Name:	Generate Cancelled Delivery Order and Tax Invoice Notice
Data In:	(1) Order cancellation detail
Data Out:	(1) Cancelled order detail (2) Delivery Order Cancellation Notice (3) Tax Invoice Cancellation Notice
Process:	(1) Get order cancellation detail (2) Record cancelled order detail into Order table (3) Generate cancelled Delivery Order and Tax Invoice Notice (4) Send Delivery Order Cancellation Notice to Manufacturing & Warehouse Staff, and send Tax Invoice Cancellation Notice to Accounting Staff
Attachment:	(1) Data Store D3 (Order) (2) Manufacturing & Warehouse Staff (3) Accounting Staff

Table D.8. Process Specification of Process 4.

Process Name:	Deliver Product
Data In:	(1) Delivery Order detail (2) Order detail
Data Out:	(1) Products (2) Delivery Order (3) Signed Delivery Order (4) Delivery detail
Process:	(1) Key in order number (2) Read order detail from Order table (3) Key in delivery date (4) Update delivery detail in Order table
Attachment:	(1) Data Store D3 (Order) (2) Customer (3) Manufacturing & Warehouse Staff (4) Operation Staff

Table D.9. Process Specification of Process 5.

Process Name:	Process Customer Payment
Data In:	(1) Payment amount (2) Invoice detail (3) Tax Invoice
Data Out:	(1) Payment detail (2) Tax Invoice
Process:	(1) Key in invoice number (2) Read invoice detail from Invoice table (3) Key in paid date (4) Update payment detail in Invoice table
Attachment:	(1) Data Store D5 (Invoice) (2) Customer (3) Accounting Staff

Table D.10. Process Specification of Process 6.1.

Process Name:	Generate Customer Report
Data In:	(1) Customer detail
Data Out:	(1) Customer Report
Process:	(1) Read customer detail from Customer table (2) Process the data to generate Customer Report (3) Print report
Attachment:	(1) Data Store D1 (Customer) (2) Management

Table D.11. Process Specification of Process 6.2.

Process Name:	Generate Sales Report
Data In:	(1) Customer detail (2) Order detail
Data Out:	(1) Sales Report
Process:	(1) Read customer detail from Customer table, and order detail from Order table (2) Process the data to generate Sales Report (3) Print Report
Attachment:	(1) Data Store D1 (Customer) (2) Data Store D3 (Order) (3) Management

Table D.12. Process Specification of Process 6.3.

Process Name:	Generate Product Report
Data In:	(1) Product detail
Data Out:	(1) Product Report
Process:	(1) Read product detail from Product table (2) Process the data to generate Product Report (3) Print Report
Attachment:	(1) Data Store D2 (Product) (2) Management

Table D.13. Process Specification of Process 6.4.

Process Name:	Generate Customer Payment Report
Data In:	(1) Customer detail (2) Invoice detail
Data Out:	(1) Customer Payment Report
Process:	(1) Read customer detail from Customer table, and invoice detail from Invoice table (2) Process the data to generate Customer Payment Report (3) Print Report
Attachment:	(1) Data Store D2 (Product) (2) Management



APPENDIX E

DATA DICTIONARY

Table E.1. Data Dictionary of Customer Database.

Field Name	Meaning
Customer no	Customer number for reference by company
User name	User name of user
Customer name	Name of customer
Customer address	Address of customer
Shipping address	Shipping address of customer
Customer phone no	Telephone number of customer
Customer fax no	Fax number of customer
Customer tax id	Tax id of customer
Contact person	Name of customer's contact person

Table E.2. Data Dictionary of Order Database.

Field Name	Meaning
Order no	Order number for reference by customer and company
Customer no	Customer number for reference by company
Sale staff code	Code of employee who gets the order from customer
User name	User name of user
Order date	Date on which customer places an order
Delivery date	Date on which Warehouse Department delivers products to customer
Cancel date	Date on which customer cancels the order
Credit term	Credit term granted to customer's order
Total amount of money	Total amount of money for an order
Vat	Vat calculated from the total amount of money
Discount	Discount granted to customer's order
Net amount of money	Net amount of money after tax and discount

Table E.3. Data Dictionary of Product Database.

Field Name	Meaning
Product no	Code of product for reference by customer and company
User name	User name of user
Product name	Name of product
Product size	Size of product
Product color	Color of product
Quantity stock	Available quantity of products in stock
Unit cost	Cost of product per unit
Unit price	Price of product per unit

Table E.4. Data Dictionary of Ordered Product Database.

Field Name	Meaning
Ordered product code	Ordered product code for reference by company
Order no	Order number for reference by customer and company
Product no	Code of product for reference by customer and Company
Quantity ordered	Quantity of products ordered by customer

Table E.5. Data Dictionary of Invoice Database.

Field Name	Meaning
Invoice no	Invoice number for reference by company
Order no	Order number for reference by customer and company
User name	User name of user
Invoice date	Date on which the invoice is issued
Due date	Last date on which customer has to make payment against invoice
Paid date	Actual date on which customer makes payment against invoice

Table E.6 Data Dictionary of Department Database.

Field Name	Meaning
Department no	Department number that employee is in
Department name	Name of department

Table E.7. Data Dictionary of Employee Database.

Field Name	Meaning
Employee code	Employee code for reference by company
Department no	Department number that employee is in
Employee name	Name of employee
Employee surname	Surname of employee
Employee address	Address of employee
Employee phone no	Telephone number of employee
Employee tax id	Tax ID. of employee
Date of birth	Birthday of employee
Salary	Salary of employee
Start date	Date that employee started to work for the company

Table E.8. Data Dictionary of User Database.

Field Name	Meaning
User name	User name of user
Employee code	Employee code for reference by company
Password	Password of user



APPENDIX F

ALTERNATIVE CANDIDATE SOLUTIONS

F.1 Alternative Candidates

There are three alternative candidates for the new system as presented below:

Table F.1. Candidate Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
(1) <u>Portion of System Computerized</u> Brief description of portion of the system that would be computerized in this candidate.	Order processing operations, and other concerning functions, which include some inventory operations and some accounting operations.	Same as candidate 1, but more powerful and more flexible to expand the portion of system to support other operations	Same as candidate 2
(2) <u>Benefits</u> Brief description of the business benefits gained from this candidate.	This solution is very cheap, and can support all user requirements currently.	This solution fully supports all user requirements, provides efficient interaction between users, and support large database.	Same as Candidate 2, and this solution is not too expensive.
(3) <u>Method of Data Processing</u> Generally some combination of: online, batch, deferred batch, remote batch, and real time.	Client/Server	Same as Candidate 1	Same as Candidate 1
(4) <u>Servers and Clients</u> A description of the servers and clients needed to support this candidate.	<u>Servers:</u> Pentium III 600 MHz., 18 GB. HDD, Cache 512 KB., RAM 256 MB., 1.44 MB. Floppy Drive, 4X4X32 CD-Write Drive, with MS Windows Server 2000, and UPS 650VA	Same as Candidate 1	Same as Candidate 1

