Financial Accounting Information System for BB Trading Co., Ltd.

by

Mr. Eakaphan Sriphan

A Final Report of the Three-Credits 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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Project Title	Financial Accounting Information System for BB Trading Co., Ltd.
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Academic Year	March 17, 2002

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

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ABSTRACT

For the trend, the information technology has the most important in the business. The demand of accurate and timely information is increasing especially accounting information.

BB Trading Co., Ltd. is the one of BB group that has many businesses in Thailand such as beverage, food, agriculture industry and restaurant. This company acts as a middleman for their group that purchases products from their group and sell overseas.

The current existing financial accounting information system is based on manual and some computerized systems. Most of data are recorded on paper, while some parts are kept in the Microsoft Excel, which create many problems in controlling the flow of documents and providing unreliable, inaccurate and inadequate information.

The new proposed system will be developed to replace the manual and some computerized systems. All data are kept in the database server. It will reduce the number of staffs, solve the problem of the problem of manual system. The scope of the project involve Purchasing, Receive Goods & Payment, Ordering, Receivable, and General Ledger

The new system that is developed by using the system analysis and design concept is designed by considering the users' need.

ACKNOWLEDGEMENTS

Several people have made contributions to this project. The writer would like to acknowledge their efforts and thank them for their contributions.

First of all, I would like to thank Air Marshal Dr. Chulit Meesajjee, my project advisor, for his valuable suggestions and advice given in to preparation of this project.

I am very grateful to all members of MS (CIS) Board for their advice. I would like to convey to my tanks to the lecturers of MS (CIS) who give knowledge and experience to me.

I extend my sincere thanks to Ms. Sujerat Siriratanapanit, BB Trading Co., Ltd. for their timely assistance and information provided to me while carrying out the data collection required for this project.

Finally, I would like to thanks every body who support me in the various ways of this project.

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I. INTRODUCTION

1.1 Background of the Project

At the present time, financial account information has an important role in business. The good financial accounting information will help the company to get a competitive advantage. Thus, every company develops its financial accounting information system to earn the benefit.

1.2 Objectives of the Project

The project objectives for financial accounting information system are as follows:

(1) To study the existing system, analyze and design the system of financial accounting information system.

(2) To change the existing system from manual process to computerized system.

(3) To enhance the effectiveness of the database.

(4) To reduce cost and time in operation.

(5) To reduce the redundant information.

(6) To reserve the future growth of the company.

1.3 Scope of the Project

The project scope covers studying the appropriate database system in Accounting department. The system develops in the computerized system to reduce the mistakes in work processes and increase efficiency of work. The new system developed closely associated to a bulk of accounting information, which must spend as less as probable time to respond to the users' commands.

The project scopes cover the following:

(1) To analyze and design an appropriate computerized system.

(2) To develop a new database system related to the computerized system.

(3) To reduce paper-based documents by using the systematic computerized database.

1.4 Deliverable

The deliverables of this project shall be employed with:

(a) Input Screens

(b) Project works, which contain the following contents

(1) Project Overview

(2) Data Flow Diagram

(3) Entity-Relationship Diagram (ER-Diagram)

(4) Input-Output

(5) System Flowchart

(6) Context Diagram

(7) Inspection and test plan, including their results

(8) Conclusion and recommendations

1.5 Project Plan

The plan starts from the first week of October 2001, and is completed in the fourth week of January 2002. The following schedule illustrates the financial accounting system project plan.

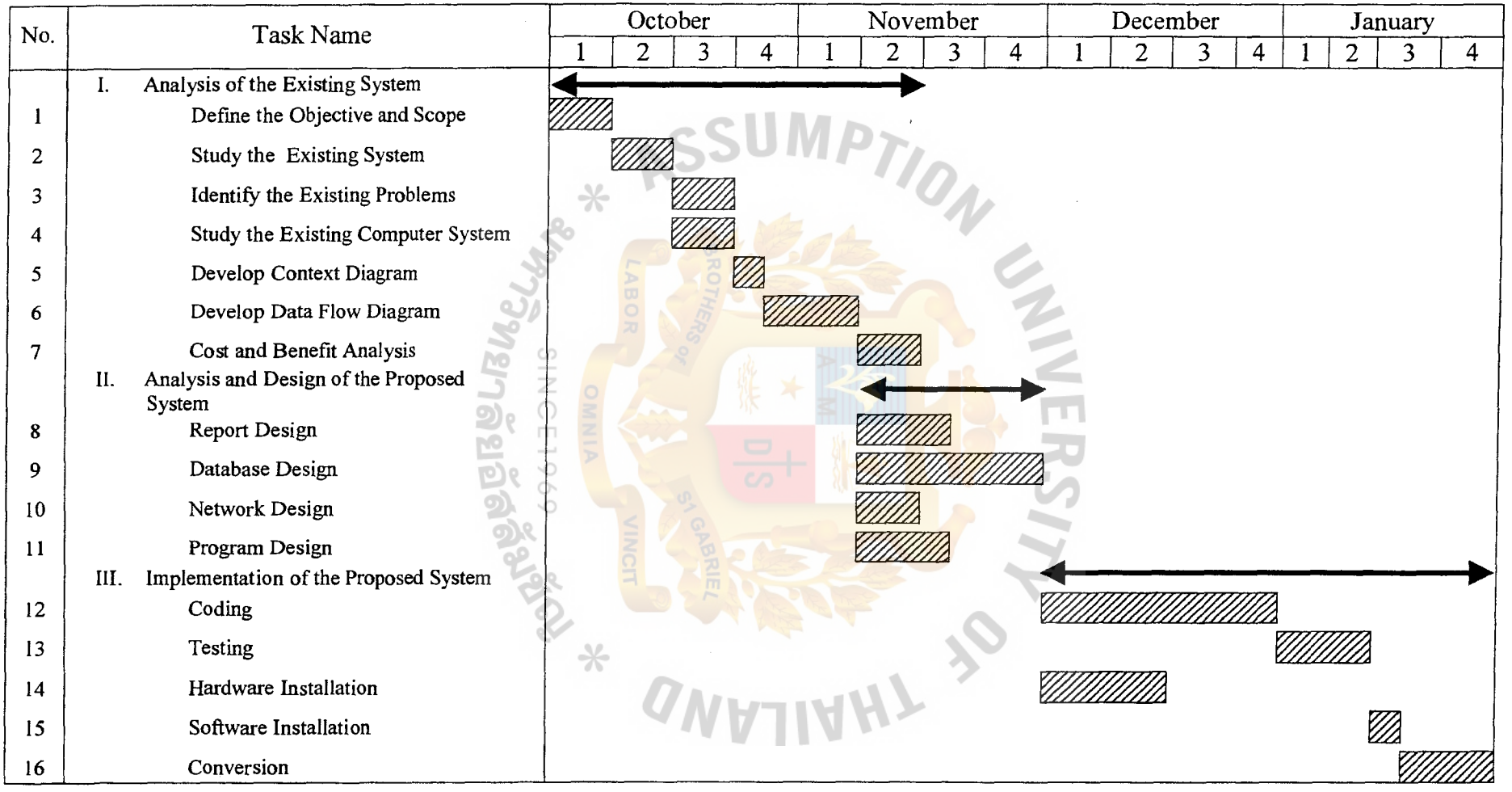

Figure 1.1. Project plan of Financial Accounting Information System for BB Trading Co., Ltd.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

BB Trading Co., Ltd. was established in 1998. It is one of BB groups that has many businesses in Thailand such as beverage, food, agriculture industry and restaurant. This company acts as a middleman for their group that purchases products from their group and sell oversea. The company commenced with only fifty employees.

2.2 Existing Business Functions

The BB Trading Co., Ltd. contains the following departments:

(1) Sales Department

The Sales Department checks the stock and prepares orders to store department. Additionally, they provide customer service, responsible for all products selling customers servicing and negotiating with foreign customer.

(2) Administration Department

The Administration Department is responsible for human resource management, administration, Human Resources Salary (HRS), including salary contributes.

(3) Financial and Accounting Department

The Finance and Accounting Department handles accounting activities that covers revenue cycle, payment cycle and general ledger handling, undertaking in company's financial budget, revenues, cost and compensations including foreign currency changes.

(4) Store Department

The Store Department undertakes handling storing, purchase goods by sale department order.

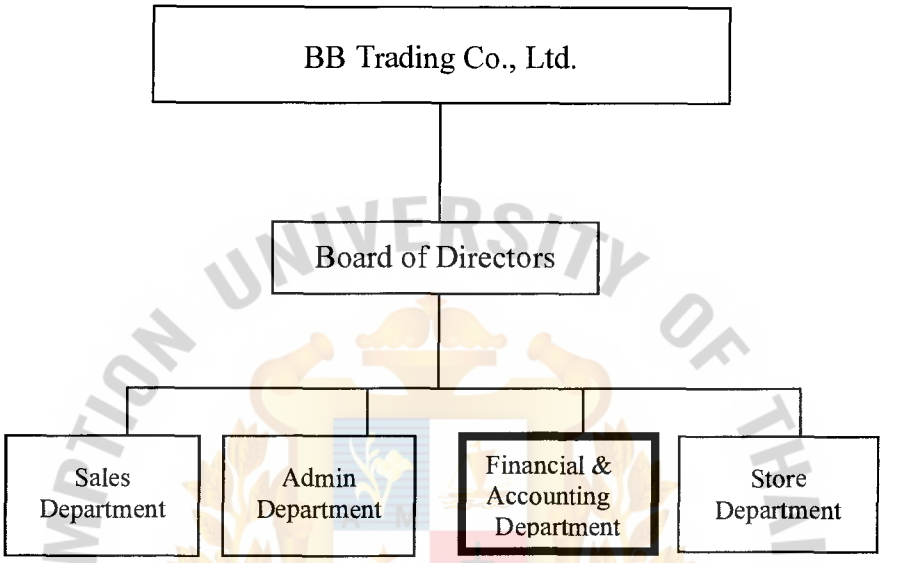

Figure 2.1. Organization Chart of BB Trading Co., Ltd.

2.3 Current Problem and Areas for Improvement

The existing system is a manual system. Therefore, there are many problems that occur in BB Trading Co., Ltd. The following problems are always found during the process:

(1) Human error

There was too much human errors being found during the manufacturing processes, since the staffs are always tired due to the overtime working. Mistakes are found such as wrong check of spare parts requisitions, or distribute the incorrect tools to the requesters, calculating incorrect payment or providing incorrect or misunderstood information.

Areas for improvement – Using the computer-based system will keep all the information in the database and retrieve the information in the report form in the required format. While the computer system must provide reliable and correct information that produce statistical reports to support decision-making and forecasting trend for manager.

(2) Redundancy information

At the current time, they get problems about too much unused information. This disturbs overall accounting process due to spending a long time just for filtering the useful information directly involved with accounting process. The existing manual system did not support the practical database system, regarding all staff are not well trained, or practiced in the database information system.

(3) Delay process

All problems that occurred in the existing manual system caused a delay of time spending in the accounting process. The accountant has to spend too much time for correcting the problem occurred in the process. Management always concentrate in this delay, so they are trying to implement the new computerized system to less an time loss in the process delay for getting necessary reports on time.

(4) Incorrect data

This incorrect data problems are affected from the human error problems, staff sometimes provide the wrong data.

III. THE PROPOSED SYSTEM

The proposed system is designed to replace the existing manual system. The proposed computerized system will control all information of all sections, especially the processes in the financial and accounting department.

3.1 System Specification

The proposed system is the new system that is created to solve some problems of the existing system. From the analysis of the existing system, both processes and resources, and the problems found, the key functions need to be analyzed are redundant information, human error, delay process and incorrect data. The proposed system covers the data organization that relates to every department, systematic management and control. Furthermore, the proposed system also covers additional functions that enhance the higher capability of the company. The system specifications are as followings:

(1) To reduce data redundancy in each transaction of all departments.

(2) To create a new database system that relates to the computerized system.

(3) To provide user-friendly interfaces that are in electronic documents.

(4) To speed up processes in each department.

(5) To create information in the suitable form, which is comfortable to each process.

(6) To reduce cost of temporary staffs employment.

(7) To reduce the number of human power errors.

(8) To enhance the efficiency and effective of each work process.

(9) To perform the right procedures in the right order.

3.2 System Design

The system design categories are divided into the following sections:

(1) Design of Input Screen

The input screen provides the convenience for user to key in the data to the form. The input screen should be simpler, user graphic interface, easy to key in and ensure that the forms meet the purpose and designed forms to assure accurate completion. The input screen is the user interface designs for the proposed system is attached in Appendix A.

(2) Design of Output Screen

The output screen will display the data for reference of printing reports. The output screen should be the simple screen and the information must be useful and support user requirements and management decision making. The output screen is show in Appendix B.

(3) Database Design

This method shall be designed to increase working process' efficiency that can also reduce human mistakes and redundant information. The database design show in Appendix C.

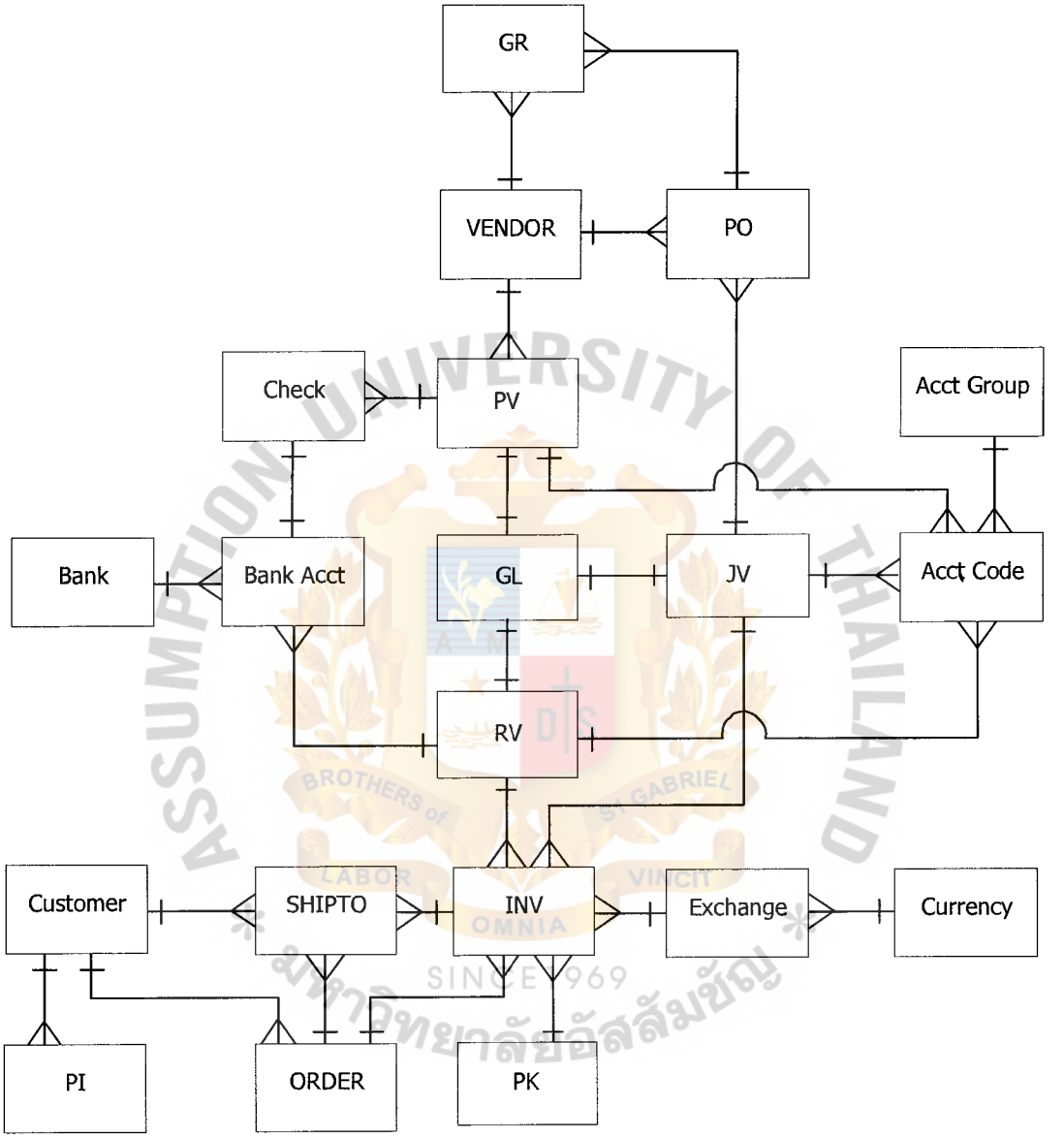

Figure 3.1. Entity Relationship Diagram (ERD).

(4) Process Specification

The process specification represents an overview of the Financial Accounting Information System. The process specification is shown in Appendix D.

Process 1.0 Purchasing

(1) To prepare purchase order.

(2) To approve purchase order.

(3) To receive goods.

(4) To record account payable.

Process 2.0 Receive Goods & Payment

(1) To prepare bill receiving.

(2) To prepare payment voucher.

(3) To prepare check.

(4) To record payment.

Process 3.0 Ordering

(1) To prepare proforma invoice.

(2) To confirm order.

(3) To prepare invoice.

(4) To prepare packing list.

(5) To transfer goods in transit.

(6) To record airway bill.

(7) To record accounting receiving.

Process 4.0 Receive

(1) To record receipt.

