An Autopart Order Handling Information System for The LRP AUTOPART Ltd., Part

by

Mr. Suprot Lertritthiphan

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
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Project Title	An Autopart Order Handling Information System for The LRP AUTOPART Ltd., Part
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Academic Year	March 2001

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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ABSTACT

This project presents the analysis, design and implementation plan of an Autopart Order Handling Information System. However, the project is based on the LRP AUTOPART Ltd., Part's operation. All processes are shown from customer order to delivery products, included report processes.

As a result of inefficient existing system of this firm is manual. There are many data flow occurring between processes. Moreover, many problems happen all time that affects on time, cost and service.

The new proposed system is built to solve all problems and to improve whole operations. The system is developed based on client-server architecture connected by LAN (local area network) Furthermore, each of departments are linked to share and exchange the data through the efficient database. Lastly, when the new system is implemented, it works with the existing system as parallel in a short term to ensure that all processes can work smoothly in the usual way.

ACKNOWLEDGEMENTS

The are many people who have made contributions to this project. The writer would like to acknowledge their contributions and for their supports as well as thank them for their contributions.

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I. INTRODUCTION

1.1 Background of the Project

In the globalization era, the information system is one of the most valuable resources for achieving business in a competitive world. The well-designed information system can enhance productivity by automating labor-intensive tasks, eliminating non value-added processes, and coordinating separate activities. Information system can enhance quality of products and services by giving customers easier access to products and services, improving quality and quicker response, and more tracking and providing status information.

As the firm grows, the control of the purchasing order data becomes more difficult and simultaneously more problems. The problems are related to the process of data collecting, data recording, and retrieving data. The traditional procedure, that is the manual operation, is not only a difficult task, but it also requires too much time to generate information for administrative purposes.

Because of the firm is in the autopart business. The firm's products are compatible with each other. This means that one kind of spare part that is used in one model of engine can be use in the same kind of spare part that is used in a different model of an engine. This compatibility of the spare part requires an efficient system to handle it.

The firm of this project is the one that needs database information system to control and manage purchases and sales with suppliers and customers which more volume of transactions grow more than to deal with manual operation. This database information system will be developed to enhance a centralized information under computerized system instead of using existing manual record keeping and abandon of hard copy filing.

1.2 Objectives of the project

(1) To determine and analyze problems and user's requirements in the autopart order handling information system.

(2) To design a new computerized system for the firm to be more accurate and quick response.

(3) To test and implement an the proposed system.

(4) To ensure the goods and satisfy the customer's demand.

(5) To develop an effective low cost application software to operate on a low cost computer hardware.

(6) To estimate and compare costs and benefits between manual and computerized system.

(7) To generate reports that related to main aspects to add value of market share and to be used for management level.

1.3 Scope of the Project

This project is to develop the autopart order handling information system for LRP AUTOPART Ltd., Part. to replace the existing autopart order handling information system, which is currently based on manual operations.

This autopart order handling information system needs to know the information about SALES REPRESENTATIVE, CUSTOMER, ORDER HISTORY, INVOICE, ORDER DETAILS, PRODUCT, SUPPLIER, RECEIVE, PURCHASE ORDER, and ON ORDER. This information system starts from getting order from customers, generating a response, keeping record, good delivery, generating reports, until payment received by Finance & Accounting Department. There are four external entities that this information system has to interact with. They are customer, supplier, management, and finance & accounting department.

1.4 Deliverables

The deliverables for the project on Autopart order handling information system for LRP AUTOPART Ltd., Part. are as follows:

(1) Screens are comprised of 10 screens as follows.

(a) Login Screen

(b) Main Menu Screen

(c) Customer Information Screen

(d) Supplier Information Screen

(e) Sales Representative Information Screen

(f) Customer Order Screen

(g) Reports Screen

(h) Purchase Order Information Screen

(i) Inventory Product Searching Screen

(j) Inventory Product Information Screen

(2) Reports are comprised of 12 reports as follow:

(a) Customer Sales Volumes (Monthly) Report

(b) Customer Information Report

(c) Product Sold (Monthly) Report

(d) Sales Representative Information Report

(e) Monthly Invoice Report

(f) Invoice

(g) Monthly Purchase Order Report

(h) Inventory Information Report

(i) Out of Stock Report

(j) Purchase Order

(k) Parts Never Sold Report

(l) Supplier Information Report

1.5 Project Plan

As shown by Project Gantt Chart in Figure 1.1, the system development project plan is started from September 2, 2000 to December 31, 2000. The major activities are System Analysis, System Design, and System Implementation.