Table F.1. Candidate Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
	<p>Clients:</p> <p>Pentium III 450 MHz., 8 GB.</p> <p>HDD, Cache 256 KB., Ram 64 MB., 1.44 MB.</p> <p>Floppy Drive, 50X CD-ROM Drive, with MS Windows ME</p>		
<p>(5) <u>Software Tools needed</u></p> <p>Software tools needed to design and build the candidate. Not generally applicable if applications software packages are to be purchased.</p>	<p>MS FrontPage 2000</p> <p>MS Internet Explorer 5.0</p>	<p>Oracle Developer Release 6.0</p>	<p>MS Visual InterDev 6.0</p>
<p>(6) <u>Application Software</u></p> <p>A description of the software to be purchased, built, accessed, or some combination of these techniques.</p>	<p>Custom Solution</p>	<p>Same as Candidate 1</p>	<p>Same as Candidate 1</p>
<p>(7) <u>Storage Database Method</u></p> <p>Brief description of how data would be organized, and what storage media would be used.</p>	<p>MS Access 2000</p>	<p>Oracle 8i Enterprise Edition Release 8.1.5</p>	<p>MS SQL Server 7.0</p>
<p>(8) <u>Input Devices and Implications</u></p> <p>A description of input methods to be used, input devices, special input requirements, and input consideration.</p>	<p>Keyboard, mouse</p> <p>1 Scanner (600x1200 dpi.) with SCSI card</p>	<p>Same as Candidate 1</p>	<p>Same as Candidate 1</p>

Table F.1. Candidate Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
<p>(9) <u>Output Devices and Implications</u> A description of output devices that would be used, special output requirements, and output considerations.</p>	<p>1 Laser Print Server</p> <p>2 Laser Printers</p> <p>3 Dot Matrix Printers</p> <p>15 inches SVGA monitor</p>	<p>Same as Candidate 1</p>	<p>Same as Candidate 1</p>



Table F.2. Hardware and Software Requirement for Each Candidate.

Hardware and Software	Candidate 1	Candidate 2	Candidate 3
Server: Pentium III 600 MHz., 18 GB. HDD, Cache 512 KB., RAM 256 MB., 1.44 MB. Floppy Drive, 4X4X32 CD-Writer Drive, Ethernet 10/100 UTP-Connect Network Adapter, SVGA Card, 15" monitor, UPS 650VA	X	X	X
Client: Pentium III 450 MHz., 8 GB. HDD, Cache 256 KB., RAM 64 MB., 1.44 MB. Floppy Drive, 50X CD-ROM Drive, Ethernet 10/100 UTP-Connect Network Adapter, SVGA Card, 15" monitor	X	X	X
Scanner (600x1200 dpi.) with SCSI card	X	X	X
Laser Print Server	X	X	X
Laser Printer	X	X	X
Dot Matrix Printer	X	X	X
Microsoft Windows Server 2000	X	X	X
Microsoft Internet Information Server	X		X
Microsoft Active Server Pages	X		X
Microsoft SQL Server 7.0			X
Oracle 8i Enterprise Edition Release 8.1.5		X	
Oracle Developer Release 6.0		X	
Microsoft Windows ME	X	X	X
Microsoft Visual InterDev 6.0			X
Microsoft Internet Explorer 5.0	X		X
Microsoft Office 2000 Professional	X	X	X
Microsoft FrontPage 2000	X		

F.2 Feasibility Analysis

From the Feasibility Analysis Matrix below, the Candidate 3 is the best overall solution, as it gets the highest score of 93 in ranking.

Table F.3. Feasibility Analysis Matrix.

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
<p>(1) <u>Operational Feasibility</u></p> <p><u>Functionality</u>: A description of to what degree the candidate would benefit the company and how well the system would work.</p> <p><u>Political</u>: A description of how well received this solution would be from both user, management, and organization perspective.</p>	30%	<p>Supports the required functionality.</p> <p>Many users and management accept this solution, as it supports all their requirements. But they are afraid that the system may not be able to support large database.</p> <p>Score: 80</p>	<p>Fully supports the required functionality.</p> <p>Most of users and management accept this candidate, as it fully supports their requirements, and can be expanded to support other functions in the future.</p> <p>Score: 100</p>	<p>Fully supports the required functionality.</p> <p>Most of users and management highly accept this solution. They are convinced that this solution will meet all their requirements by using not too long time of construction. It can also be expanded easily to support other functions in the future.</p> <p>Score: 100</p>
<p>(2) <u>Technical Feasibility</u></p> <p><u>Technology</u>: An assessment of the maturity, availability (or ability to acquire), and desirability of the computer technology needed to support this candidate.</p> <p><u>Expertise</u>: An assessment of the technical expertise needed to develop, operate, and maintain the candidate system.</p>	30%	<p>MS FrontPage 2000 can easily be used to design and build the system, but FrontPage does not support ASP. Therefore, MS Internet Explorer 5.0 is also needed in designing and building the system.</p> <p>MS Access is easy to use. It can be used to manage database very well, but the size of database must not be large. If the database becomes larger, MS Access will not be able to</p>	<p>Oracle can effectively be used to design and build the system. Oracle is very good at support large database, but it may be complex and hard to learn.</p> <p>Required to hire a computer company to construct all the system, and recruit one system engineer to take care of the system.</p>	<p>MS Visual InterDev 6.0 can effectively be used to design and build the system without MS Internet Explorer, because MS Visual InterDev InterDev itself supports ASP.</p> <p>MS SQL Server 7.0 is good at support large database. It is very stable and provides very fast access to large database. In addition, it is not complex and not hard to learn.</p>

Table F.3. Feasibility Analysis Matrix (Continued).

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
		work effectively. Required to hire a computer company to construct all the system, and recruit one system engineer to take care of the system. Score: 85		Required to hire a computer company to construct all the system, and recruit one system engineer to take care of the system. Score: 95
(3) <u>Economic Feasibility</u> Development Cost: Break-even point: Payback period: Detailed calculations:	30%	Approximately 1,301,050 baht 2 months 2 months See page 113-119 Score: 95	Approximately 1,497,050 baht 1 year and 1 month 1 year and 2 months See page 120-126 Score: 80	Approximately 1,400,050 baht 4 months 5 months See page 127-133 Score: 85
(4) <u>Schedule Feasibility</u> An assessment of how long the solution will take to design and implement.	10%	About 1 month Score: 95	About 2.5 months Score: 80	About 1.5 months Score: 90
Ranking	100%	87.50	89.00	93.00