Process 5.0 General Ledger

(1) Transfer to G/L

(2) Record transaction

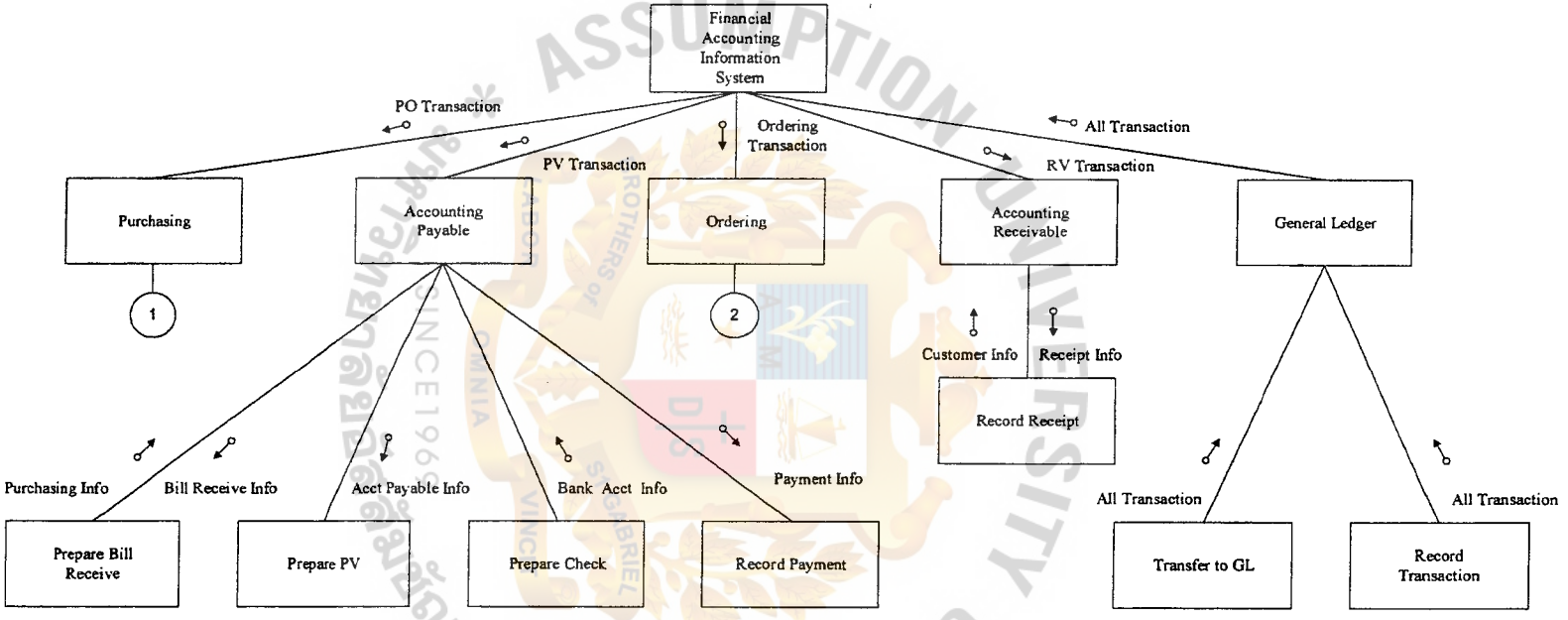

Figure 3.2. Structure Chart of Financial Accounting Information System Process.

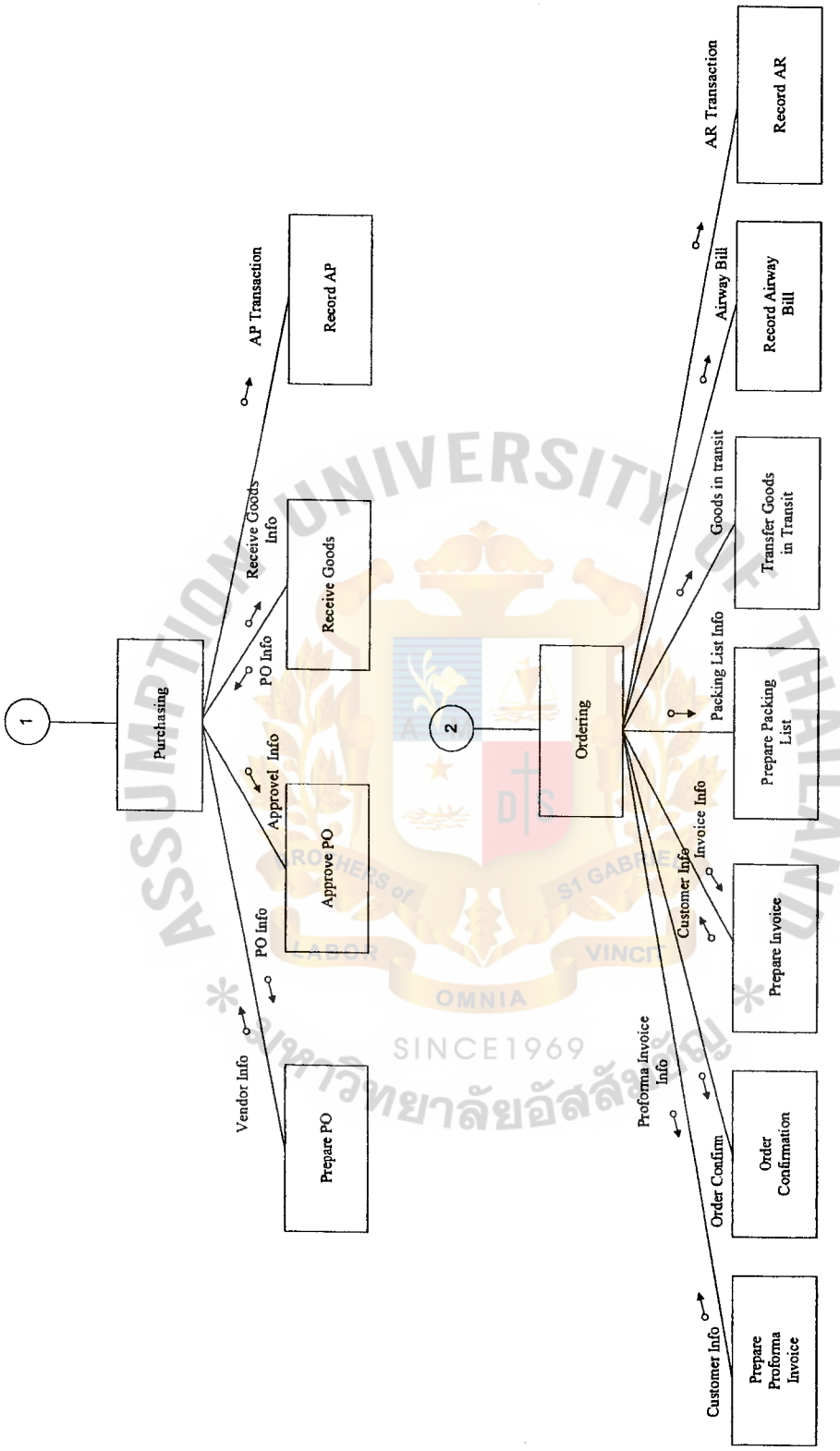

Figure 3.3. Structure Chart of Financial Accounting Information System Process (Continued).

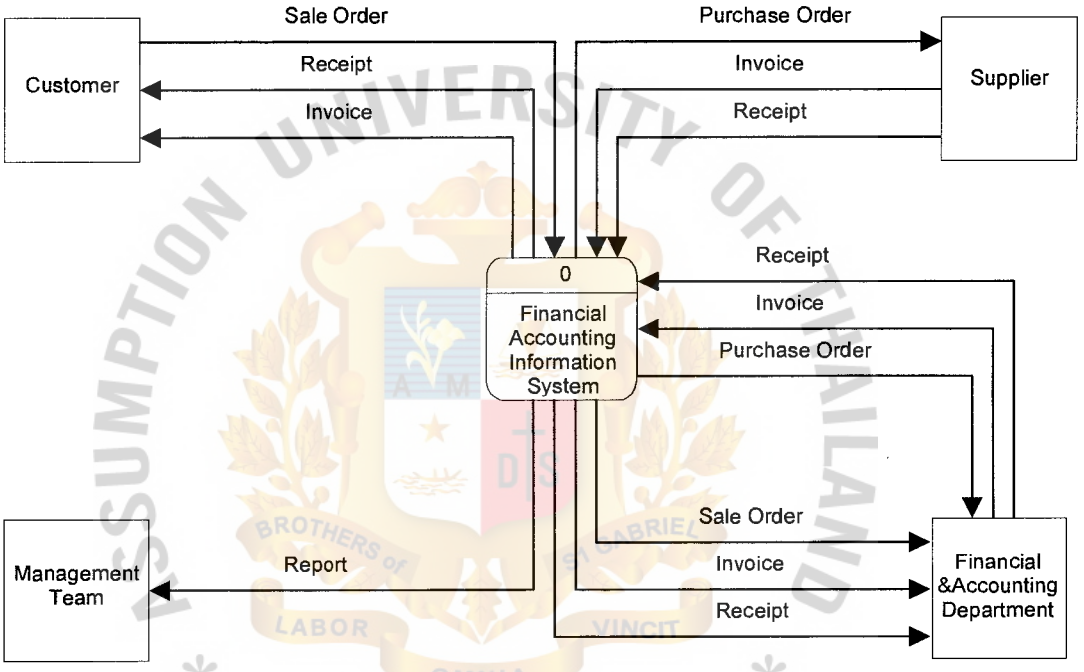

Figure 3.4. Context Diagram of Proposed System.

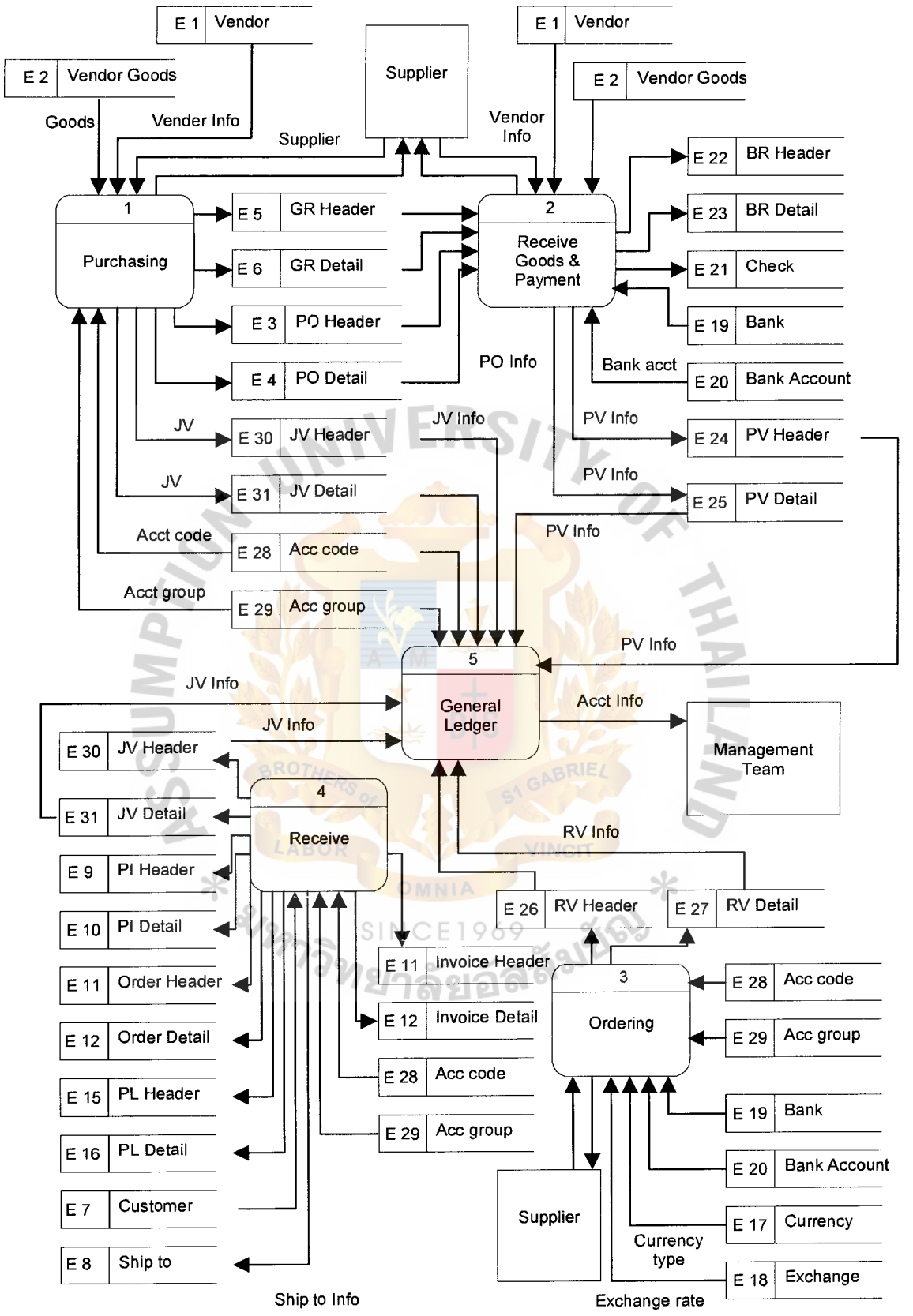

Figure 3.5. DFD Level 0.

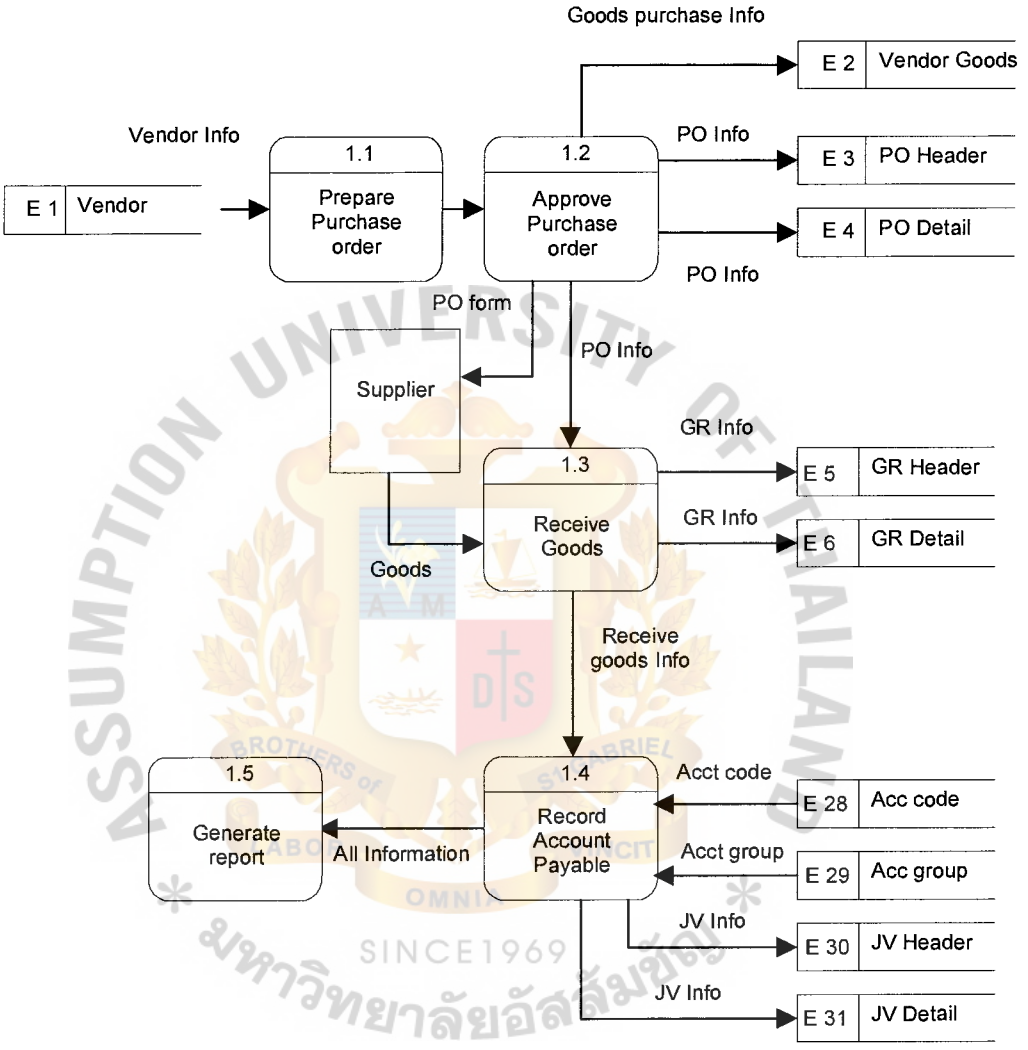

Figure 3.6. DFD Process 1.0 Level 1.0.