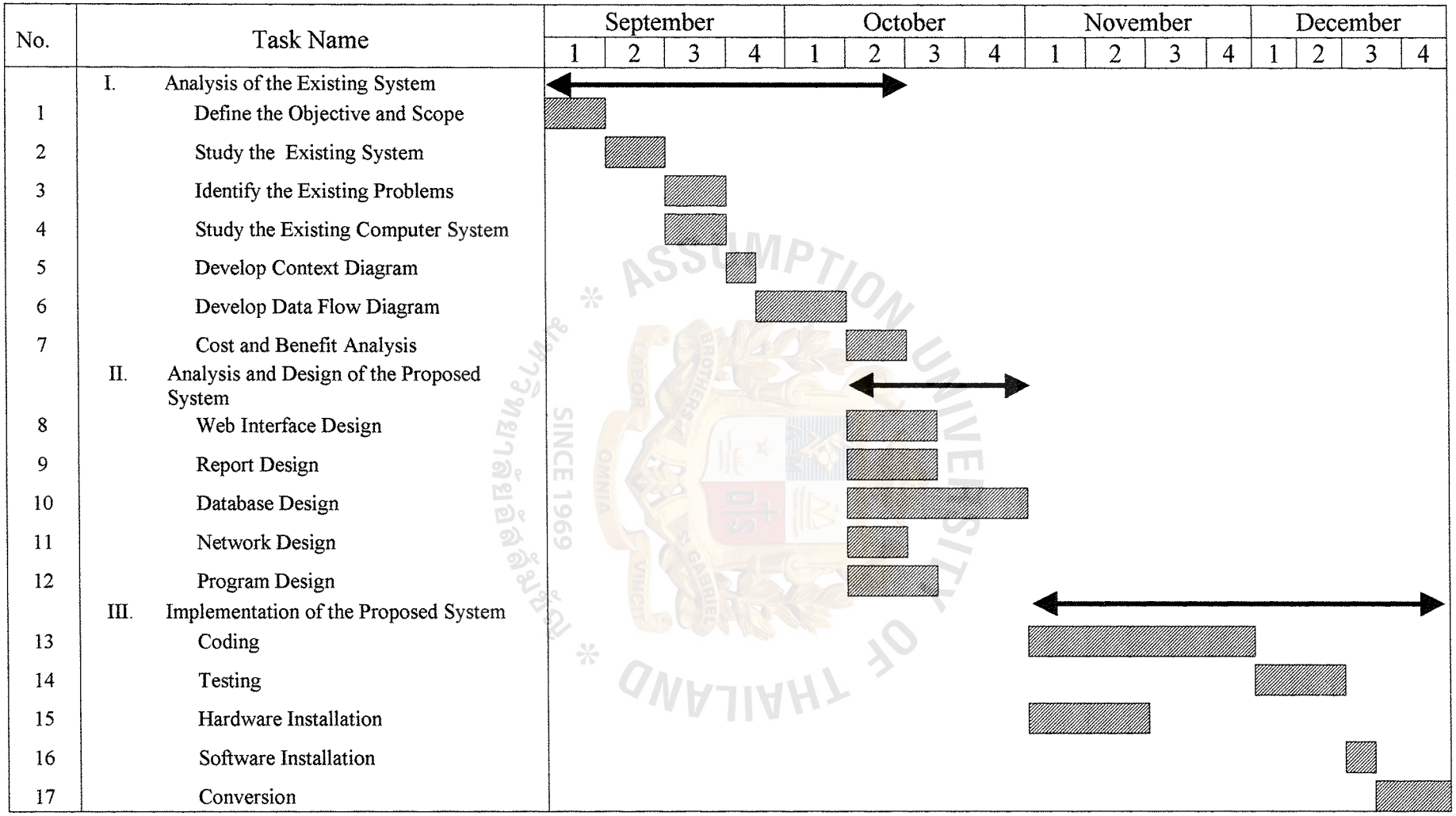

Figure 1.1. Project Plan of the Autopart Order Handling Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

LRP AUTOPART Limited Partnership was established in 1993. It was founded with the main objective to produce and distribute various types of spare parts of automobiles. In the early years, the firm acted as a wholesaler to provide sales and after sale services to almost retailers in Thailand. With increasing in demands, the firm has expanded its customer base to nearby countries such as Malaysia, Vietnam, and Cambodia.

In the production management strategy, the firm uses outsourcing strategy in order to produce high quality spare parts with cheaper prices. With this strategy, the firm can gain the competitive advantages over its competitors and attract more customers to purchase more spare parts. Consequently, the firm has to enlarge itself to be a bigger firm.