F.3 Cost/Benefit Analysis for Candidate 1

F.3.1 Cost of Candidate 1 Computerized System

Table F.4. Computerized System Cost Analysis for Candidate 1, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost (Development Cost)					
Hardware Cost:					
Computer Server Cost	19,000.00	19,000.00	19,000.00	19,000.00	19,000.00
Personal Computer Cost	49,000.00	49,000.00	49,000.00	49,000.00	49,000.00
Laser Printer 2 units@25,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Laser Print Server 1 unit@50,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Dot Matrix Printer 3 units@25,000	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Scanner 1 unit@14,000	2,800.00	2,800.00	2,800.00	2,800.00	2,800.00
UPS 1 unit@8,000	1,600.00	1,600.00	1,600.00	1,600.00	1,600.00
Total Hardware Cost	107,400.00	107,400.00	107,400.00	107,400.00	107,400.00
Software Cost	63,200.00	63,200.00	63,200.00	63,200.00	63,200.00
Network Cost	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
System Construction Cost	150,000.00	-	-	-	-
Training Cost	18,000.00	-	-	-	-
Maintenance Cost	-	50,000.00	55,000.00	60,500.00	66,550.00
Total Fixed Cost	348,200.00	230,200.00	235,200.00	240,700.00	246,750.00
Operating Cost					
Salary Cost:					
Operation Manager 1 person@42,000	42,000.00	46,200.00	50,820.00	55,902.00	61,492.20
Operation Staff 4 persons@21,000	84,000.00	92,400.00	101,640.00	111,804.00	122,984.40
Sales Staff 8 persons@16,000	128,000.00	140,800.00	154,880.00	170,368.00	187,404.80
System Engineer 1 person@27,000	27,000.00	29,700.00	32,670.00	35,937.00	39,530.70
Total Monthly Salary Cost	281,000.00	309,100.00	340,010.00	374,011.00	411,412.10
Total Annual Salary Cost	3,372,000.00	3,709,200.00	4,080,120.00	4,488,132.00	4,936,945.20
Office Supplies & Miscellaneous Cost:					
Stationery 1,200 per month	14,400.00	15,840.00	17,424.00	19,166.40	21,083.04
Paper 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Miscellaneous 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Total Annual Office Supplies & Miscellaneous Cost	72,000.00	79,200.00	87,120.00	95,832.00	105,415.20
Utility Cost:					
Electricity 44,000 per month	528,000.00	580,800.00	638,880.00	702,768.00	773,044.80
Water 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Telephone 17,500 per month	210,000.00	231,000.00	254,100.00	279,510.00	307,461.00
Total Utility Cost	786,000.00	864,600.00	951,060.00	1,046,166.00	1,150,782.60
Total Operating Cost	4,230,000.00	4,653,000.00	5,118,300.00	5,630,130.00	6,193,143.00
Total Computerized System Cost	4,578,200.00	4,883,200.00	5,353,500.00	5,870,830.00	6,439,893.00

F.3.2 Cost Comparison and Breakeven Analysis for Candidate 1

Table F.5. The Comparison of the System Cost for Candidate 1, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	4,560,500.00	4,578,200.00
2	9,576,640.00	9,461,400.00
3	15,093,984.00	14,814,900.00
4	21,162,652.40	20,685,730.00
5	27,837,777.64	27,125,623.00



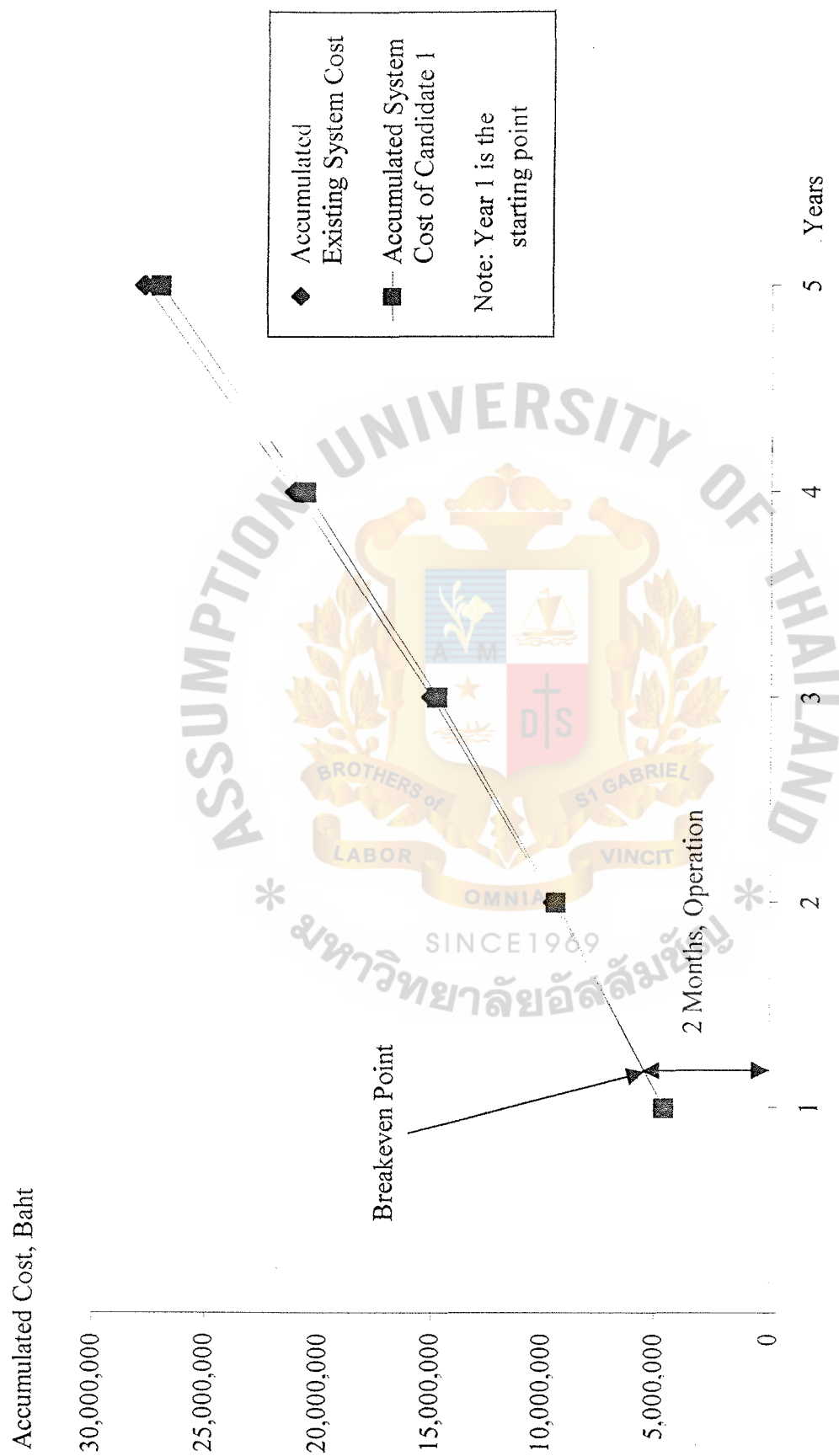


Figure F.1. Cost Comparison between Manual and Proposed System for Candidate 1.