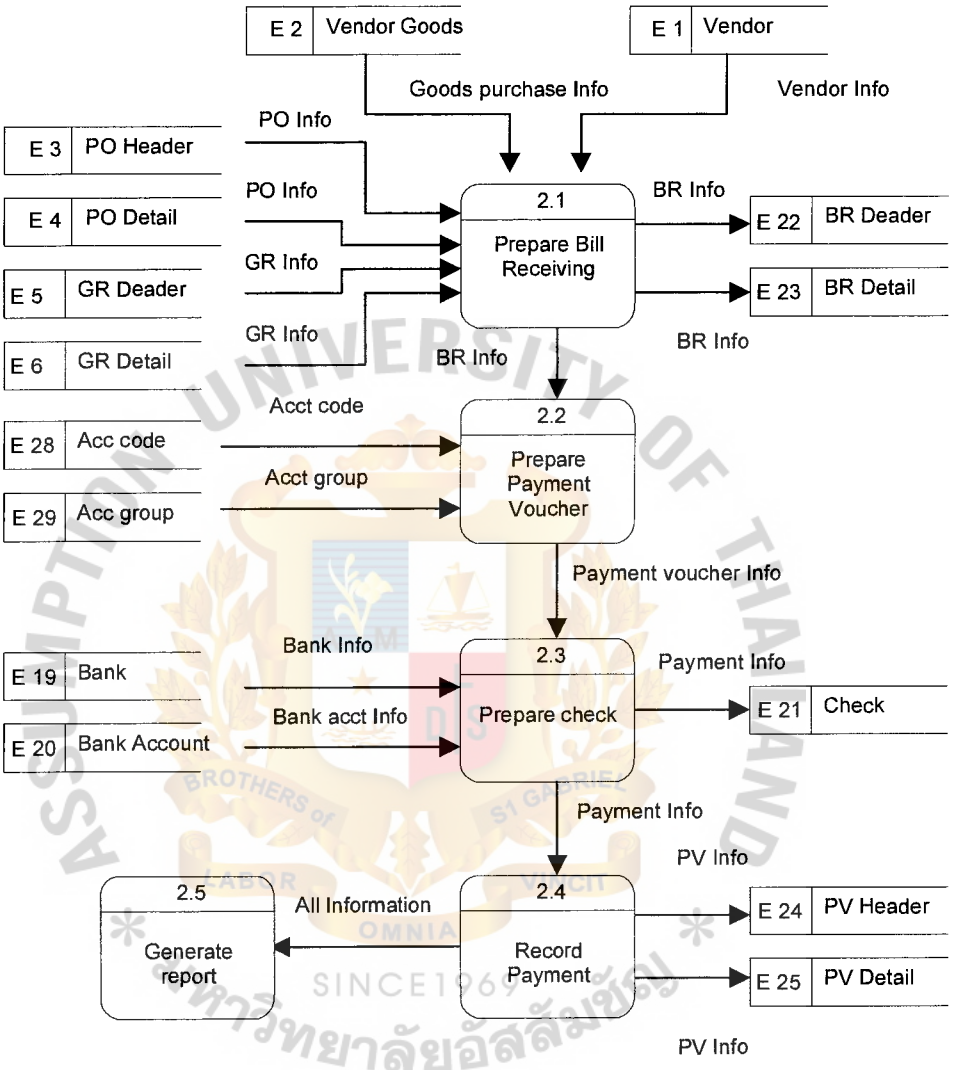

Figure 3.7. DFD Process 2.0 Level 1.0.

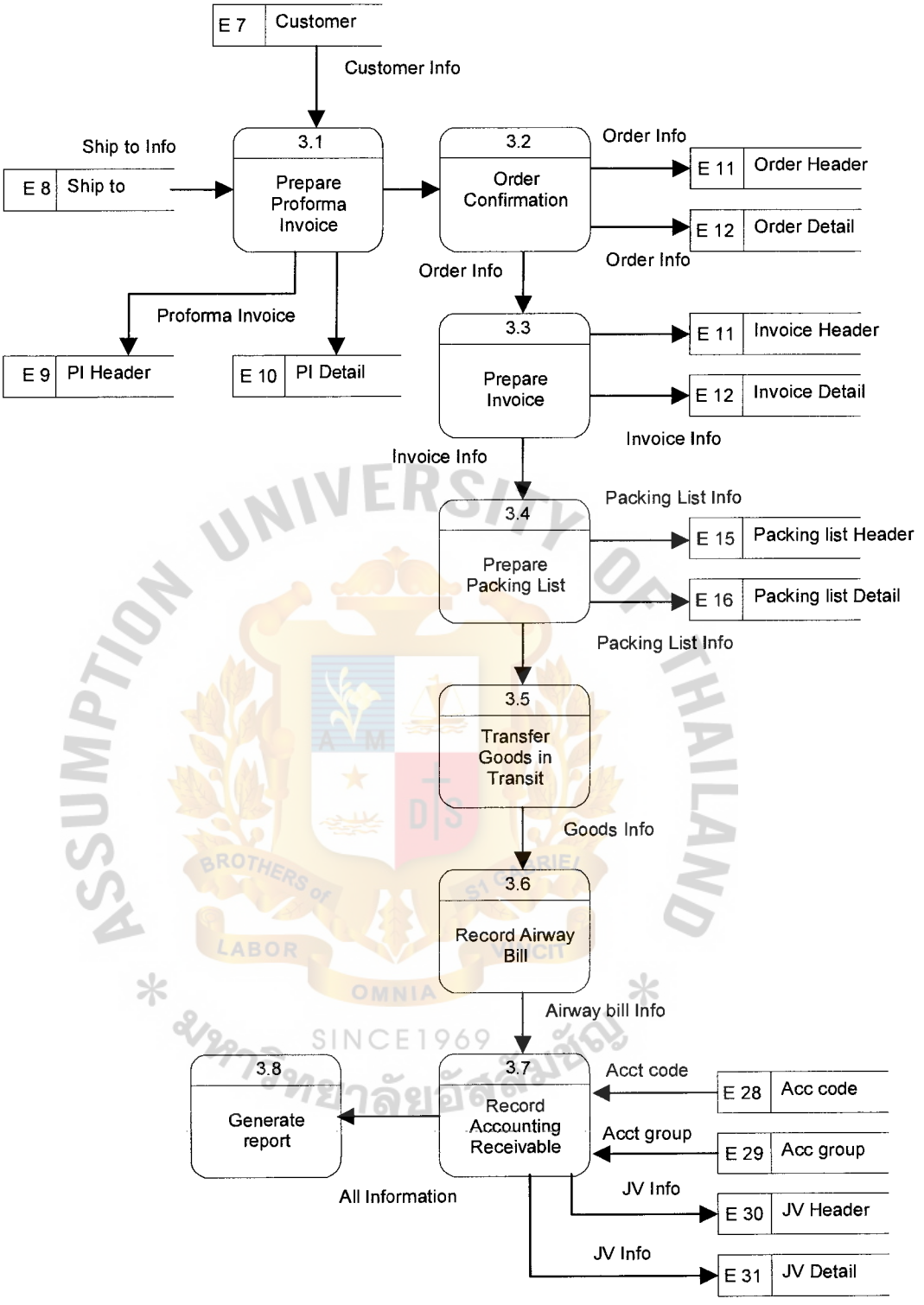

Figure 3.8. DFD Process 3.0 Level 1.0.

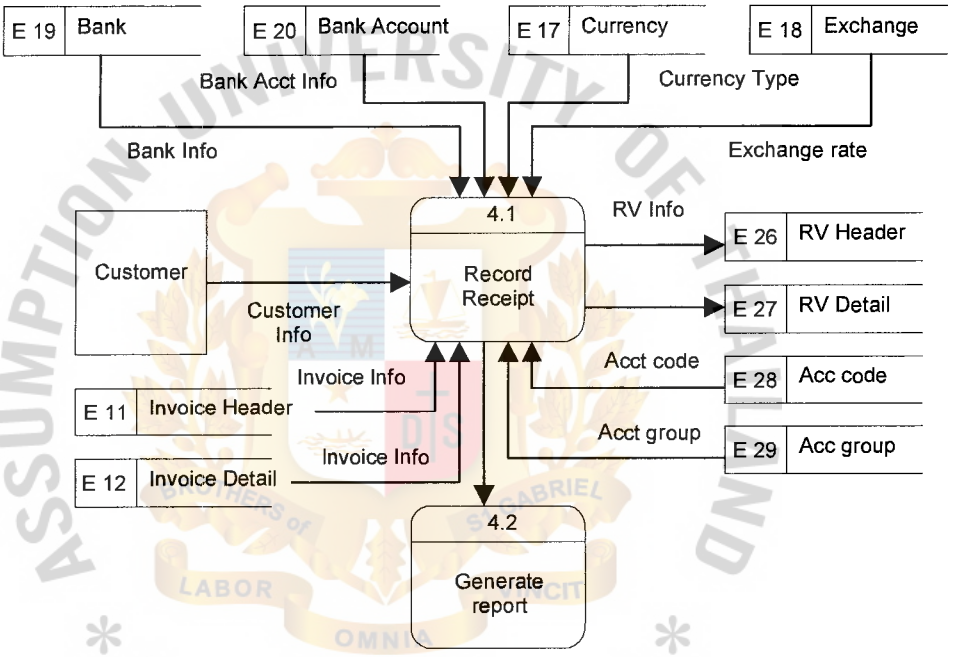

Figure 3.9. DFD Process 4.0 Level 1.0.

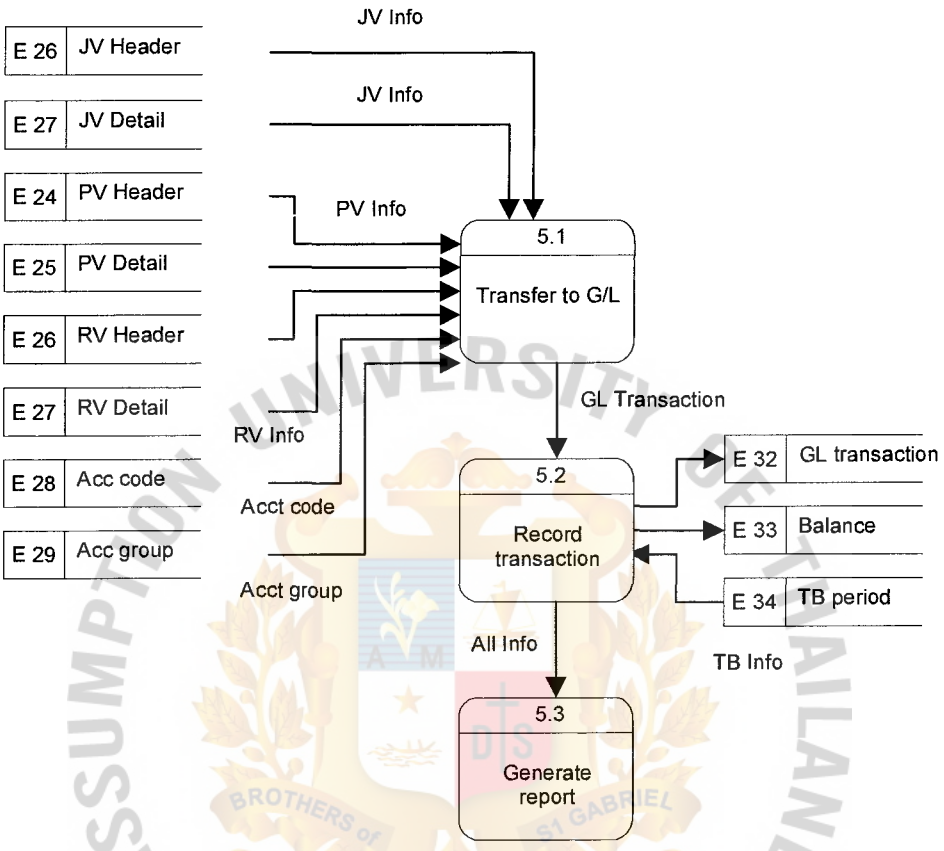

Figure 3.10. DFD Process 5.0 Level 1.0.

(5) Structure Chart

Structure charts provide a detailed graphic of the internal organization of computer program. They show an hierarchy of functions, where each function represents a program module. Structure chart feature data couples with flags to graphically illustrate which inputs are received by which module and which output are produced.

3.3 Hardware and Software Requirement

(1) Hardware Requirement

The required hardware specification for this proposed system is composed of 1 serve, 4 workstations, 1 printer, network peripherals, and cabling, each specification is stated below:

Table 3.1. The Hardware Specification for the Server.

Hardware	Specification
Processor	Multi-Processor Dual Processor Pentium III750 MHz
Memory	512 MB ECC SD Ram
CPU Cache	512 K Per CPU
Hard Disk Interface	Ultra Wide SCSI RAID Controller
Hard Disk	4*4 GB Raid 5 Average Seek Time Max 10 ms.
Video Ram	4 MB DRAM
Expansion Slots	3*PCI Slots and 2 PCI/ISA Slots
Graphic	PCI Card 3D Accelerator Chip
Network Card	10/100 Base-T PCI
I/O Port	2 Serial, 1 Parallel
CD-Rom	40X CDROM Drive

Table 3.1. The Hardware Specification for the Server (Continued).

Hardware	Specification
Monitor	15 " SVGA
Keyboard	104 or Windows 95 PS/2 Thai Version.
Mouse	PS/2 Style- 2 Button
Floppy Disk	1.44 MB Internal

Table 3.2. The Hardware Specification for Each Client Machine.

Hardware	Specification
Processor	Processor Pentium III 700 MHz.
Memory	128 MBECC SDRam
CPU Cache	256 K
Hard Disk	20 GB IDE.
Graphic	PCI Card 3D Accelerator Chip
Network Card	10/100 Base-T PCI
I/O Port	2 Serial 1 Parallel
CD-Rom	40X CDROM Drive
Monitor	15 " SVGA
Keyboard	104 or Windows 95 PS/2 Thai Version.
Mouse	PS/2 Style- 2 Button
Floppy Disk	1.44 MB Internal

Printer

HP LaserJet 2100

UPS

UPS Leonic Green II- 500 VA

Network Peripherals

COM Super Stack II (Hub) 16: 24 ports

HP Jet Direct Explus printer server, 1 serial ports

Cabling

UTP Cable

RJ-45 Connector

(2) Software Requirement

Table 3.3. The Software Specification for the Server.

Software	Specification
Operating System	MS Windows 2000 (Server)
Database Server	Microsoft SQL Server 7.0

Table 3.4. The Software Specification for Each Client Machine.

Software	Specification
Operating System	Microsoft Windows 98 SE
Application Software	Microsoft Office 2000 Professional Edition

(3) Data Communication and Network

All computer machines are interconnected as LAN network. Each device is directly connected to the central server. All communication between devices are controlled by and routed through the central server. Server will be install MS Window 2000 and MS Server 7.0 and each workstation will be install MS Window 98 and MS Office 2000.

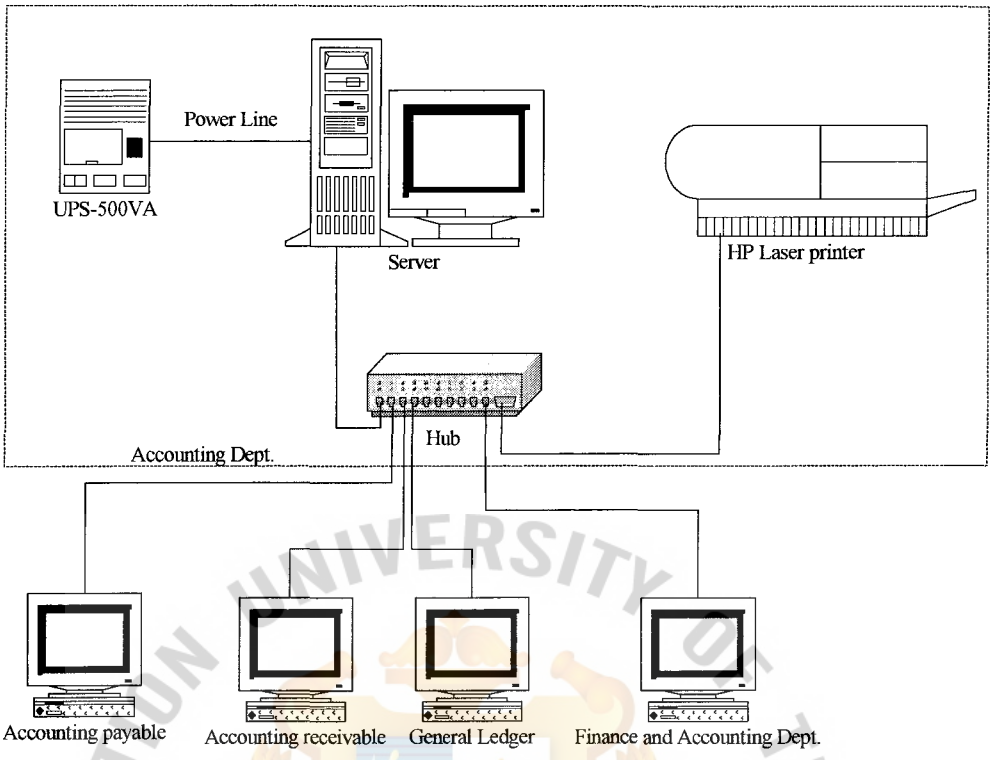

Figure 3.11. The Hardware Configuration

3.4 Security and Control

Security and control plan is one of the most important controls a company can implement. A good way to develop a plan to determine who needs access to what information, when they need it, and on which systems the information resides. This information can be used to determine information threats, risk, and exposures and to select the most cost-effective security measures.

For the proposed system, the security policy is set up for controlling the access of the user as follows:

(1) Set up password and authority in the system for each user to login to the system. The users are asked to enter the user name and the password. After checking if the user is authorized, they could make the data entry,

modification and correction. When the information is keyed in, modified or changed by the user, the system will identify the user, who does that transaction, both for the audit trail and for permission to access certain data every time.

(2) The user is allowed to access only the authorized data so that different users can be restricted to different modes of access (such as read and write). Access depends on his/her job and position.

(3) The user must change the password every 45 days and must keep his/her password confident.

(4) Authorized persons should be instructed to sign source document.

(5) The distribution of reports should be controlled to ensure that they are sent to the correct department.

(6) The hardware should not be left unattended during the printing process.

(7) The hardware must be checked for completeness or any damages every 3 months for preventing the damage for external factor.

3.5 Cost and Benefit Analysis

(1) Costs of Existing System

The cost of existing system is mainly the staff cost because the system operates manually.