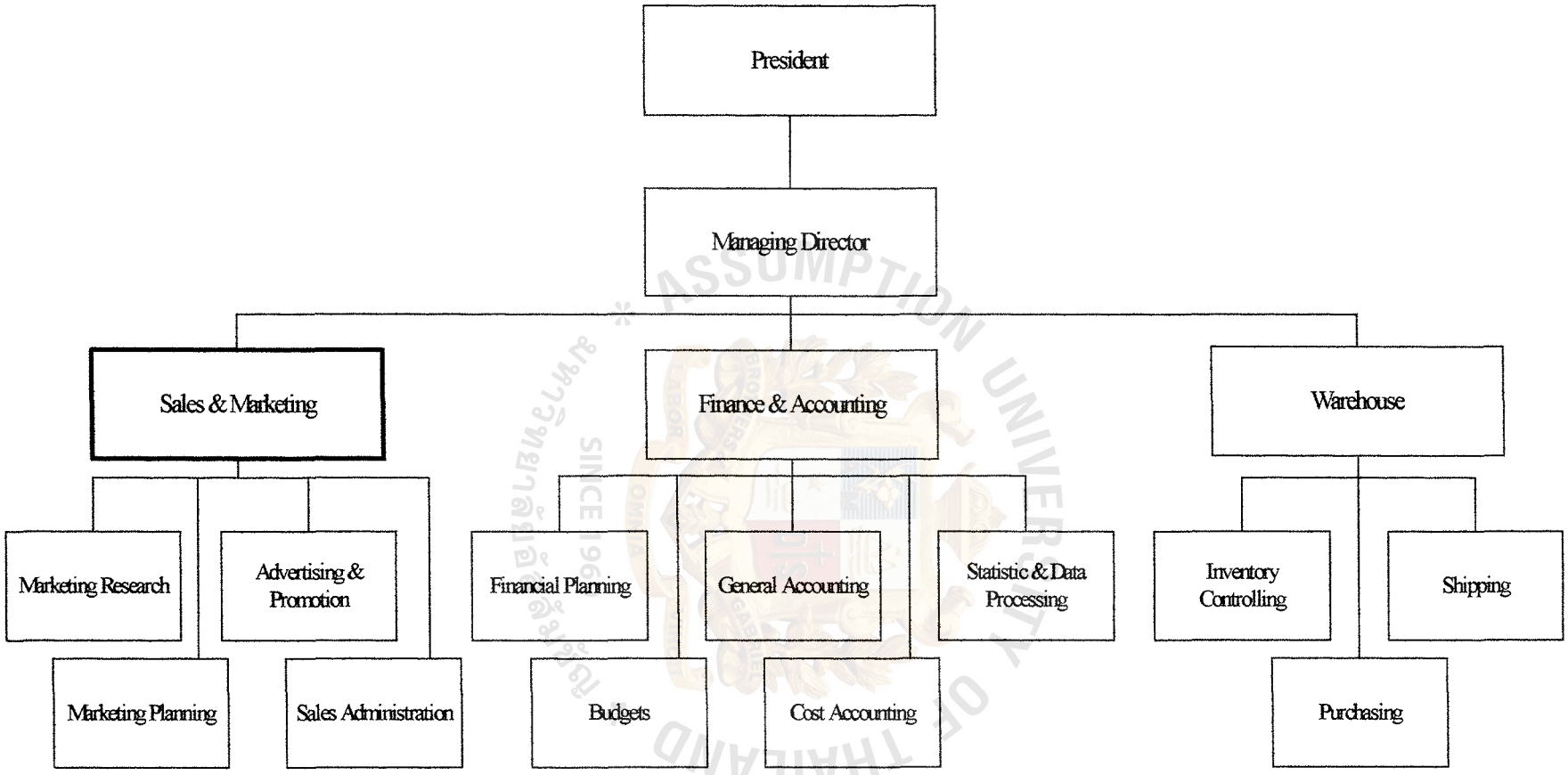

Figure 2.1. The Organization Chart.

2.2 Current Problems and Areas for Improvement

There are several following problems that appear from the existing system.

(1) The existing information system cannot provide timely and accurate data or documents to the management staffs and officers.

(2) The existing information system takes a lot of time due to manual operation.

(3) The existing information system cannot provide the timely information that is necessary for immediate and critical management decision.

(4) The existing information system takes a lot of time to issue any documents for employee and customer requests.

(5) There is no master file/ database used by all reporting systems. This leads to cost discrepancies between systems due to factors such as time-consuming data operating tasks.

(6) There is heavily dependent on manual system. So the system is not an efficient and effective tool with regard to coping with changing business condition.

(7) There are a lot of unnecessary papers and documents.

Table 2.1. Cause and Effect Analysis.

Effects	Causes
1. Inability to provide timely and accurate data or documents to the management staffs and officers.	1.1 Data entry people often generate errors in their operations. 1.2 There is not an audit routine system that always checks errors when data entry operations are handled.

Table 2.1. Cause and Effect Analysis (Continued).