F.3.3 Benefit Analysis for Candidate 1

From the Candidate1 system, salary cost, office supplies and miscellaneous cost, and utility cost are saved as shown below:

$$\begin{aligned}\text{Benefit for the 1}^{\text{st}} \text{ year} &= (3,648,000 - 3,372,000) + (116,400 - 72,000) \\ &\quad + (792,000 - 786,000) \\ &= 326,400 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 2}^{\text{nd}} \text{ year} &= (4,012,800 - 3,709,200) + (128,040 - 79,200) \\ &\quad + (871,200 - 864,600) \\ &= 359,040 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 3}^{\text{rd}} \text{ year} &= (4,414,080 - 4,080,120) + (140,844 - 87,120) \\ &\quad + (958,320 - 951,060) \\ &= 394,944 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 4}^{\text{th}} \text{ year} &= (4,855,488 - 4,488,132) + (154,928.40 - \\ &\quad 95,832) + (1,054,152 - 1,046,166) \\ &= 434,438.40 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 5}^{\text{th}} \text{ year} &= (5,341,036.80 - 4,936,945.20) + (170,421.24 - \\ &\quad 105,415.20) + (1,159,567.20 - 1,150,782.60) \\ &= 477,882.24 \text{ Baht/year}\end{aligned}$$

F.3.4 Payback Analysis for Candidate 1

Table P.6. Cost and Benefit Analysis for Candidate 1, Baht.

Cost Items	Years				
	1	2	3	4	5
Total Cost Invested for the Candidate 1 System	348,200.00	230,200.00	235,200.00	240,700.00	246,750.00
Accumulated Cost Invested for the Candidate 1 System	348,200.00	578,400.00	813,600.00	1,054,300.00	1,301,050.00
Total Benefit from the Candidate 1 System	326,400.00	359,040.00	394,944.00	434,438.40	477,882.24
Accumulated Benefit from the Candidate 1 System	326,400.00	685,440.00	1,080,384.00	1,514,822.40	1,992,704.64

Table F.7. The Comparison of the Accumulated Cost Invested for the Candidate 1 System and Accumulated Benefit from the Candidate 1 System, Baht.

Year	Accumulated Cost	Accumulated Benefit	Accumulated (Benefit – Cost)
1	348,200.00	326,400.00	-21,800.00
2	578,400.00	685,440.00	107,040.00
3	813,600.00	1,080,384.00	266,784.00
4	1,054,300.00	1,514,822.40	460,522.40
5	1,301,050.00	1,992,704.64	691,654.64

As the accumulated (benefit-cost) is negative in the first year, but it is positive in the second year, payback period is therefore between the first year and the second year.

Payback period can be calculated as follows:

$$21,800 / (21,800 + 107,040) = 0.17 \text{ year}$$

$$0.17 \times 12 = 2 \text{ months}$$

Therefore, the payback period for Candidate 1 is about 2 months. Please note that year 1 is the starting point.

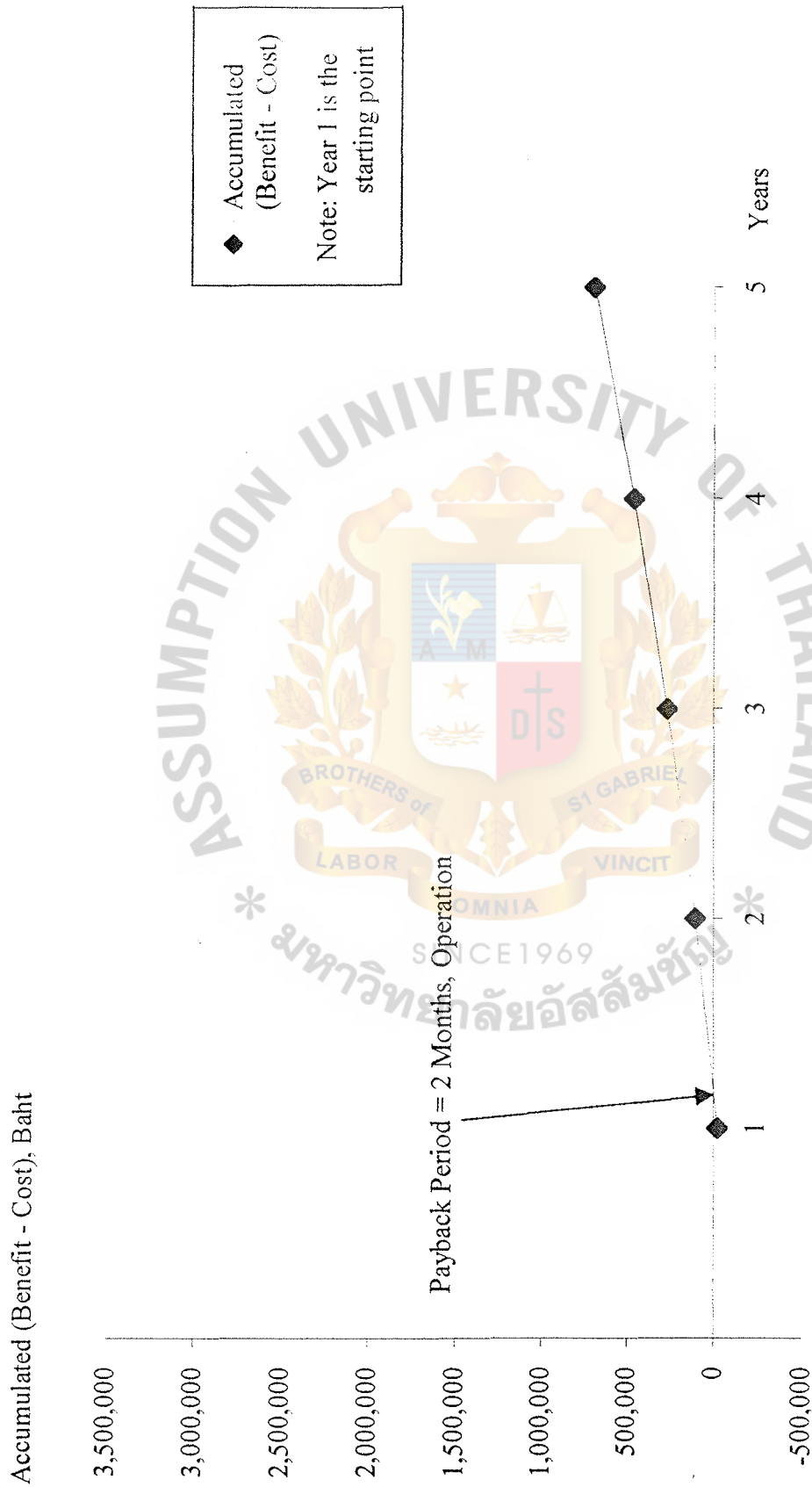


Figure F.2. Payback Chart for the Candidate 1.