Table 3.5. Manual System Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Typewriter	60,000.00	-	-	-	-
Calculator	15,000.00	-	-	-	-
Total Fixed Cost	75,000.00	-	-	-	-
Operating Cost					
Manager	720,000.00	1,080,000.00	1,362,000.00	954,000.00	858,000.00
Staff	2,100,000.00	2,814,000.00	3,732,000.00	2,341,200.00	2,065,200.00
Overtime	185,000.00	198,000.00	213,000.00	83,000.00	43,000.00
Total Annual Salary Cost	3,005,000.00	4,092,000.00	5,307,000.00	3,378,200.00	2,966,200.00
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	41,000.00	81,000.00	88,000.00	37,800.00	24,800.00
Paper Per Annual	50,000.00	68,000.00	78,000.00	28,000.00	18,000.00
Utility Per Annual	62,000.00	42,000.00	88,000.00	38,000.00	38,000.00
Miscellaneous Per Annual	67,000.00	87,000.00	39,000.00	38,000.00	23,000.00
Total Office Supplies & Miscellaneous Cost	220,000.00	278,000.00	293,000.00	141,800.00	103,800.00
Total Manual System Cost	3,300,000.00	4,370,000.00	5,600,000.00	3,520,000.00	3,070,000.00

Table 3.6. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	3,300,000.00	3,300,000.00
2	4,370,000.00	7,670,000.00
3	5,600,000.00	13,270,000.00
4	3,520,000.00	16,790,000.00
5	3,070,000.00	19,860,000.00
Total	19,860,000.00	-

(2) Costs of Computerized System

Table 3.7. Computerized System Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Computer Server	57,000.00	57,000.00	57,000.00	57,000.00	57,000.00
Workstation	35,000.00	35,000.00	35,000.00	35,000.00	35,000.00
Printer	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
UPS	6,600.00	6,600.00	6,600.00	6,600.00	6,600.00
Network Peripherals	10,800.00	10,800.00	10,800.00	10,800.00	10,800.00
Cabling	5,600.00	5,600.00	5,600.00	5,600.00	5,600.00
Software Cost:					
Computer Server	26,000.00	26,000.00	26,000.00	26,000.00	26,000.00
Network	16,000.00	16,000.00	16,000.00	16,000.00	16,000.00
Software Tool	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
Total Fixed Cost	182,000.00	182,000.00	182,000.00	182,000.00	182,000.00
Operating Cost					
Manager	720,000.00	1,080,000.00	1,362,000.00	954,000.00	858,000.00
IT Specialist	480,000.00	768,000.00	900,000.00	684,000.00	612,000.00
Staff	600,000.00	756,000.00	924,000.00	420,000.00	384,000.00
Total Annual Salary Cost	1,800,000.00	2,604,000.00	3,186,000.00	2,058,000.00	1,854,000.00
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	33,000.00	64,000.00	74,000.00	46,560.00	74,560.00
Paper Per Annual	37,000.00	26,000.00	50,000.00	58,840.00	54,840.00
Utility Per Annual	48,000.00	56,300.00	70,000.00	61,600.00	81,600.00
Miscellaneous Per Annual	55,000.00	50,000.00	68,000.00	87,000.00	85,000.00
Total Office Supplies & Miscellaneous Cost	173,000.00	196,300.00	262,000.00	254,000.00	256,000.00
Total Computerized System Cost	5,060,000.00	2,990,000.00	3,680,000.00	2,380,000.00	2,220,000.00

Table 3.8. Five Years Accumulated Computerized Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	5,060,000.00	5,060,000.00
2	2,990,000.00	8,050,000.00
3	3,680,000.00	11,730,000.00
4	2,380,000.00	14,110,000.00
5	2,220,000.00	16,220,000.00
Total	16,220,000.00	-

(3) The Comparison of the System Costs between Manual System and Computerized System

Table 3.9. The Comparison of the System Costs, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	3,300,000.00	5,060,000.00
2	7,670,000.00	8,050,000.00
3	13,270,000.00	11,730,000.00
4	16,790,000.00	14,110,000.00
5	19,860,000.00	16,220,000.00

(4) Breakeven Analysis

Breakeven analysis determines the point at which the cost of the proposed system equals the cost of the current system, or the cost of a new system equals its benefits. After determining the break even point, the analyst subjectively evaluates conditions evidenced in the project to assess its acceptability. The comparison of the system costs between computerized cost and manual cost is show in Table 3.9. Breakeven point between current system and proposed system in show in Figure 3.8.

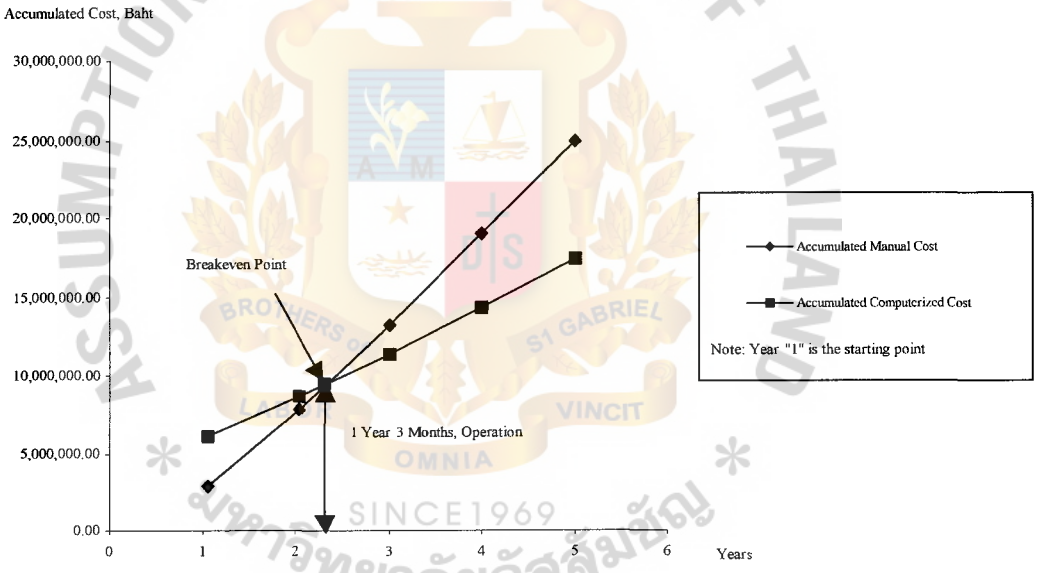

Figure 3.12. Breakeven Point of the Project.

(5) Benefits Analysis

The benefits of the computerized system over the manual in longer range are as follows:

(a) Tangible benefits are the benefits that can be determined as the monetary value. Implementing the proposed system causes the costs of the current system to be eliminated as follows:

Reduction of stationary and paper usage	5,000 baht
Reduction of human labor	1,392,000 baht
Reduction of duplicate work	25,000 baht
Total Tangible Benefits	1,422,000 baht

(6) Payback Analysis

The payback period is determined by the number of years required to accumulate earning sufficient to cover the cost of the proposed system.

$$P = i/(1-T)R$$

Where P = Payback Period (Year)

i = Investment Cost

T = Tax rate (12%)

R = Annual Saving realize by investment

$$P = 5{,}060{,}000/\ \{(1-12)*\ 1{,}422{,}000\}$$

$$= 4.3 \text{ years}$$

Table 3.10. Payback Analysis for the Proposed System, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	2,332,000.00	-	-	-	-	-
Operation & maintenance cost	0.00	5,060,000.00	2,990,000.00	3,680,000.00	2,380,000.00	2,220,000.00
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted costs (adjusted to present value)	0.00	4,518,580.00	2,383,030.00	2,620,160.00	1,513,680.00	1,258,740.00
Cumulative time-adjusted costs over lifetime	-2,332,000.00	6,850,580.00	9,233,610.00	11,853,770.00	13,367,450.00	14,626,190.00
Benefits derived from operation of new system	0.00	1,422,000.00	5,500,500.00	6,100,000.00	6,750,000.00	7,100,000.00
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted costs (adjusted to present value)	0.00	1,269,846.00	4,383,898.50	4,343,200.00	4,293,000.00	4,025,700.00
Cumulative time-adjusted benefits over lifetime	0.00	1,269,846.00	5,653,744.50	9,996,944.50	14,289,944.50	18,315,644.50
Cumulative lifetime time-adjusted cost + benefit	-2,332,000.00	-5,580,734.00	-3,579,865.50	-1,856,825.50	922,494.50	3,689,454.50

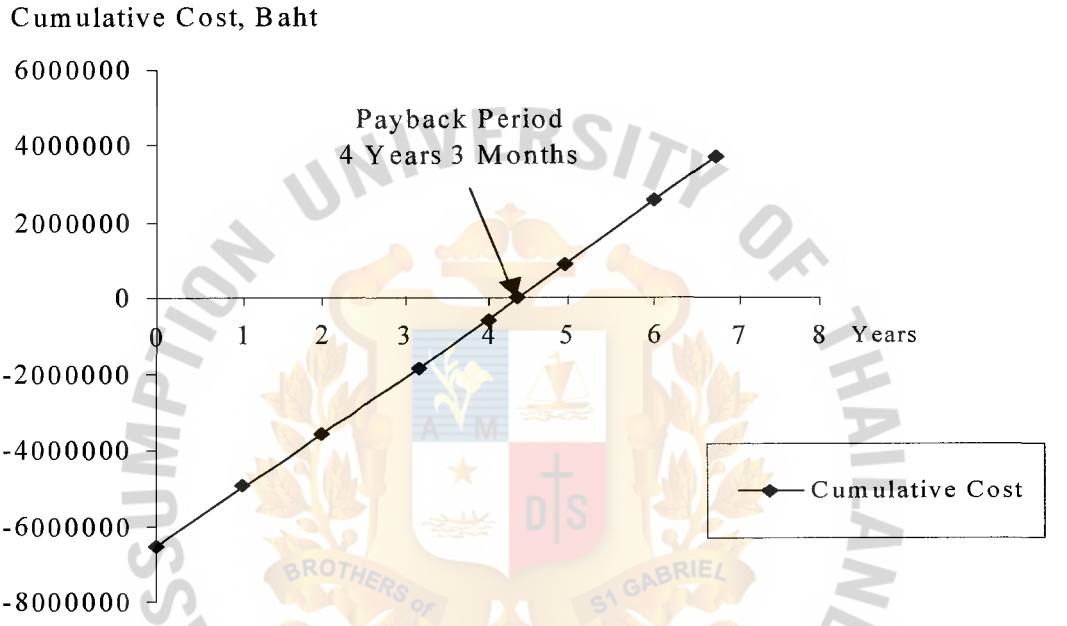

Figure 3.13. Payback Period.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The project objective of this implementation plan is to implement for BB trending Co., Ltd.

4.2 Testing

The testing is used to determine whether all the different program correctly operate as a complete system. The objective of system testing is to ensure that the system performs as promised in the user requirement phase. The testing consists of

(1) Peak load testing determines how the system would perform in periods of high demand of computer execution.

(2) Performance testing determines the length of time required for certain system operation.

(3) Recovery testing examines the ability of the system to recover from a failure.

(4) Storage testing determines the ability of the system to store a maximum amount of data.

(5) Procedure testing provides a basic test of both system and user documentation. System documentation provides directions in a procedure user's manual for operation personnel and user personnel to follow when they encounter the problems.

(6) User procedure testing ensures that the users perform a procedure exactly as shown in the user manual. If these have difficulty with the procedure, the manual needs some revising.

(7) User acceptance testing determines how the system is actually used. The following features are considered: clarity of documentation, ease of use, how well the system satisfies user information needs, and the opinions of the users about the system.

4.3 Installation

The installation of the proposed system is to combine 2 major processes, software installation and hardware installation.

(1) Software Installation

The proposed system has to install new software, which is designed for solving the current problems and increasing the ability of the system. The program will use Visual Basic 6.0 to write the proposed system and it will be inspected to guarantee the efficiency of the application before installation.

(2) Hardware Installation

The proposed system has to install some new hardware that does not have in the existing system. The existing system is the manual system, which is different from the proposed system; it is the computerized system. The hardware installation has to be concerned in many reasons, such as compatibility between each hardware component reason, suitable location of the hardware component reason and security of the hardware component reason.

4.4 Training

Training the staff is an important step in implementing the computerized system, because the user would function the system correctly when they understand it well. The user must be instructed in how to operate the equipment and instructed in troubleshooting the system. The training topic would be enabled by officer's duty and department.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

After studying the existing system of BB Trading Co., Ltd., It has encountered many problems. Improper data recording caused by manual operation, time processing, inaccurate and redundant data, keep the data in unsecured place, unable to manage the information flow in the right time to the right person, and lack of the appropriate reports for management, were the problems.

Passing through the analysis and design phase, a computerized system is recommended to BB to solve all the problems. The Financial Accounting Information System is developed by programmers, using Visual Basic 6.0 that is well known and popular among the programming developers. The security and control include data accuracy control, authorized personal allowance and installation of hardware and software concern. The use of password can protect access of the system from unauthorized persons and the source document and able to pass to the correct interrelated section.

Table 5.1 shows the time performance on each process of the proposed system compared with the existing system. It shows that each process of the proposed system performs less time than each process of the existing system which has to operate many work steps in the manual system. So, it can be concluded that the proposed system is more efficient and effective than the existing system. Examples of cycle time reduction in various processes are as follows:

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

Process	Existing System	Proposed System
Sales Inquiry	10 minutes	3 minutes
Inventory Inquiry	10 minutes	3 minutes
Inventory Control Process	15 minutes	3 minutes
Generate Report Process	3 days	5 minutes

From Table 5.1, the sale inquiry process and inventory inquiry process can inquire sales and inventory information from the proposed system as 3 minutes by user can use data of sale and inventory that are stored in database.

The proposed system can help the company to reduce time in the controlling of inventory 15 minutes (prepare stock card and controlling book) to be 3 minutes because computerization can help to eliminate paper work and reduce time in the inventory processing.

Additionally, it helps the company's management for generating report to help their decision making. Currently, they prepare reports manually that takes time about 3 days but the proposed system, can generate reporting in only 3 minutes.

5.2 Recommendations

The Information System is just one of the examples where computerization can be applied to ease daily business operation. Given its simplicity, the system can be modified and adapted to suit other types of business.

Financial Accounting Information System can be developed in future for increased efficiency in system that can separate to be 3 steps as following:

(1) Extending the information system to be covering management accounting to be fully integrating accounting information system.

(2) Developing the system to be ERP by integrating all system together.

(3) Using supply chain management concept to develop the system by integrating the system with the system of all BB group's companies.

APPENDIX A

DESIGN OF INPUT SCREEN

DESIGN OF INPUT SCREEN

Design of input screen shows examples of input screen of financial accounting information system that consists of:

(1) Security Control Screen

(2) Prepare purchase order

(3) Supplier information

(4) Order confirmation

(5) Payment Voucher

(6) Bank account

(7) Receive voucher

(8) Transfer accounting receivable

(9) General Ledger

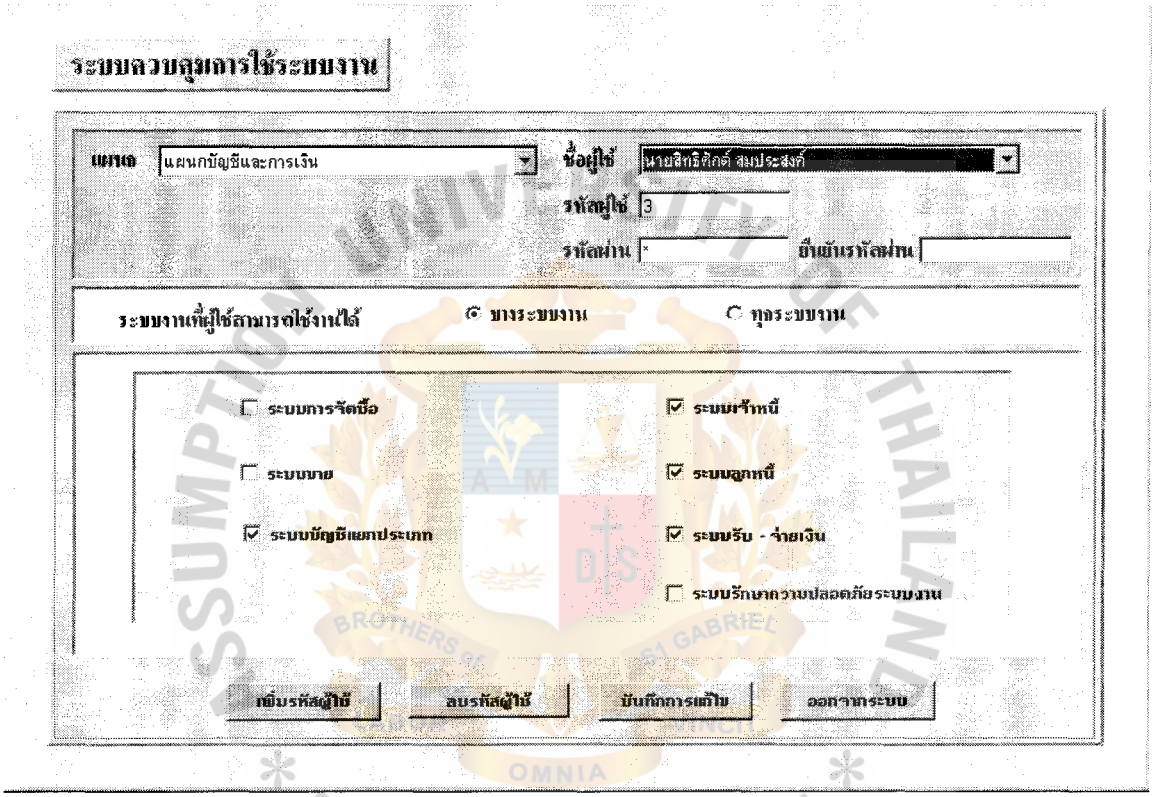

Figure A.1. Security Control Screen.