F.4 Cost/Benefit Analysis for Candidate 2

F.4.1 Cost of Candidate 2 Computerized System

Table F.8. Computerized System Cost Analysis for Candidate 2, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost (Development Cost)					
Hardware Cost:					
Computer Server Cost	19,000.00	19,000.00	19,000.00	19,000.00	19,000.00
Personal Computer Cost	49,000.00	49,000.00	49,000.00	49,000.00	49,000.00
Laser Printer 2 units@25,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Laser Print Server 1 unit@50,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Dot Matrix Printer 3 units@25,000	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Scanner 1 unit@14,000	2,800.00	2,800.00	2,800.00	2,800.00	2,800.00
UPS 1 unit@8,000	1,600.00	1,600.00	1,600.00	1,600.00	1,600.00
Total Hardware Cost	107,400.00	107,400.00	107,400.00	107,400.00	107,400.00
Software Cost	86,000.00	86,000.00	86,000.00	86,000.00	86,000.00
Network Cost	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
System Construction Cost	200,000.00	-	-	-	-
Training Cost	50,000.00	-	-	-	-
Maintenance Cost	-	50,000.00	55,000.00	60,500.00	66,550.00
Total Fixed Cost	453,000.00	253,000.00	258,000.00	263,500.00	269,550.00
Operating Cost					
Salary Cost:					
Operation Manager 1 person@42,000	42,000.00	46,200.00	50,820.00	55,902.00	61,492.20
Operation Staff 4 persons@21,000	84,000.00	92,400.00	101,640.00	111,804.00	122,984.40
Sales Staff 8 persons@16,000	128,000.00	140,800.00	154,880.00	170,368.00	187,404.80
System Engineer 1 person@27,000	27,000.00	29,700.00	32,670.00	35,937.00	39,530.70
Total Monthly Salary Cost	281,000.00	309,100.00	340,010.00	374,011.00	411,412.10
Total Annual Salary Cost	3,372,000.00	3,709,200.00	4,080,120.00	4,488,132.00	4,936,945.20
Office Supplies & Miscellaneous Cost:					
Stationery 1,200 per month	14,400.00	15,840.00	17,424.00	19,166.40	21,083.04
Paper 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Miscellaneous 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Total Annual Office Supplies & Miscellaneous Cost	72,000.00	79,200.00	87,120.00	95,832.00	105,415.20
Utility Cost:					
Electricity 44,000 per month	528,000.00	580,800.00	638,880.00	702,768.00	773,044.80
Water 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Telephone 17,500 per month	210,000.00	231,000.00	254,100.00	279,510.00	307,461.00
Total Utility Cost	786,000.00	864,600.00	951,060.00	1,046,166.00	1,150,782.60
Total Operating Cost	4,230,000.00	4,653,000.00	5,118,300.00	5,630,130.00	6,193,143.00
Total Computerized System Cost	4,683,000.00	4,906,000.00	5,376,300.00	5,893,630.00	6,462,693.00

F.4.2 Cost Comparison and Breakeven Analysis for Candidate 2

Table F.9. The Comparison of the System Cost for Candidate 2, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	4,560,500.00	4,683,000.00
2	9,576,640.00	9,589,000.00
3	15,093,984.00	14,965,300.00
4	21,162,652.40	20,858,930.00
5	27,837,777.64	27,321,623.00



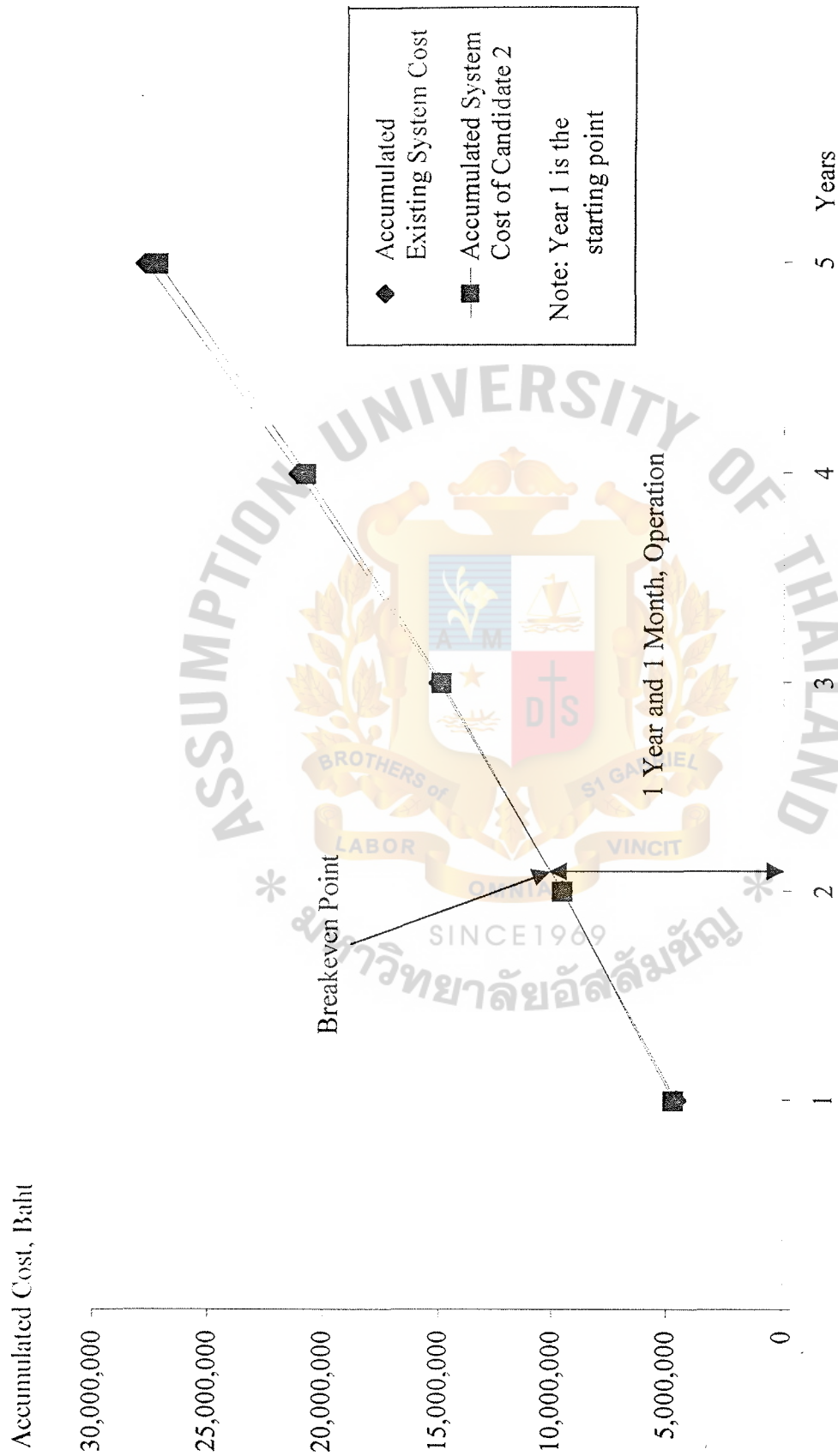


Figure F.3. Cost Comparison between Manual and Proposed System for Candidate 2.

F.4.3 Benefit Analysis for Candidate 2

From the Candidate 2 system, salary cost, office supplies and miscellaneous cost, and utility cost are saved as shown below:

$$\begin{aligned}\text{Benefit for the 1}^{\text{st}} \text{ year} &= (3,648,000 - 3,372,000) + (116,400 - 72,000) \\ &\quad + (792,000 - 786,000) \\ &= 326,400 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 2}^{\text{nd}} \text{ year} &= (4,012,800 - 3,709,200) + (128,040 - 79,200) \\ &\quad + (871,200 - 864,600) \\ &= 359,040 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 3}^{\text{rd}} \text{ year} &= (4,414,080 - 4,080,120) + (140,844 - 87,120) \\ &\quad + (958,320 - 951,060) \\ &= 394,944 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 4}^{\text{th}} \text{ year} &= (4,855,488 - 4,488,132) + (154,928.40 - \\ &\quad 95,832) + (1,054,152 - 1,046,166) \\ &= 434,438.40 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 5}^{\text{th}} \text{ year} &= (5,341,036.80 - 4,936,945.20) + (170,421.24 - \\ &\quad 105,415.20) + (1,159,567.20 - 1,150,782.60) \\ &= 477,882.24 \text{ Baht/year}\end{aligned}$$

F.4.4 Payback Analysis for Candidate 2

Table F.10. Cost and Benefit Analysis for Candidate 2, Baht.

Cost Items	Years				
	1	2	3	4	5
Total Cost Invested for the Candidate 2 System	453,000.00	253,000.00	258,000.00	263,500.00	269,550.00
Accumulated Cost Invested for the Candidate 2 System	453,000.00	706,000.00	964,000.00	1,227,500.00	1,497,050.00
Total Benefit from the Candidate 2 System	326,400.00	359,040.00	394,944.00	434,438.40	477,882.24
Accumulated Benefit from the Candidate 2 System	326,400.00	685,440.00	1,080,384.00	1,514,822.40	1,992,704.64

Table F.11. The Comparison of the Accumulated Cost Invested for the Candidate 2 System and Accumulated Benefit from the Candidate 2 System, Baht.

Year	Accumulated Cost	Accumulated Benefit	Accumulated (Benefit – Cost)
1	453,000.00	326,400.00	-126,600.00
2	706,000.00	685,440.00	-20,560.00
3	964,000.00	1,080,384.00	116,384.00
4	1,227,500.00	1,514,822.40	287,322.40
5	1,497,050.00	1,992,704.64	495,654.64

As the accumulated (benefit-cost) is negative in the first and the second year, but it is positive in the third year, payback period is therefore between the second year and the third year. Payback period can be calculated as follows:

$$20,560 / (20,560 + 116,384) = 1.15 \text{ years}$$

$$1.15 \times 12 = 14 \text{ months, or 1 year and 2 months}$$

Therefore, the payback period for Candidate 2 is about 1 year and 2 months.

Please note that year 1 is the starting point.

Accumulated (Benefit - Cost), Baht

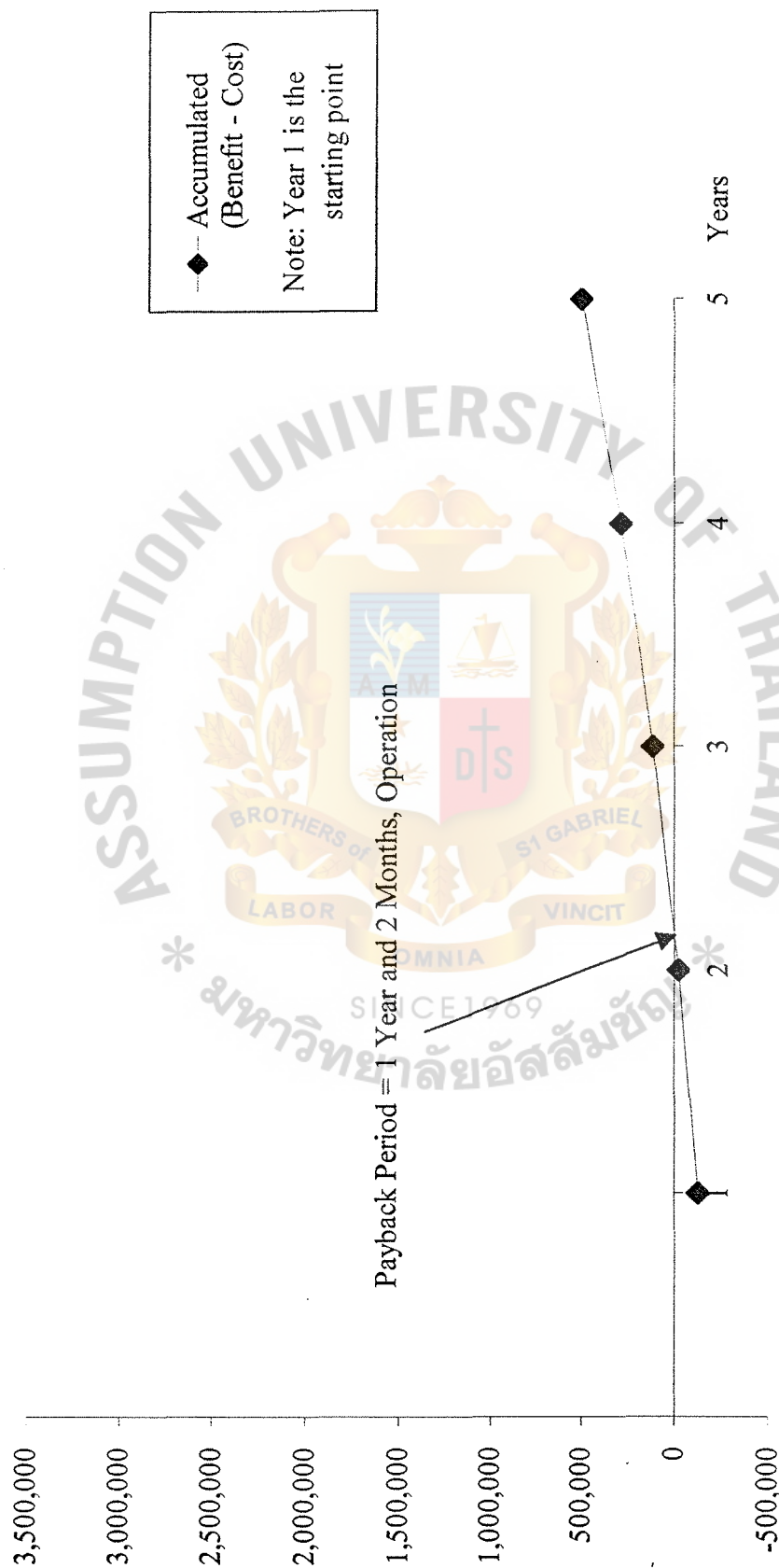


Figure F.4. Payback Chart for the Candidate 2.