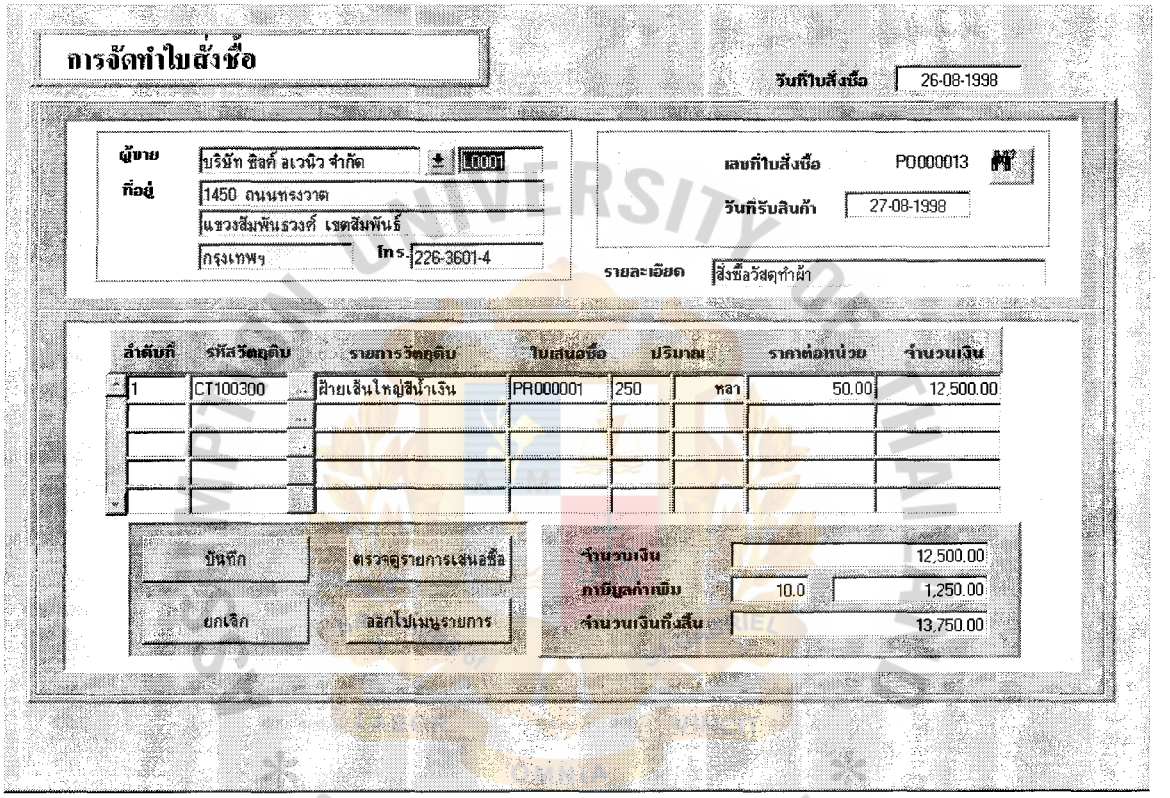

Figure A.2. Prepare Purchase Order.

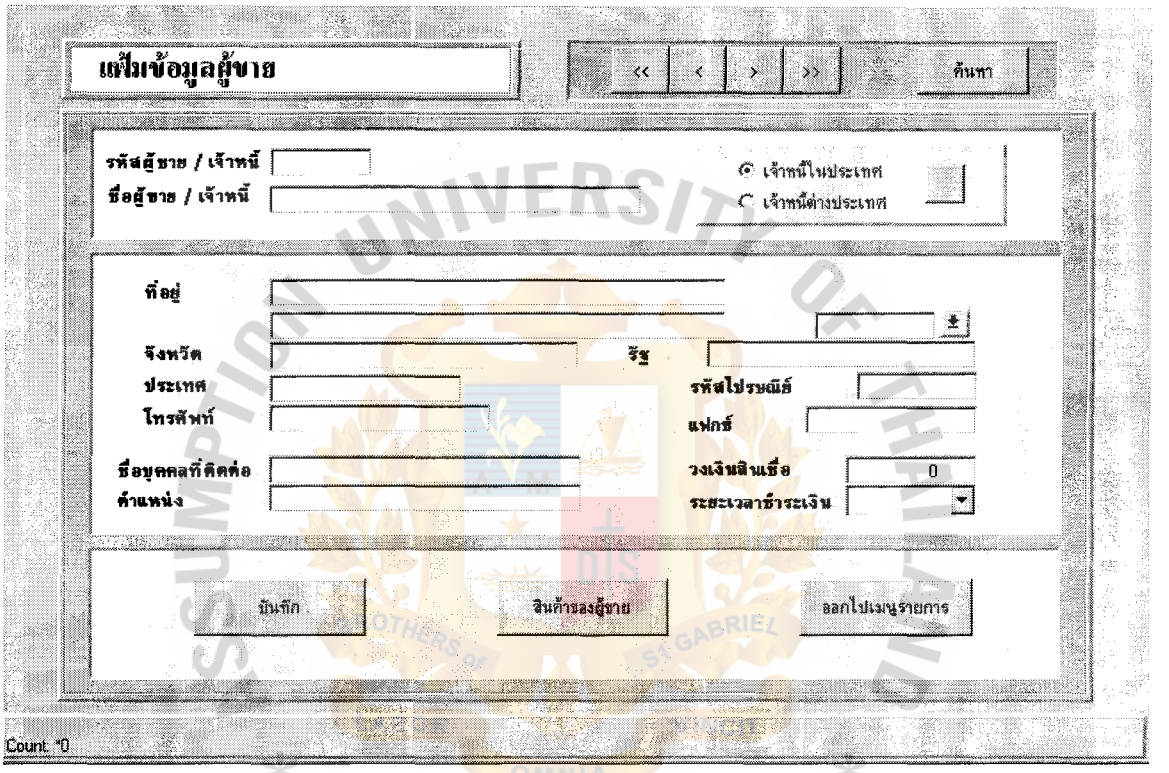

Figure A.3. Supplier Information.

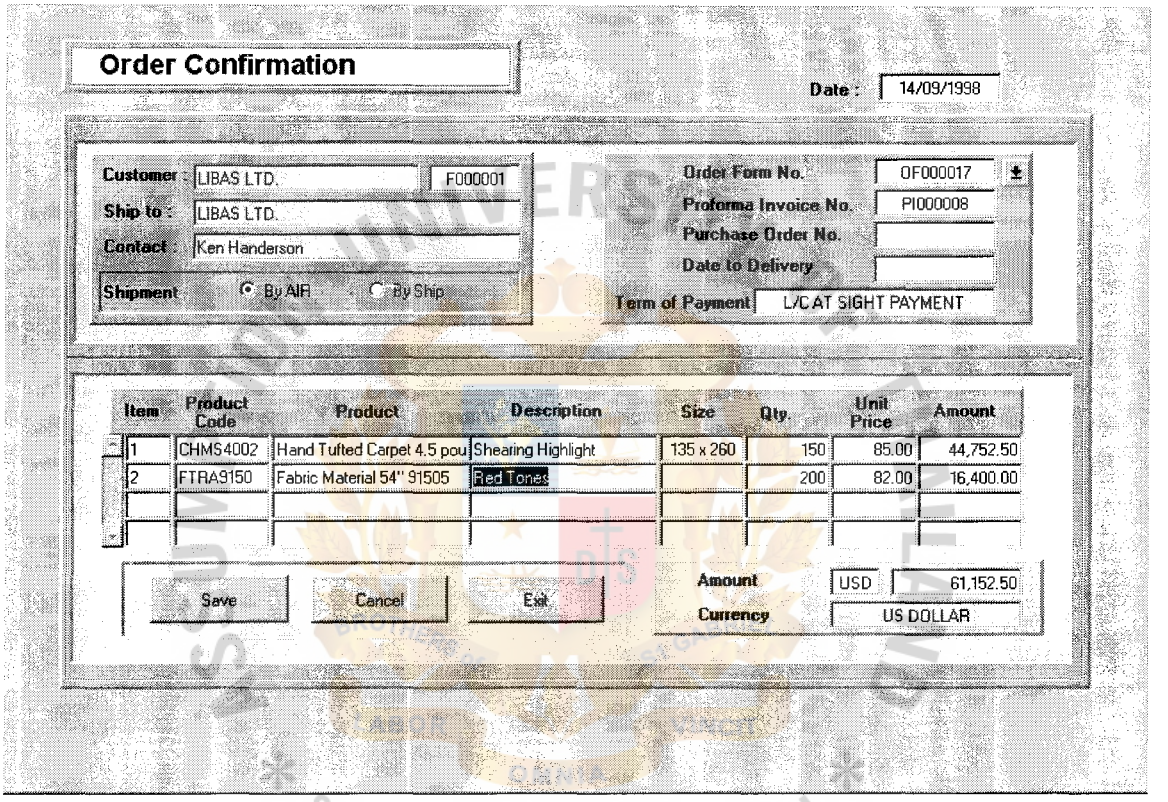

Figure A.4. Order Confirmation.

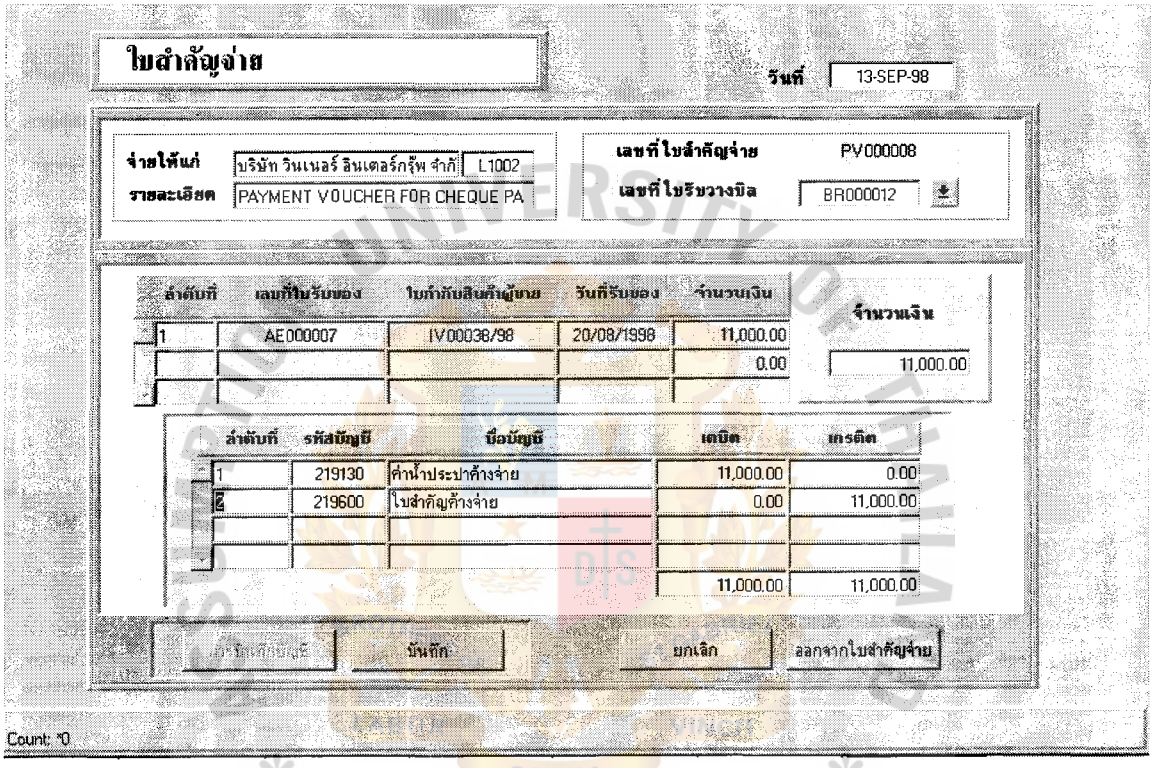

Figure A.5. Payment Voucher.

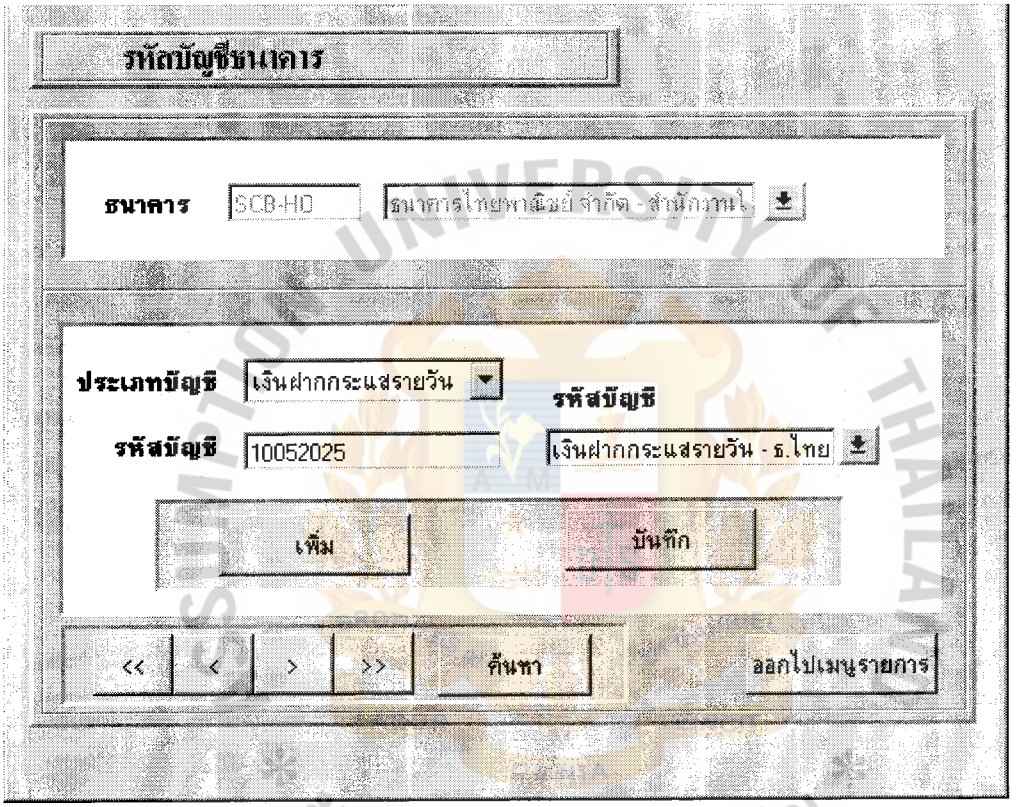

Figure A.6. Bank Account.

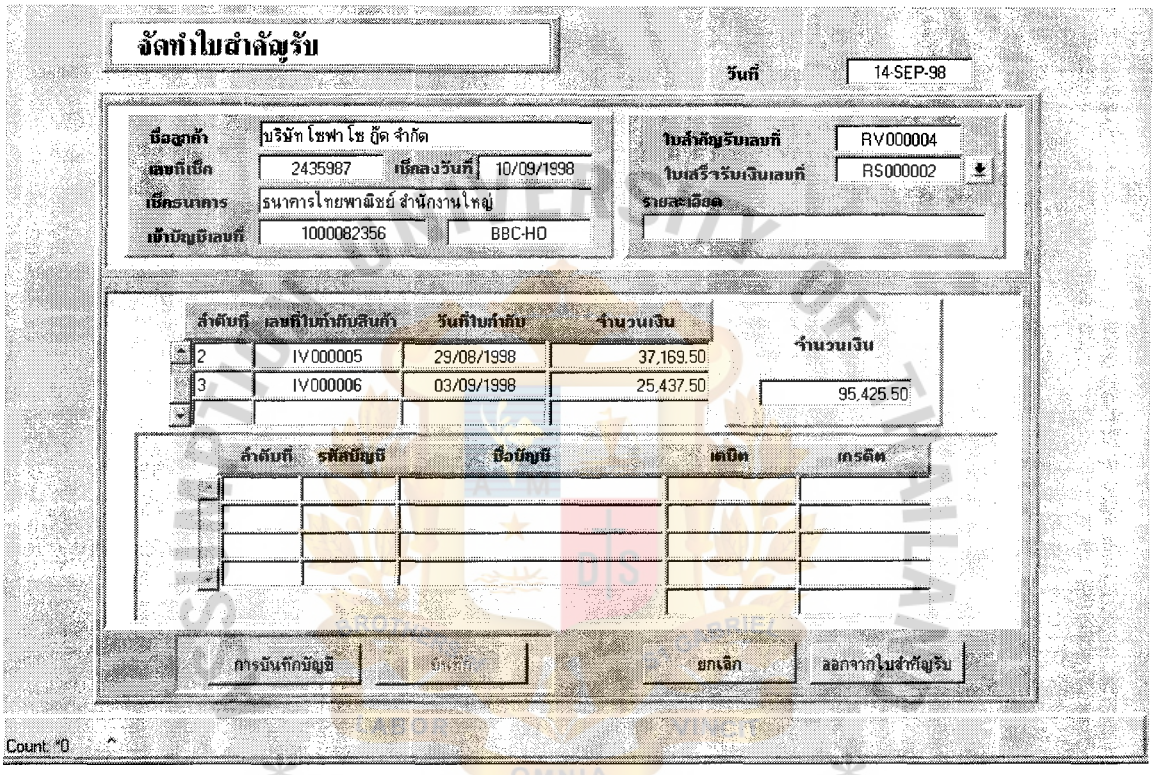

Figure A.7. Receive Voucher.

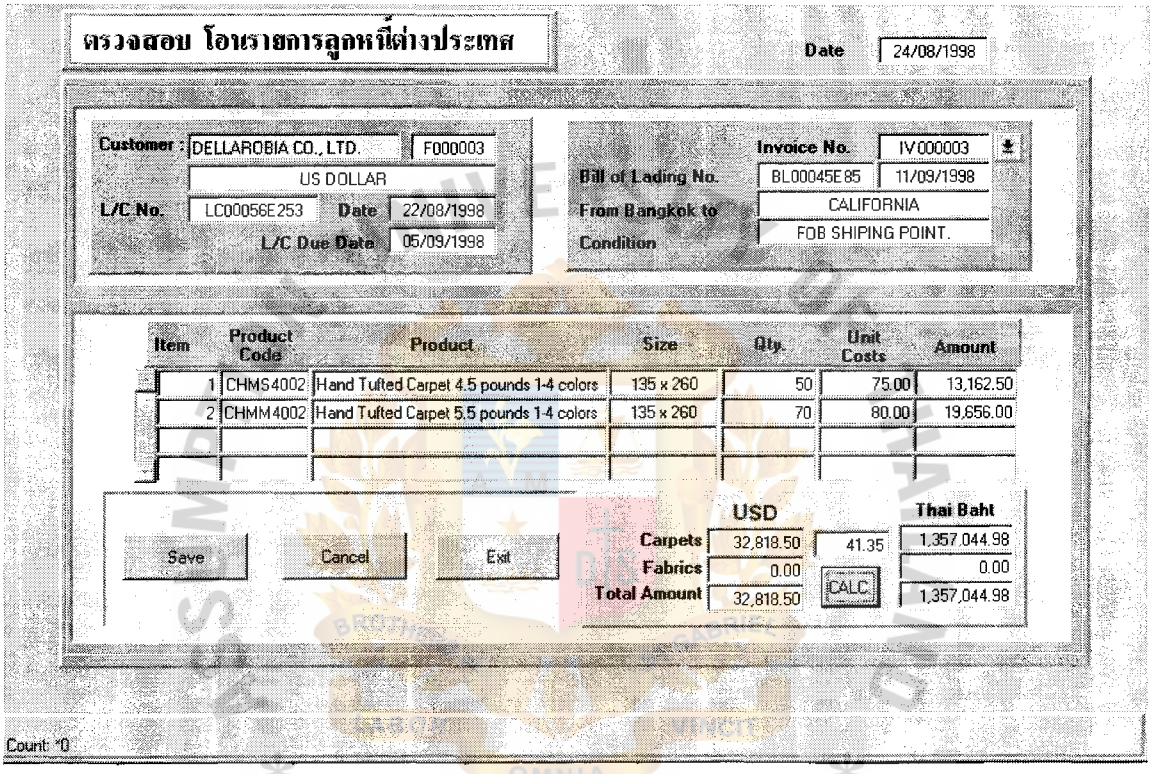

Figure A.8. Record Accounting Receivable.

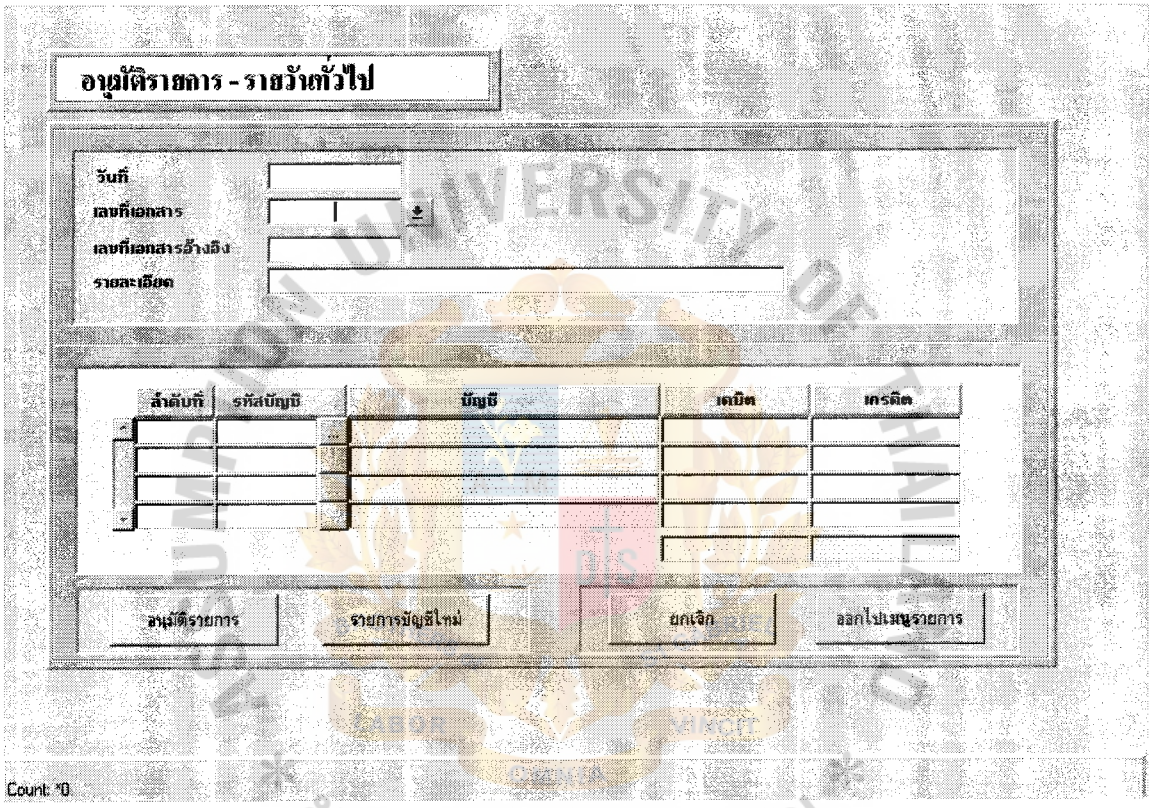

Figure A.9. General Ledger.

APPENDIX B

DESIGN OF OUTPUT SCREEN

DESIGN OF OUTPUT SCREEN

Design of input screen shows examples of input screen of financial accounting information system that consists of:

(1) Balance sheet

(2) Invoice

(3) Daily purchasing report

BB Trading Co., Ltd.

Balance Sheet

As at December 31, 2001

Asset		
	Cash in hand and at bank	3,000,000.00
	Short - term investment	40,000.00
	Receivable and promisissory notes	12,587,260.00
	Inventory	5,704,594.00
	Propety, Plant and Equipment	23,139,900.00
	Accumulated Depreciation	-9,410,740.00
	Other asset	254,800.00
Total asset		35,315,814.00
Liability		
	Bank overdraff and loan	12,905,925.00
	Account payable and promissory note	2,028,084.00
	Current liabilities	215,700.00
	Othe current liability	2,891,380.00
	Long term debt	5,000,000.00
	Othe liability	-
Total		23,041,089.00
Shareholder' equity		
	Share capital	7,000,000.00
	Share premium	250,000.00
	Retain earning	5,024,725.00
Total		12,274,725.00
Total liability and shareholder' equity		35,315,814.00

Figure B.1. Balance Sheet.

BB Trading Co., Ltd.
2 UBC Tower 2, Sukhomvit road,
Bangkok, Thailand

INVOICE

No. IV000007
Dated 22/9/2001

Customer:	**Ship to:**
CUSTOM LOOMS RUG MILL 253 YELLOW AVENUE, WEST CAROLINA, NEW YORK	CUSTOM LOOMS RUG MILL THE SAME
L/C No. **Date**	**From Bangkok to**
Order No.	**Condition**

Product	Unit Cost	Quantity	Amount
	135.00	10	1,350

Country of Origin: Thailand

Total Amount USD 1,350

Figure B.2. Invoice.

รายงานสั่งซื้อสินค้าประจำวัน

31/09/2001

เลขที่ใบรับของ	รหัสเจ้าหนี้	วันที่คาดว่าจะได้รับ	เลขที่ใบเสนอซื้อ	รหัสสินค้า	ชื่อสินค้า	ปริมาณที่สั่งซื้อ	ต้นทุนต่อหน่วย
PO00032	L0002	14/11/2001	PR00025	BP10001	Lichee can	200	70.00
			PR00025	BP20224	Pineapple can	400	60.00
			PR00025	BP20004	Rambutan can	100	50.00

Figure B.3. Daily Purchasing Report.

APPENDIX C

DESIGN OF DATABASE

DESIGN OF DATABASE

Design of database shows table of database of financial accounting information system that consists of:

(1) VENDOR Table
(2) VENDOR_GOODS Table
(3) PO_HEADER Table
(4) PO_DETAIL Table
(5) GR_HEADER Table
(6) GR_DETAIL Table
(7) CUSTOMER Table
(8) SHIPTO Table
(9) PI_HEADER Table
(10) PI_DETAIL Table
(11) ORDER_HEADER Table
(12) ORDER_DETAIL Table
(13) INV_HEADER Table
(14) INV_DETAIL Table
(15) PK_HEADER Table
(16) PK_DETAIL Table
(17) CURRENCY Table
(18) EXCHANGE Table
(19) BANK Table
(20) BANK_ACCOUNT Table
(21) CHECK Table
(22) BR_HEADER Table
(23) BR_DETAIL Table
(24) PV_HEADER Table
(25) PV_DETAIL Table
(26) RV_HEAD Table
(27) RV_DETAIL Table
(28) ACC_CODE Table
(29) ACC_GROUP Table
(30) JV_HEADER Table
(31) JV_DETAIL Table
(32) GL_TRANSACTION Table
(33) BALANCE Table
(34) TB_PERIOD Table
(35) SECURITY Table
(36) EMPLOYEE Table
(37) DEPARTMENT Table

Table C.1. VENDOR Table.

Field Name	Description	Data type
VEN_NO	Vendor number	INT(6)
VEN_NAME	Vendor name	CHAR(20)
VEN_ADDR	Vendor address	CHAR(40)
VEN_CITY	Vendor city	CHAR(10)
VEN_ZIP	Zip code	INT(6)
VEN_TEL	Telephone number	INT(12)
VEN_FAX	Fax number	INT(12)
VEN_STATUS	Vendor status	CHAR(1)
VEN_CONTACT	Vendor contactor	CHAR(20)
VEN_POSI	Vendor position	CHAR(10)
VEN_CRLIMT	Credit limit	DECIMAL(16)
VEN_CRTERM	Credit term	INT(3)
Primary Key VEN_NO		

Table C.2. VENDOR_GOODS Table.

Field Name	Description	Data type
VG_VEN_NO	Vendor number	INT(6)
VG_GOODS_ID	Goods ID	INT(6)
VG_VEN_DOC	Goods ID of Vendor	INT(6)
Primary Key VG_GOODS_ID Foreign Key (VG_VEN_NO) References Vendor		

Table C.3. PO_HEADER Table.

Field Name	Description	Data type
PO_NO	Purchase Order number	INT(6)
PO_VEN_NO	Vendor number	INT(6)
PO_DATE	Purchase date	DATE
PO_DELI_DATE	Delivery date	DATE
PO_DESC	Purchasing description	MEMO
PO_AMOUNT	Amount	DECIMAL(16)
PO_VAT_RATE	VAT rate	DECIMAL(10)
PO_VAT	VAT amount	DECIMAL(16)
PO_STATUS	Purchasing status	CHAR(1)
Primary Key PO_NO Foreign Key (PO_VEN_NO) References Vendor		

Table C.4. PO_DETAIL Table.

Field Name	Description	Data type
PD_PO_NO	Purchase order number	INT(6)
PD_GOODS_NO	Goods number	INT(6)
PD_PR_NO	Purchase request number	INT(6)
PD_QUANT	Quantity	INT(4)
PD_UCOST	Unit cost	DECIMAL(16)
PD_AMOUNT	Amount	DECIMAL(16)
PD_STATUS	Purchasing status	CHAR(1)
Primary Key PD_PO_NO Foreign Key (PD_PO_NO) References Purchase order Foreign Key (PD_GOODS_NO) References Goods		

Table C.5. GR_HEADER Table.

Field Name	Description	Data type
GR_NO	Goods receipt number	INT(6)
GR_VEN_NO	Vendor number	INT(6)
GR_PO_NO	Purchase order number	INT(6)
GR_VEN_DOC	Goods number of Vendor	INT(6)
GR_DATE	Receive date	DATE
GR_DUE	Due date	DATE
GR_AMOUNT	Amount	DECIMAL(16)
GR_VAT	VAT	DECIMAL(16)
GR_VAT_RATE	VAT rate	DECIMAL(10)
Primary Key GR_NO		
Foreign Key (GR_VEN_NO) References Vendor		
Foreign Key (GR_PO_NO) References Purchase order		

Table C.6. GR_DETAIL Table.

Field Name	Description	Data type
GD_GR_NO	Goods receipt number	INT(6)
GD_GOODS_NO	Goods number	INT(6)
GD_GOODS_TYPE_ID	Goods type ID	INT(6)
GD_QUANT	Quantity	INT(6)
GD_UCOST	Unit cost	DECIMAL(16)
GD_AMOUNT	Amount	DECIMAL(16)
Primary Key GD_GR_NO Foreign Key (GD_GOODS_NO) References Goods		

Table C.7. CUSTOMER Table.

Field Name	Description	Data type
CUST_NO	Customer number	INT(6)
CUST_NAME	Customer name	CHAR(20)
CUST_ADDR	Customer address	CHAR(40)
CUST_CITY	City	CHAR(10)
CUST_ZIP	Zip code	INT(6)
CUST_TEL	Telephone number	INT(12)
CUST_FAX	Fax number	INT(12)
CUST_COUNTRY	Country	CHAR(10)
CUST_CURR_TYPE	Currency type	CHAR(3)
CUST_STATUS	Customer status	CHAR(1)
CUST_CONTACT	Customer contact	CHAR(20)
CUST_POSI	Customer position	CHAR(10)
CUST_CRLIMIT	Credit limit	DECIMAL(16)
CUST_CRTERM	Credit term	INT(3)
Primary Key CUST_NO		

Table C.8. SHIPTO Table.

Field Name	Description	Data type
SHIPTO_SEQ	Ship to sequence	INT(6)
SHIPTO_CUST_NO	Customer number	INT(6)
SHIPTO_NAME	Ship to name	CHAR(10)
SHIPTO_ADDR	Ship to address	CHAR(40)
SHIPTO_CITY	Ship to city	CHAR(10)
SHIPTO_ZIP	Ship to zip code	INT(6)
Primary Key SHIPTO_SEQ Foreign Key (SHIPTO_CUST_NO) References Customer		

Table C.9. PI_HEADER Table.

Field Name	Description	Data type
PI_NO	Proforma invoice number	INT(6)
PI_DATE	Proforma invoice date	DATE
PI_CUST_NO	Customer number	INT(6)
PI_AMOUNT	Amount	DECIMAL(16)
PI_PAY_DESC	Payment description	MEMO
PI_DESC	Proforma invoice description	MEMO
PI_CURR_TYPE	Currency type	CHAR(3)
PI_STATUS	Order status	CHAR(1)
Primary Key PI_NO Foreign Key (PI_CUST_NO) References Customer		

Table C.10. PI_DETAIL Table.

Field Name	Description	Data type
PD_SEQ	Proforma invoice sequence	INT(6)
PD_PI_NO	Proforma invoice number	INT(6)
PD_PROD_NO	Goods number	INT(6)
PD_QUANT	Quantity	INT(6)
PD_PRICE	Unit price	DECIMAL(16)
Primary Key PD_SEQ Foreign Key (PD_PI_NO) References Proforma invoice Foreign Key (PD_PROD_NO) References Goods		

Table C.11. ORDER_HEADER Table.

Field Name	Description	Data type
ORDER_NO	Order number	INT(6)
ORDER_DATE	Order date	DATE
ORDER_SHIP_DATE	Ship date	DATE
ORDER_CUST_NO	Customer number	INT(6)
ORDER_SHIPTO_SEQ	Ship to sequence	INT(6)
ORDER_SHIPMENT	Shipment type	CHAR(3)
ORDER_CUST_DOC	Purchase order number	INT(6)
ORDER_DESC	Order description	MEMO
ORDER_CURR_TYPE	Currency type	CHAR(3)
ORDER_AMOUNT	Amount	DECIMAL(16)
ORDER_VAT_RATE	VAT rate	DECIMAL(10)
ORDER_VAT	VAT	DECIMAL(16)
ORDER_STATUS	Order status	CHAR(1)
Primary Key ORDER_NO		
Foreign Key (ORDER_CUST_NO) References Customer		
Foreign Key (ORDER_SHIPTO_SEQ) References Ship-to		

Table C.12. ORDER_DETAIL Table.

Field Name	Description	Data type
OD_SEQ	Order sequence	INT(6)
OD_ORDER_NO	Order number	INT(6)
OD_PROD_NO	Goods number	INT(6)
OD_PROD_TYPR_ID	Goods type ID	INT(6)
OD_DESC	Goods description	MEMO
OD_QUANT	Order quantity	INT(6)
OD_PRICE	Unit price	DECIMAL(16)
OD_AMOUNT	Amount	DECIMAL(16)
OD_STATUS	Order status	CHAR(1)
Primary Key OD_SEQ		
Foreign Key (OD_ORDER_NO) References Order		
Foreign Key (OD_PROD_NO) References Product		

Table C.13. INV_HEADER Table.

Field Name	Description	Data type
INV_NO	Invoice number	INT(6)
INV_DATE	Invoice date	DATE
INV_CUST_NO	Customer number	INT(6)
INV_SHIP_SEQ	Ship sequence	INT(6)
INV_ORDER_NO	Order number	INT(6)
INV_SHIP_DATE	Shipment date	DATE
INV_SHIP_DESC	Shipment description	MEMO
INV_CURR_TYPE	Currency type	CHAR(3)
INV_EXC_RATE	Exchange rate	DECIMAL (16)
INV_ DUE_DATE	Due date	DATE
INV_AMOUNT	Amount	DECIMAL(16)
INV_VAT_RATE	VAT rate	DECIMAL(10)
INV_VAT	VAT	DECIMAL(16)
INV_STATUS	Invoice status	CHAR(1)
INV_PK	Packing list status	CHAR(1)
INV_PAY	Payment status	CHAR(1)
INV_POST	Posting status	CHAR(1)
Primary Key INV_NO		
Foreign Key (INV_CUST_NO) References Customer		
Foreign Key (INV_SHIP_SEQ) References Ship-to		
Foreign Key (INV_ORDER_NO) References Order		
Foreign Key (INV_PK) References Packing list status		
Foreign Key (INV_EXC_RATE) References Exchange rate		

Table C.14. INV_DETAIL Table.