F.5 Cost/Benefit Analysis for Candidate 3

F.5.1 Cost of Candidate 3 Computerized System

Table F.12. Computerized System Cost Analysis for Candidate 3, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost (Development Cost)					
Hardware Cost:					
Computer Server Cost	19,000.00	19,000.00	19,000.00	19,000.00	19,000.00
Personal Computer Cost	49,000.00	49,000.00	49,000.00	49,000.00	49,000.00
Laser Printer 2 units@25,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Laser Print Server 1 unit@50,000	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Dot Matrix Printer 3 units@25,000	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Scanner 1 unit@14,000	2,800.00	2,800.00	2,800.00	2,800.00	2,800.00
UPS 1 unit@8,000	1,600.00	1,600.00	1,600.00	1,600.00	1,600.00
Total Hardware Cost	107,400.00	107,400.00	107,400.00	107,400.00	107,400.00
Software Cost	82,600.00	82,600.00	82,600.00	82,600.00	82,600.00
Network Cost	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
System Construction Cost	150,000.00	-	-	-	-
Training Cost	20,000.00	-	-	-	-
Maintenance Cost	-	50,000.00	55,000.00	60,500.00	66,550.00
Total Fixed Cost	369,600.00	249,600.00	254,600.00	260,100.00	266,150.00
Operating Cost					
<u>Salary Cost:</u>					
Operation Manager 1 person@42,000	42,000.00	46,200.00	50,820.00	55,902.00	61,492.20
Operation Staff 4 persons@21,000	84,000.00	92,400.00	101,640.00	111,804.00	122,984.40
Sales Staff 8 persons@16,000	128,000.00	140,800.00	154,880.00	170,368.00	187,404.80
System Engineer 1 person@27,000	27,000.00	29,700.00	32,670.00	35,937.00	39,530.70
Total Monthly Salary Cost	281,000.00	309,100.00	340,010.00	374,011.00	411,412.10
Total Annual Salary Cost	3,372,000.00	3,709,200.00	4,080,120.00	4,488,132.00	4,936,945.20
<u>Office Supplies & Miscellaneous Cost:</u>					
Stationery 1,200 per month	14,400.00	15,840.00	17,424.00	19,166.40	21,083.04
Paper 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Miscellaneous 2,400 per month	28,800.00	31,680.00	34,848.00	38,332.80	42,166.08
Total Annual Office Supplies & Miscellaneous Cost	72,000.00	79,200.00	87,120.00	95,832.00	105,415.20
<u>Utility Cost:</u>					
Electricity 44,000 per month	528,000.00	580,800.00	638,880.00	702,768.00	773,044.80
Water 4,000 per month	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Telephone 17,500 per month	210,000.00	231,000.00	254,100.00	279,510.00	307,461.00
Total Utility Cost	786,000.00	864,600.00	951,060.00	1,046,166.00	1,150,782.60
Total Operating Cost	4,230,000.00	4,653,000.00	5,118,300.00	5,630,130.00	6,193,143.00
Total Computerized System Cost	4,599,600.00	4,902,600.00	5,372,900.00	5,890,230.00	6,459,293.00

F.5.2 Cost Comparison and Breakeven Analysis for Candidate 3

Table F.13. The Comparison of the System Cost for Candidate 3, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	4,560,500.00	4,599,600.00
2	9,576,640.00	9,502,200.00
3	15,093,984.00	14,875,100.00
4	21,162,652.40	20,765,330.00
5	27,837,777.64	27,224,623.00



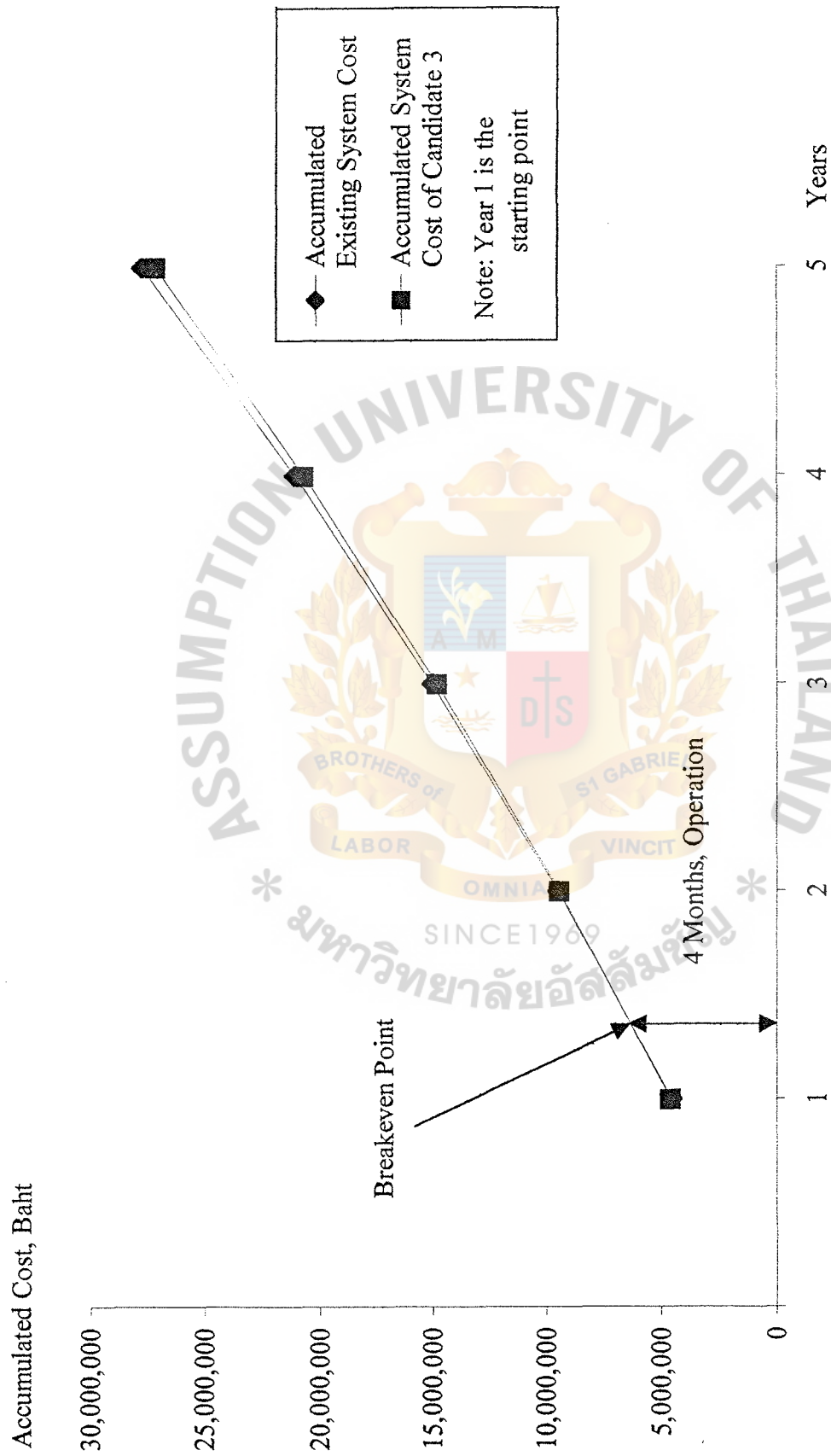


Figure F.5. Cost Comparison between Manual and Proposed System for Candidate 3.