Field Name	Description	Data type
IND_SEQ	Invoice sequence	INT(6)
IND_INV_NO	Invoice number	INT(6)
IND_PROD_NO	Goods number	INT(6)
IND_PROD_TYPE_ID	Goods type ID	INT(6)
IND_QUANT	Quantity	INT(6)
IND_PRICE	Unit price	DECIMAL(16)
IND_AMOUNT	Amount	DECIMAL(16)
IND_STATUS	Invoice status	CHAR(1)
Primary Key IND_SEQ Foreign Key (IND_INV_NO) References Invoice Foreign Key (IND_PROD_NO) References Product number Foreign Key (IND_PROD_TYPE_ID) References Product type		

Table C.15. PK_HEADER Table.

Field Name	Description	Data type
PK_INV_NO	Invoice number	INT(6)
PK_LC_NO	L/C number	INT(6)
PK_LC_DATE	L/C date	DATE
PK_LC_DUE	L/C due date	DATE
PK_BL_NO	Bill of lading number	INT(6)
PK_BL_DATE	Bill of lading date	DATE
PK_SHIP_TO	Ship to	CHAR(10)
PK_PACKAGE	Package amount	DECIMAL(16)
PK_AREA	Area	DECIMAL(10)
PK_DESC	Packing list description	MEMO
PK_INV_POST	Posting status	CHAR(1)
PK_STATUS	Packing list status	CHAR(1)
Primary Key PK_INV_NO		

Table C.16. PK_DETAIL Table.

Field Name	Description	Data type
PD_IND_SEQ	Packing list sequence	INT(6)
PD_IND_NO	Invoice number	INT(6)
PD_ROLL_NO	Roll number	INT(6)
PD_NW	Net weight	DECIMAL(12)
PD_GW	Gross weight	DECIMAL(12)
PD_CONTENT	Content weight	DECIMAL(12)
PD_NOTE	Shipping marks	MEMO
VEN_STATUS	Vendor status	CHAR(1)
VEN_CONTACT	Vendor contactor	CHAR(20)
VEN_POSI	Vendor position	CHAR(10)
VEN_CRLIMT	Credit limit	DECIMAL(16)
VEN_CRTERM	Credit term	INT(3)
Primary Key PD_IND_SEQ		
Foreign Key (PD_IND_NO) References Invoice number		

Table C.17. CURRENCY Table.

Field Name	Description	Data type
CURR_TYPE	Currency type	CHAR(3)
CURR_DESC	Foreign currency description	MEMO
CURR_TDESC	Thai currency description	MEMO
Primary Key CURR_TYPE		

Table C.18. EXCHANGE Table.

Field Name	Description	Data type
EXC_CURR_TYPE	Currency type	CHAR(3)
EXC_DATE	Exchange date	DATE
EXC_RATE	Exchange rate	DECIMAL(16)
Primary Key EXC_CURR_TYPE Foreign Key (EXC_CURR_TYPE) References Currency		

Table C.19. BANK Table.

Field Name	Description	Data type
BANK_SEQ	Bank sequence	INT(6)
BANK_NAME	Bank name	CHAR(20)
BANK_BRANCH	Branch name	CHAR(20)
BANK_LC_EXPIRED	L/C status	CHAR(1)
BANK_LC_CRLIMIT	L/C credit limit	DECIMAL(16)
BANK_TR_EXPIRED	T/R status	CHAR(1)
BANK_TR_CRLIMIT	T/R credit limit	DECIMAL(16)
Primary Key BANK_SEQ		

Table C.20. BANK_ACCOUNT Table.

Field Name	Description	Data type
BA_SEQ	Bank account sequence	INT(6)
BA_BANK_SEQ	Bank sequence	INT(6)
BA_ACCODE	Bank account	INT(12)
BA_ACTYPE	Account type	CHAR(10)
BA_BALANCE	L/C status	CHAR(1)
BA_AC_NO	Bank account status	CHAR(1)
BA_STATUS	T/R status	CHAR(1)
Primary Key BA_SEQ Foreign Key (BA_BANK_SEQ) References Bank		

Table C.21. CHECK Table.

Field Name	Description	Data type
CH_SEQ	Check sequence	INT(6)
CH_NO	Check number	INT(12)
CH_DATE	Check date	DATE
CH_TRANS_DATE	Preparing check date	DATE
CH_REC_DATE	Receive date	DATE
CH_BR_NO	Billing number	INT(6)
CH_TOTAL	Total	DECIMAL(16)
CH_BA_SEQ	Bank account sequence	INT(6)
CH_VEN_NO	Vendor number	INT(6)
CH_VENDOR	Vendor name	CHAR(20)
CH_RECEIVER	Receiver name	CHAR(20)
CH_STATUS	Check status	CHAR(1)
Primary Key CH_SEQ		
Foreign Key (CH_BA_SEQ) References Bank account		
Foreign Key (CH_VENDOR) References Vendor		

Table C.22. BR_HEADER Table.

Field Name	Description	Data type
BR_NO	Bill receive number	INT(6)
BR_DATE	Bill receive date	DATE
BR_VEN_NO	Vendor number	INT(6)
BR_CHDATE	Check date	DATE
BR_TOTAL	Total	DECIMAL(16)
BR_STATUS	Bill receive status	CHAR(1)
Primary Key BR_NO Foreign Key (BR_VEN_NO) References Vendor		

Table C.23. BR_DETAIL Table.

Field Name	Description	Data type
BD_SEQ	Bill receive sequent	INT(6)
BD_BR_NO	Bill receive number	INT(6)
BD_GR_NO	Goods receive number	INT(6)
BD_GR_VEN_DOC	Vendor document number	INT(6)
Primary Key BD_SEQ Foreign Key (BD_BR_NO) References Bill receive		

Table C.24. PV_HEADER Table.

Field Name	Description	Data type
PV_NO	Payment voucher number	INT(6)
PV_LINE	Payment voucher line	INT(6)
PV_DATE	Payment voucher date	DATE
PV_VEN_NO	Vendor number	INT(6)
PV_BR_NO	Bill receive number	INT(6)
PV_CH_SEQ	Check sequence	INT(6)
PV_TOTAL	Total	DECIMAL(16)
PV_DESC	Payment voucher description	MEMO
PV_STATUS	Payment voucher status	CHAR(1)
PV_POST	Posting status	CHAR(1)
Primary Key PV_NO		
Foreign Key (PV_VEN_NO) References Vendor		
Foreign Key (PV_BR_NO) References Bill receive		
Foreign Key (PV_CH_SEQ) References Check		

Table C.25. PV_DETAIL Table.

Field Name	Description	Data type
PD_PV_NO	Payment voucher number	INT(6)
PD_SQ_NO	Payment voucher sequence	INT(6)
PD_GR_NO	Goods receive number	INT(6)
PD_VEN_DOC	Vendor document number	INT(6)
PD_GR_DATE	Goods receive date	DATE
PD_TOTAL	Total	DECIMAL(16)
PD_AC_NO	Account code	INT(12)
PD_DEBIT	Debit item	DECIMAL(16)
PD_CREDIT	Credit item	DECIMAL(16)
PD_STATUS	Payment voucher status	CHAR(1)
Primary Key PD_SQ_NO		
Foreign Key (PD_PV_NO) References Payment voucher		
Foreign Key (PD_GR_NO) References Goods receive		
Foreign Key (PD_AC_NO) References Account code		

Table C.26. RV_HEADER Table.

Field Name	Description	Data type
RV_NO	Receive voucher number	INT(6)
RV_LINE	Receive voucher line	INT(6)
RV_DATE	Receive voucher date	DATE
RV_REC_NO	Receipt number	INT(6)
RV_CUST_NO	Customer number	INT(6)
RV_BA_SEQ	Bank account sequent	INT(6)
RV_TOTAL	Total	DECIMAL(16)
RV_DESC	Receive voucher description	MEMO
RV_STATUS	Receive voucher status	INT(1)
Primary Key RV_NO		
Foreign Key (RV_CUST_NO) References Customer		
Foreign Key (RV_BA_SEQ) References Bank account		

Table C.27. RV_DETAIL Table.

Field Name	Description	Data type
RVD_SEQ	Receive voucher sequent	INT(6)
RVD_RV_NO	Receive voucher number	INT(6)
RVD_INV_NO	Invoice number	INT(6)
RVD_INV_DATE	Invoice date	DATE
RVD_TOTAL	Total	DECIMAL(16)
RVD _AC_NO	Account code	INT(12)
RVD _DEBIT	Debit item	DECIMAL(16)
RVD _CREDIT	Credit item	DECIMAL(16)
RVD _STATUS	Receive voucher status	CHAR(1)
Primary Key RVD_SEQ		
Foreign Key (RVD_RV_NO) References Receive voucher		
Foreign Key (RVD_AC_SEQ) References Account code		
Foreign Key (RVD_INV_NO) References Invoice		

Table C.28. ACC_CODE Table.

Field Name	Description	Data type
AC_NO	Account code	INT(12)
AC_TNAME	Account Thai code name	CHAR(10)
AC_ENAME	Account English code name	CHAR(10)
AC_OPEN_BAL	Opening balance	DECIMAL(16)
AC_CURR_BAL	Current balance	DECIMAL(16)
AC_TYPE	Account type	CHAR(10)
Primary Key AC_NO		

Table C.29. ACC_GROUP Table.

Field Name	Description	Data type
AG_NO	Account code	INT(12)
AG_TNAME	Account group Thai name	CHAR(10)
AG_ENAME	Account group English name	CHAR(10)
Primary Key AG_NO Foreign Key (AG_NO) References Account code		

Table C.30. JV_HEADER Table.

Field Name	Description	Data type
JH_NO	Journal voucher number	INT(6)
JH_REF	Journal voucher reference	INT(6)
JH_DESC	Journal voucher description	MEMO
JH_DATE	Journal voucher date	DATE
JH_STATUS	Journal voucher status	CHAR(1)
Primary Key JH_NO		
Foreign Key (JH_DATE) References PO date and Invoice date		

Table C.31. JV_DETAIL Table.

Field Name	Description	Data type
JVD_SEQ	Journal voucher sequence	INT(6)
JVD_LINE	Journal voucher line	INT(6)
JVD_JVH_NO	Journal voucher number	INT(6)
JVD_AC_NO	Account code	INT(12)
JVD_DEBIT	Debit item	DECIMAL(16)
JVD_CREDIT	Credit item	DECIMAL(16)
JVD_STATUS	Journal voucher status	CHAR(1)
Primary Key JVD_SEQ		
Foreign Key (JVD_JVH_NO) References Journal voucher		
Foreign Key (JVD_AC_NO) References Account code		

Table C.32. GL_TRANSACTION Table.

Field Name	Description	Data type
GL_BATCH	Batch number	INT(6)
GL_LINE	GL line	INT(6)
GL_DOC	GL document	INT(6)
GL_REF	GL reference	INT(6)
GL_DOC_DATE	GL reference date	DATE
GL_DATE	GL date	DATE
GL_AC_NO	Account code	INT(12)
GL_DESC	GL description	MEMO
GL_DEBIT	Debit item	DECIMAL(16)
GL_CREDIT	Credit item	DECIMAL(16)
GL_STATUS	GL status	CHAR(1)
Primary Key GL_BATCH		

Table C.33. BALANCE Table.

Field Name	Description	Data type
BAL_YEAR	Year	INT(4)
BAL_MONTH	Month	INT(2)
BAL_AC_NO	Account code	INT(12)
BAL_NETCHANGE	Net amount last period	DECIMAL(16)
BAL_AMOUNT	Amount	DECIMAL(16)
Primary Key BAL_YEAR Foreign Key (BAL_AC_NO) References Account code		

Table C.34. TB_PERIOD Table.

Field Name	Description	Data type
TBP_YEAR	Year	INT(4)
TBP_MONTH	Month	INT(2)
TBP_STATUS	Balance status	CHAR(1)
Primary Key TBP_YEAR Foreign Key (TBP_YEAR) References Balance		

Table C.35. SECURITY Table.

Field Name	Description	Data type
EMP_ID	Employee ID	INT(6)
USER_ID	User ID	INT(6)
PASSWORD	Password	CHAR(12)
USER_LEVEL	User level	CHAR(2)
MENU1	Acceptation for purchasing system	CHAR(1)
MENU2	Acceptation for Sale system	CHAR(1)
MENU3	Acceptation for accounting payable	CHAR(1)
MENU4	Acceptation for accounting receivable	CHAR(1)
MENU5	Acceptation for Pay and receive	CHAR(1)
MENU6	Acceptation for General ledger	CHAR(1)
MENU7	Acceptation for security	CHAR(1)
Primary Key EMP_ID		

Table C.36. EMPLOYEE Table.

Field Name	Description	Data type
EMP_ID	Employee ID	INT(6)
EMP_NAME	Employee name	CHAR(20)
EMP_DEPT_ID	Department ID	INT(4)
EMP_START_DATE	Start date	DATE
EMP_STATUS	Employee status	CHAR(1)
Primary Key EMP_ID		

Table C.37. DEPARTMENT Table.

Field Name	Description	Data type
DEPT_ID	Department ID	INT(4)
DEPT_NAME	Department name	CHAR(10)
Primary Key DEPT_ID		

APPENDIX D

PROCESS SPECIFICATION

PROCESS SPECIFICATION

Process Specification shows table of database of financial accounting information system that consists of:

(1) Prepare Purchase Order
(2) Approve Purchase Order
(3) Receive Goods
(4) Transfer Accounting Payable
(5) Prepare Bill Receiving
(6) Prepare Payment Voucher
(7) Prepare Check
(8) Record Payment
(9) Prepare Proforma Invoice
(10) Order Confirmation
(11) Prepare Invoice
(12) Prepare Packing List
(13) Transfer Goods in transit
(14) Record Airway Bill
(15) Record Accounting Receivable
(16) Record receipt
(17) Transfer to General Ledger
(18) Record transaction

PROCESS SPECIFICATION

Table D.1. Process Specification of Process 1.1.

Items	Descriptions
Process Name:	Prepare Purchase Order
Data In:	Supplier Information, Product
Data Out:	-
Process:	(1) Get Purchase order number from database (2) Get Supplier ID, Supplier name and address from database (3) Get Product ID, Product name from database (4) Key in quantity, price and unit (5) Keep new Purchase order record in database

Table D.2. Process Specification of Process 1.2.

Items	Descriptions
Process Name:	Approve Purchase Order
Data In:	Supplier Information Purchase Order Number
Data Out:	Purchase Order
Process:	(1) Get Purchase order from database (2) Change Purchase order's status to be approve (3) Keep new purchase order's status (4) Print out Purchase order to Supplier

Table D.3. Process Specification of Process 1.3.

Items	Descriptions
Process Name:	Receive Goods
Data In:	Supplier Information Purchase Order
Data Out:	Receiving Report
Process:	(1) Get Purchase order number, supplier ID (2) Change Purchase order's status (3) Keep new purchase order's status (4) Print out Receiving Report

Table D.4. Process Specification of Process 1.4.

Items	Descriptions
Process Name:	Record Accounting Payable
Data In:	Receiving Report Account code
Data Out:	Journal Voucher
Process:	(1) Get Receiving report, and account code (2) Key in purchasing transaction. (3) Transfer transaction to General Ledger. (4) Print out Journal Voucher.

Table D.5. Process Specification of Process 2.1.

Items	Descriptions
Process Name:	Prepare Bill Receiving
Data In:	Supplier Information Purchase Order Receiving Report
Data Out:	Bill Receiving
Process:	(1) Get Supplier information, Purchase order, and Receiving report. (2) Get Bill Receiving number. (3) Keep transaction into database. (4) Print out Bill Receiving to Supplier.

Table D.6. Process Specification of Process 2.2.

Items	Descriptions
Process Name:	Prepare Payment Voucher
Data In:	Supplier Information Receiving Report Bill receiving
Data Out:	Invoice
Process:	(1) Get Supplier information, Receiving report, and Bill receiving. (2) Get Payment Voucher number from database (3) Keep Payment Voucher. (4) Print out Payment Voucher.

Table D.7. Process Specification of Process 2.3.

Items	Descriptions
Process Name:	Prepare Check
Data In:	Bill Receiving Payment Voucher Bank Information
Data Out:	Check
Process:	(1) Get Bill Receiving, Payment Voucher, and Bank Information. (2) Key in Creditor name, Total amount. (3) Print out Check

Table D.8. Process Specification of Process 2.4.

Items	Descriptions
Process Name:	Record Payment
Data In:	Bill Receiving Payment Voucher Creditor Check Information
Data Out:	-
Process:	(1) Get Bill Receiving, Payment Voucher, Creditor and Check information. (2) Update Check status. (3) Keep Check status.

Table D.9. Process Specification of Process 3.1.

Items	Descriptions
Process Name:	Prepare Proforma Invoice
Data In:	Customer Information Term of Payment
Data Out:	Proforma Invoice
Process:	(1) Get Customer number, and Name (2) Get Goods ID, Goods name. (3) Key in quantity, price and unit. (4) Keep Proforma Invoice. (5) Print out Proforma Invoice to customer.

Table D.10. Process Specification of Process 3.2.

Items	Descriptions
Process Name:	Order Confirmation
Data In:	Customer Information Term of Payment Ship to Information Order Number Proforma Invoice
Data Out:	Order Confirmation
Process:	(1) Get Proforma Invoice information. (2) Key in Purchase Order number, Date to Delivery, and Shipment. (3) Keep Order. (4) Print out Order Confirmation to customer.

Table D.11. Process Specification of Process 3.3.

Items	Descriptions
Process Name:	Prepare Invoice
Data In:	Order Confirmation
Data Out:	Invoice
Process:	(1) Get Order Confirmation information. (2) Key in L/C number, L/C Date, and L/C Due date (3) Keep Invoice. (4) Print out Invoice to customer.

Table D.12. Process Specification of Process 3.4.

Items	Descriptions
Process Name:	Prepare Packing List
Data In:	Customer Information Ship to Information Letter of Credit Number Invoice Number
Data Out:	Packing List
Process:	(1) Get Invoice Information. (2) Key in Carton/Roll number, Content Per CTN, ROLL, Net Weights, Gross Weight. (3) Calculate weight. (4) Keep Packing List. (5) Print out Packing List.

Table D.13. Process Specification of Process 3.5.

Items	Descriptions
Process Name:	Transfer Goods in transit
Data In:	Customer Information Ship to Information Letter of Credit Number Invoice Number Account code
Data Out:	Journal Voucher
Process:	(1) Get Invoice information. (2) Get Account code, and account name. (3) Key in Goods in transit transaction. (4) Keep Goods in transit transaction. (5) Print out Goods in transit transaction.

Table D14. Process Specification of Process 3.6.

Items	Descriptions
Process Name:	Record Airway Bill
Data In:	Invoice Information
Data Out:	-
Process:	(1) Get Invoice Information. (2) Key in Airway Bill/ Bill Landing number, and B/L Date. (3) Keep Airway Bill Information.

Table D.15. Process Specification of Process 3.7.

Items	Descriptions
Process Name:	Record Accounting Receivable
Data In:	Invoice Number
Data Out:	Receive Voucher
Process:	(1) Get Invoice, and account code (2) Key in receiving transaction. (3) Transfer transaction to General Ledger. (4) Print out Journal Voucher.

Table D.16. Process Specification of Process 4.1.

Items	Descriptions
Process Name:	Record receipt
Data In:	Bank Account Information Invoice Information Customer Information
Data Out:	-
Process:	(1) Get Invoice Information Receipt number, Customer Information. (2) Key in total amount, Transfer rate. (3) Keep Receipt.

Table D.17. Process Specification of Process 5.1.

Items	Descriptions
Process Name:	Transfer to General Ledger
Data In:	Receivable transaction, Payment transaction, and General transaction
Data Out:	-
Process:	(1) Get Voucher number, and transaction. (2) Receiving all transaction get into General Ledger

Table D.18. Process Specification of Process 5.2.

Items	Descriptions
Process Name:	Record transaction
Data In:	Receivable transaction, Payment transaction, and General transaction
Data Out:	-
Process:	(1) Receiving all transaction get into General Ledger

APPENDIX E

DATA DICTIONARY

DATA DICTIONARY

Data dictionary use for refer with financial accounting information system that can be separate to be subsystem as following:

Purchasing System

VENDOR

VENDOR_GOODS

PO_HEADER

PO_DETAIL

GR_HEADER

GR_DETAIL

Sales System

CUSTOMER

SHIPTO

PI_HEADER

PI_DETAIL

ORDER_HEADER

ORDER_DETAIL

INV_HEADER

INV_DETAIL

PK_HEADER

PK_DETAIL

Payment and Receipt System

Currency Exchange

CURRENCY

EXCHANGE

Bank

BANK

BANK_ACCOUNT

CHECK

Payment and Receipt

BR_HEADER

BR_DETAIL

PV_HEADER

PV_DETAIL

RV_HEADER

RV_DETAIL

General Ledger System

ACC_CODE

ACC_GROUP

JV_HEADER

JV_DETAIL

GL_TRANSACTION

BALANCE

TB_PERIOD

Table E.1. Data Dictionary of VENDOR.

Field Name	Meaning
VEN_NO	Vendor number
VEN_NAME	Vendor name
VEN_ADDR	Vendor address
VEN_CITY	Vendor city
VEN_ZIP	Zip code
VEN_TEL	Telephone number
VEN_FAX	Fax number
VEN_STATUS	Vendor status
VEN_CONTACT	Vendor contactor
VEN_POSI	Vendor position
VEN_CRLIMT	Credit limit
VEN_CRTERM	Credit term

Table E.2. Data Dictionary of VENDOR_GOODS.

Field Name	Meaning
VG_VEN_NO	Vendor number
VG_GOODS_ID	Goods ID
VG_VEN_DOC	Goods ID of Vendor

Table E.3. Data Dictionary of PO_HEADER.

Field Name	Meaning
PO_NO	Purchase Order number
PO_VEN_NO	Vendor number
PO_DATE	Purchase date
PO_DELI_DATE	Delivery date
PO_DESC	Purchasing description
PO_AMOUNT	Amount
PO_VAT_RATE	VAT rate
PO_VAT	VAT amount
PO_STATUS	Purchasing status

Table E.4. Data Dictionary of PO_DETAIL.

Field Name	Meaning
PD_PO_NO	Purchase order number
PD_GOODS_NO	Goods number
PD_PR_NO	Purchase request number
PD_QUANT	Quantity
PD_UCOST	Unit cost
PD_AMOUNT	Amount
PD_STATUS	Purchasing status

Table E.5. Data Dictionary of GR_HEADER.

Field Name	Meaning
GR_NO	Goods receipt number
GR_VEN_NO	Vendor number
GR_PO_NO	Purchase order number
GR_VEN_DOC	Goods number of Vendor
GR_DATE	Receive date
GR_DUE	Due date
GR_AMOUNT	Amount
GR_VAT	VAT
GR_VAT_RATE	VAT rate
GR_STATUS	Receive status
GR_POST	Posting status
GR_PAY	Payment status

Table E.6. Data Dictionary of GR_DETAIL.

Field Name	Meaning
GD_GR_NO	Goods receipt number
GD_GOODS_NO	Goods number
GD_GOODS_TYPE_ID	Goods type ID
GD_QUANT	Quantity
GD_UCOST	Unit cost
GD_AMOUNT	Amount

Table E.7. Data Dictionary of CUSTOMER.

Field Name	Meaning
CUST_NO	Customer number
CUST_NAME	Customer name
CUST_ADDR	Customer address
CUST_CITY	City
CUST_ZIP	Zip code
CUST_TEL	Telephone number
CUST_FAX	Fax number
CUST_COUNTRY	Country
CUST_CURR_TYPE	Currency type
CUST_STATUS	Customer status
CUST_CONTACT	Customer contact
CUST_POSI	Customer position
CUST_CRLIMIT	Credit limit
CUST_CRTERM	Credit term

Table E.8. Data Dictionary of SHIPTO.

Field Name	Meaning
SHIPTO_SEQ	Ship to sequence
SHIPTO_CUST_NO	Customer number
SHIPTO_NAME	Ship to name
SHIPTO_ADDR	Ship to address
SHIPTO_CITY	Ship to city
SHIPTO_ZIP	Ship to zip code

Table E.9. Data Dictionary of PI_HEADER.

Field Name	Meaning
PI_NO	Proforma invoice number
PI_DATE	Proforma invoice date
PI_CUST_NO	Customer number
PI_AMOUNT	Amount
PI_PAY_DESC	Payment description
PI_DESC	Proforma invoice description
PI_CURR_TYPE	Currency type
PI_STATUS	Order status

Table E.10. Data Dictionary of PI_DETAIL.

Field Name	Meaning
PD_SEQ	Proforma invoice sequence
PD_PI_NO	Proforma invoice number
PD_PROD_NO	Goods number
PD_QUANT	Quantity
PD_PRICE	Unit price

Table E.11. Data Dictionary of ORDER_HEADER.

Field Name	Meaning
ORDER_NO	Order number
ORDER_DATE	Order date
ORDER_SHIP_DATE	Ship date
ORDER_CUST_NO	Customer number
ORDER_SHIPTO_SEQ	Ship to sequence
ORDER_SHIPMENT	Shipment type
ORDER_CUST_DOC	Purchase order number
ORDER_DESC	Order description
ORDER_CURR_TYPE	Currency type
ORDER_AMOUNT	Amount
ORDER_VAT_RATE	VAT rate
ORDER_VAT	VAT
ORDER_STATUS	Order status

Table E.12. Data Dictionary of ORDER_DETAIL.

Field Name	Meaning
OD_SEQ	Order sequence
OD_ORDER_NO	Order number
OD_PROD_NO	Goods number
OD_PROD_TYPR_ID	Goods type ID
OD_DESC	Goods description
OD_QUANT	Order quantity
OD_PRICE	Unit price
OD_AMOUNT	Amount
OD_STATUS	Order status

Table E.13. Data Dictionary of INV_HEADER.

Field Name	Meaning
INV_NO	Invoice number
INV_DATE	Invoice date
INV_CUST_NO	Customer number
INV_SHIP_SEQ	Ship sequence
INV_ORDER_NO	Order number
INV_SHIP_DATE	Shipment date
INV_SHIP_DESC	Shipment description
INV_CURR_TYPE	Currency type
INV_ DUE_DATE	Due date
INV_AMOUNT	Amount
INV_VAT_RATE	VAT rate
INV_VAT	VAT
INV_STATUS	Invoice status
INV_PK	Packing list status
INV_PAY	Payment status
INV_POST	Posting status

Table E.14. Data Dictionary of INV_DETAIL.

Field Name	Meaning
IND_SEQ	Invoice sequence
IND_INV_NO	Invoice number
IND_PROD_NO	Goods number
IND_PROD_TYPE_ID	Goods type ID
IND_QUANT	Quantity
IND_PRICE	Unit price
IND_AMOUNT	Amount
IND_STATUS	Invoice status

Table E.15. Data Dictionary of PK_HEADER.

Field Name	Meaning
PK_INV_NO	Invoice number
PK_LC_NO	L/C number
PK_LC_DATE	L/C date
PK_LC_DUE	L/C due date
PK_BL_NO	Bill of lading number
PK_BL_DATE	Bill of lading date
PK_SHIP_TO	Ship to
PK_PACKAGE	Package amount
PK_AREA	Area
PK_DESC	Packing list description
PK_INV_POST	Posting status
PK_STATUS	Packing list status

Table E.16. Data Dictionary of PK_DETAIL.

Field Name	Meaning
PD_IND_SEQ	Packing list sequence
PD_IND_NO	Invoice number
PD_ROLL_NO	Roll number
PD_NW	Net weight
PD_GW	Gross weight
PD_CONTENT	Content weight
PD_NOTE	Shipping marks

Table E.17. Data Dictionary of CURRENCY.

Field Name	Meaning
CURR_TYPE	Currency type
CURR_DESC	Foreign currency description
CURR_TDESC	Thai currency description

Table E.18. Data Dictionary of EXCHANGE.

Field Name	Meaning
EXC_CURR_TYPE	Currency type
EXC_DATE	Exchange date
EXC_PUR_RATE	Purchase rate
EXC_SALE_RATE	Sale rate

Table E.19. Data Dictionary of BANK.

Field Name	Meaning
BANK_SEQ	Bank sequence
BANK_NAME	Bank name
BANK_BRANCH	Branch name
BANK_LC_EXPIRED	L/C status
BANK_LC_CRLIMIT	L/C credit limit
BANK_TR_EXPIRED	T/R status
BANK_TR_CRLIMIT	T/R credit limit

Table E.20. Data Dictionary of BANK_ACCOUNT.

Field Name	Meaning
BA_SEQ	Bank account sequence
BA_BANK_SEQ	Bank sequence
BA_ACCODE	Bank account
BA_ACTYPE	Account type
BA_BALANCE	L/C status
BA_AC_NO	Bank account status
BA_STATUS	T/R status

Table E.21. Data Dictionary of CHECK.

Field Name	Meaning
CH_SEQ	Check sequence
CH_NO	Check number
CH_DATE	Check date
CH_TRANS_DATE	Preparing check date
CH_REC_DATE	Receive date
CH_BR_NO	Billing number
CH_TOTAL	Total
CH_BA_SEQ	Bank account sequence
CH_VEN_NO	Vendor number
CH_VENDOR	Vendor name
CH_RECEIVER	Receiver name
CH_STATUS	Check status

Table E.22. Data Dictionary of BR_HEADER.

Field Name	Meaning
BR_NO	Bill receive number
BR_DATE	Bill receive date
BR_VEN_NO	Vendor number
BR_CHDATE	Check date
BR_TOTAL	Total
BR_STATUS	Bill receive status

Table E.23. Data Dictionary of BR_DETAIL.

Field Name	Meaning
BD_SEQ	Bill receive sequent
BD_BR_NO	Bill receive number
BD_GR_NO	Goods receive number
BD_GR_VEN_DOC	Vendor document number

Table E.24. Data Dictionary of PV_HEADER.

Field Name	Meaning
PV_NO	Payment voucher number
PV_LINE	Payment voucher line
PV_DATE	Payment voucher date
PV_VEN_NO	Vendor number
PV_BR_NO	Bill receive number
PV_CH_SEQ	Check sequence
PV_TOTAL	Total
PV_DESC	Payment voucher description
PV_STATUS	Payment voucher status
PV_POST	Posting status

Table E.25. Data Dictionary of PV_DETAIL.

Field Name	Meaning
PD_PV_NO	Payment voucher number
PD_SQ_NO	Payment voucher sequence
PD_GR_NO	Goods receive number
PD_VEN_DOC	Vendor document number
PD_GR_DATE	Goods receive date
PD_TOTAL	Total
PD_AC_NO	Account code
PD_DEBIT	Debit item
PD_CREDIT	Credit item
PD_STATUS	Payment voucher status

Table E.26. Data Dictionary of RV_HEADER.

Field Name	Meaning
RV_NO	Receive voucher number
RV_LINE	Receive voucher line
RV_DATE	Receive voucher date
RV_REC_NO	Receipt number
RV_CUST_NO	Customer number
RV_BA_SEQ	Bank account sequent
RV_TOTAL	Total
RV_DESC	Receive voucher description
RV_STATUS	Receive voucher status

Table E.27. Data Dictionary of RV_DETAIL.

Field Name	Meaning
RVD_SEQ	Receive voucher sequent
RVD_RV_NO	Receive voucher number
RVD_INV_NO	Invoice number
RVD_INV_DATE	Invoice date
RVD_TOTAL	Total
RVD _AC_NO	Account code
RVD _DEBIT	Debit item
RVD _CREDIT	Credit item
RVD _STATUS	Receive voucher status

Table E.28. Data Dictionary of ACC_CODE.

Field Name	Meaning
AC_NO	Account code
AC_TNAME	Account Thai code
AC_ENAME	Account English code
AC_OPEN_BAL	Opening balance
AC_CURR_BAL	Current balance
AC_TYPE	Account type

Table E.29. Data Dictionary of ACC_GROUP.

Field Name	Meaning
AG_NO	Account code
AG_TNAME	Account group Thai name
AG_ENAME	Account group English name

Table E.30. Data Dictionary of JV_HEADER.

Field Name	Meaning
JH_NO	Journal voucher number
JH_REF	Journal voucher reference
JH_DESC	Journal voucher description
JH_DATE	Journal voucher date
JH_STATUS	Journal voucher status

Table E.31. Data Dictionary of JV_DETAIL.

Field Name	Meaning
JVD_SEQ	Journal voucher sequence
JVD_LINE	Journal voucher line
JVD_JVH_NO	Journal voucher number
JVD_AC_NO	Account code
JVD_DEBIT	Debit item
JVD_CREDIT	Credit item
JVD_STATUS	Journal voucher status

Table E.32. Data Dictionary of GL_TRANSACTION.

Field Name	Meaning
GL_BATCH	Batch number
GL_LINE	GL line
GL_DOC	GL document
GL_REF	GL reference
GL_DOC_DATE	GL reference date
GL_DATE	GL date
GL_AC_NO	Account code
GL_DESC	GL description
GL_DEBIT	Debit item
GL_CREDIT	Credit item
GL_STATUS	GL status

Table E.33. Data Dictionary of BALANCE.

Field Name	Meaning
BAL_YEAR	Year
BAL_MONTH	Month
BAL_AC_NO	Account code
BAL_NETCHANGE	Net amount last period
BAL_AMOUNT	Amount

Table E.34. Data Dictionary of TB_PERIOD.

Field Name	Meaning
TBP_YEAR	Year
TBP_MONTH	Month
TBP_STATUS	Balance status

Table E.35. Data Dictionary of SECURITY.

Field Name	Meaning
EMP_ID	Employee ID
USER_ID	User ID
PASSWORD	Password
USER_LEVEL	User level
MENU1	Acceptation for purchasing system
MENU2	Acceptation for Sale system
MENU3	Acceptation for accounting payable
MENU4	Acceptation for accounting receivable
MENU5	Acceptation for Pay and receive
MENU6	Acceptation for General ledger
MENU7	Acceptation for security

Table E.36. Data Dictionary of EMPLOYEE.

Field Name	Meaning
EMP_ID	Employee ID
EMP_NAME	Employee name
EMP_DEPT_ID	Department ID
EMP_START_DATE	Start date
EMP_STATUS	Employee status

Table E.37. Data Dictionary of DEPARTMENT.

Field Name	Meaning
DEPT_ID	Department ID
DEPT_NAME	Department name

BIBLIOGRAPHY

1. Fowler, Martin. Analysis Patterns: Reusable Object Models. NY: Addison Wesley Pub Co., 1996.

2. Greer, Tyson. Understanding Intranets. Redmond, WA: Microsoft Press, 1998.

3. Hoffer, Jeffrey A. Modern System Analysis and Design, Second Edition NY: Addison-Wesley Pub Co., 1998.

4. Kendall, Kenneth E. and Julie E. Kendall. System Analysis and Design, Third Edition. New Jersey: Prentice Hall International Company, 1995.

5. Kosiur, David. Understanding Electronic Commerce. Washington: Microsoft Press, 1997.

6. Langer, Arthur M. Analysis and Design of Information Systems, Second Edition. London: Springer Verlag, 2000.

7. Laudon, Kenneth C. and Jane P. Laudon. Management Information Systems, Sixth Edition. New Jersey: Prentice Hall International Company, 2000.

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

9. Muller, Robert J. Database Design for Smarties. MA: Morgan Kaufmann Publishers, 1999.

10. Page Jones, Meilir. The Practical Guide to Structured Systems Design, Second Edition. New Jersey: Prentice Hall International Company, 1992.

11. Reingruber, Michael and William W. Gregory. The Data Modeling Handbook. NY: John Wiley & Sons, 1994.

12. Trepper, Charles. E-Commerce Strategies. USA: Microsoft Press, 2000.

13. Whitten, Jeffrey L. and Lonnie D. Bently. Systems Analysis and Design Methods, Fourth Edition. NY. Irwin/McGraw-Hill, 1998.