F.5.3 Benefit Analysis for Candidate 3

From the Candidate 3 system, salary cost, office supplies and miscellaneous cost, and utility cost are saved as shown below:

$$\begin{aligned}\text{Benefit for the 1}^{\text{st}} \text{ year} &= (3,648,000 - 3,372,000) + (116,400 - 72,000) \\ &\quad + (792,000 - 786,000) \\ &= 326,400 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 2}^{\text{nd}} \text{ year} &= (4,012,800 - 3,709,200) + (128,040 - 79,200) \\ &\quad + (871,200 - 864,600) \\ &= 359,040 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 3}^{\text{rd}} \text{ year} &= (4,414,080 - 4,080,120) + (140,844 - 87,120) \\ &\quad + (958,320 - 951,060) \\ &= 394,944 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 4}^{\text{th}} \text{ year} &= (4,855,488 - 4,488,132) + (154,928.40 - \\ &\quad 95,832) + (1,054,152 - 1,046,166) \\ &= 434,438.40 \text{ Baht/year}\end{aligned}$$

$$\begin{aligned}\text{Benefit for the 5}^{\text{th}} \text{ year} &= (5,341,036.80 - 4,936,945.20) + (170,421.24 - \\ &\quad 105,415.20) + (1,159,567.20 - 1,150,782.60) \\ &= 477,882.24 \text{ Baht/year}\end{aligned}$$

F.5.4 Payback Analysis for Candidate 3

Table F.14. Cost and Benefit Analysis for Candidate 3, Baht.

Cost Items	Years				
	1	2	3	4	5
Total Cost Invested for the Candidate 3 System	369,600.00	249,600.00	254,600.00	260,100.00	266,150.00
Accumulated Cost Invested for the Candidate 3 System	369,600.00	619,200.00	873,800.00	1,133,900.00	1,400,050.00
Total Benefit from the Candidate 3 System	326,400.00	359,040.00	394,944.00	434,438.40	477,882.24
Accumulated Benefit from the Candidate 3 System	326,400.00	685,440.00	1,080,384.00	1,514,822.40	1,992,704.64

Table F.15. The Comparison of the Accumulated Cost Invested for the Candidate 3 System and Accumulated Benefit from the Candidate 3 System, Baht.

Year	Accumulated Cost	Accumulated Benefit	Accumulated (Benefit – Cost)
1	369,600.00	326,400.00	-43,200.00
2	619,200.00	685,440.00	66,240.00
3	873,800.00	1,080,384.00	206,584.00
4	1,133,900.00	1,514,822.40	380,922.40
5	1,400,050.00	1,992,704.64	592,654.64

As the accumulated (benefit-cost) is negative in the first year, but it is positive in the second year, payback period is therefore between the first year and the second year.

Payback period can be calculated as follows:

$$43,200 / (43,200 + 66,240) = 0.39 \text{ year}$$

$$0.39 \times 12 = 5 \text{ months}$$

Therefore, the payback period for Candidate 3 is about 5 months. Please note that year 1 is the starting point.

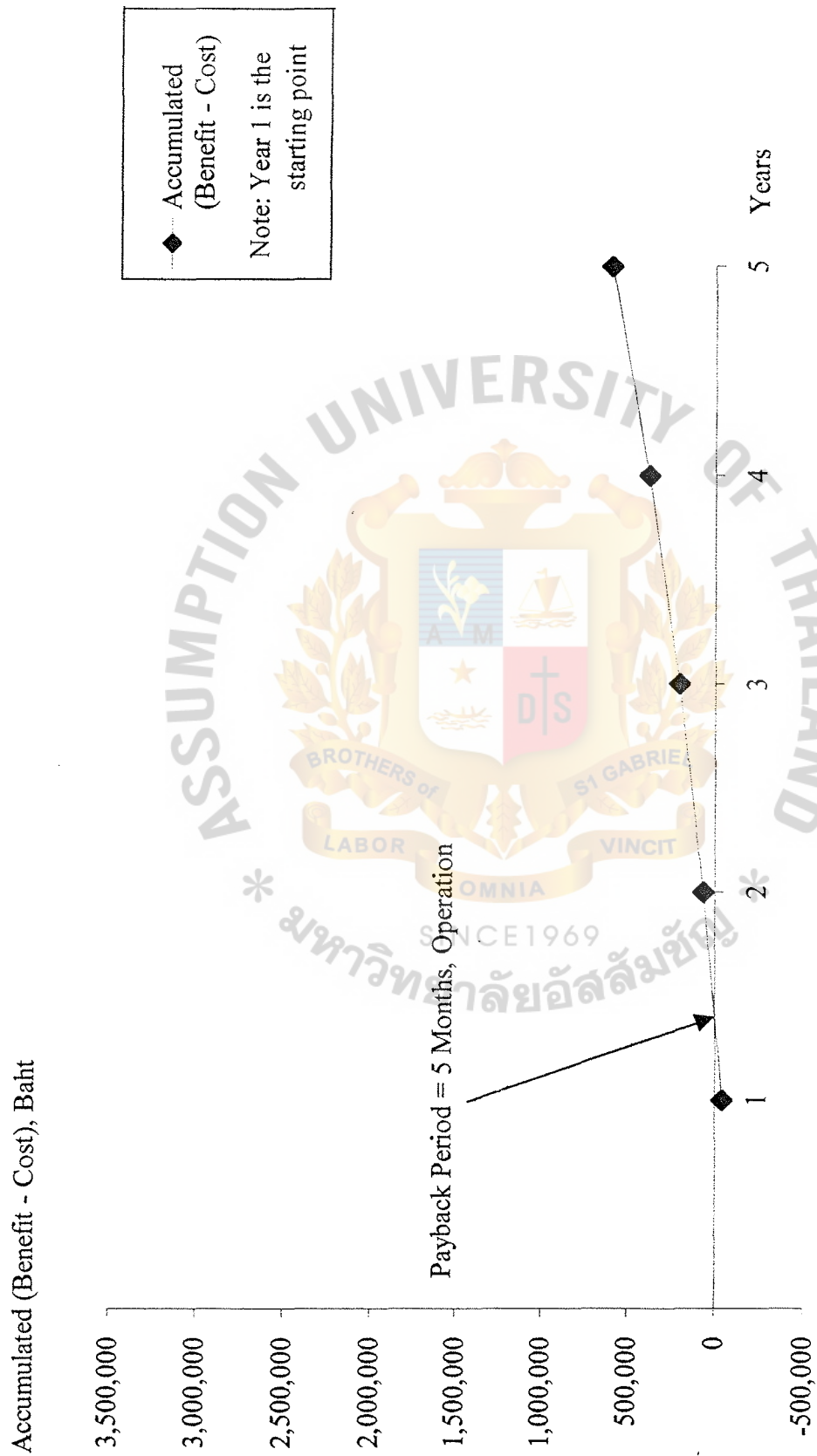


Figure F.6. Payback Chart for the Candidate 3.

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