Effects	Causes
	1.3 The process of data collecting, data recording, data retrieving, data updating, and coordinating separate activities are done manually. This will require a lot of time for processing. For example, when the management staff wants to know the updated stock balance, it will take a lot of time for gathering all new data and updating them in the stock balance.
2. Takes a lot of time for processing of the system.	2.1 The process of data collecting, data recording, data retrieving, data updating, and coordinating separate activities are done manually. This will require a lot of time in the operation of the system. For example, when we want to search for a specified purchasing order, it will take time since all purchasing orders are kept in the form of papers and documents.

Table 2.1. Cause and Effect Analysis (Continued).

Effects	Causes
3. Inability to provide the timely information that is necessary for immediate and critical management decision.	3.1 The process of data collecting data recording, data retrieving, data updating, and coordinating separate activities are done manually. This will require a lot of time in the operation of the system. For example, when we want to verify the customer about the availability of our product, we cannot get the newly updated stock information since it takes a lot of time for updating with the manual system.
4. Takes a lot of time to issue any documents for employee and customer requests.	4.1 The process of data collecting, data recording, data retrieving, data updating, and coordinating separate activities are done manually. This will require a lot of time in the operation of the system. For example, issuing an invoice to the customer, it takes a lot of time since there are many documents must be approved before allowing to issue an invoice and all these documents are handled manually.

Table 2.1. Cause and Effect Analysis (Continued).

Effects	Causes
5. Cost discrepancies between manual system and proposed computer information system due to factors such as time-consuming data operating tasks.	5.1 The process of data collecting, data recording, data retrieving, data updating, and coordinating separate activities are done manually. This will require a lot of time in the operation of the system since there are a lot of documents to be handled and it consumes a lot of time. 5.2 There is no master file/database used by all reporting systems. For example, when we want to create many reports with the same data or information, it requires a lot of time and more processes for gathering all these data.
6. The system is not an efficient and effective tool with regard to coping with changing business condition.	6.1 The process of data collecting, data recording, data retrieving, data updating, and coordinating separate activities are done manually. This will require a lot of time in the operation of the system. For example, when we have to provide an immediate response to the customer, it will take a lot of time to do it.

Table 2.1. Cause and Effect Analysis (Continued).

Effects	Causes
	This will lead to lose the customer since we are in the high competitive business condition. 6.2 There is heavily dependent on a manual system.
7. There are a lot of unnecessary papers and documents.	7.1 The existing system is the manual system that requires all data entry operations and related activities to be handled on papers.

From above Cause-And-Effect Analysis Table, we can find that there are many causes that lead to many problems. The main cause of these problems is the operation of the manual system, which is much slower than the computer information system. The process of data collecting, data recording, data retrieving, data updating, and coordinating separate activities require a lot of time to finish their jobs. Other causes are there is no master file/database, there is no audit routine system for tracking errors, and errors of data entry people.

2.3 Existing Computer System

The existing system is the manual system and there are four main functions concerning the existing business. These functions occur as a routine process. The functions are as follows:

(1) Customer purchase order

(a) Customer purchase order is received by sales.

(b) Checking the customer record.

(c) After that, sales will request for checking stock status according to customer order and will record the customer purchase order in customer order folder.

(d) Then, customer purchase order will be stamped with new order number and collected in filing documents.

(2) Purchase order to supplier

(a) If the product items in customer order are out of stock, sales will issue the out of stock report to management level for approval purchasing the products from supplier.

(b) When approval was succeed, clerk and stock officer will perform the purchase order by checking the supplier record and stock details.

(c) After that, they will generate the purchase order and send to management level for signature.

(d) The purchase order will be sent to supplier and collected in the filing documents.

(3) Update stock

(a) When supplier informs the shipment arrival, the clerk and stock officer will search purchase order in the filing documents that matching with the shipment.

(b) When the products was received, the next process is to update records for received products.

(c) After updating stock, the next step is to inform available stock status to sale for preparing delivery order to customer.

(4) Delivery order

(a) When sale received the confirmation for available stock, they will check the customer record from the customer order folder and searching the customer purchase order from filing documents to prepare the delivery order.

(b) The next process is to cut stock according to the customer order and request the finance & accounting department to issue the delivery invoice by attached the customer order.

(c) Sale will prepare the delivery products including sale invoice to customer.

(d) After delivery order to customer, the invoice copy & customer order will be collected into filing documents.

III. THE PROPOSED SYSTEM

3.1 System Specification

The proposed system is needed to solve all problems occurring from using the manual system. Therefore, the new system should be designed to achieve the goals. These following components are represented in the Autopart Order Handling Information System.

(1) Customer Database developed to the high performance database server, available for every responsible workers, to manage the data, make a query, and solve the problems occurring from the current system.

(2) Sales Representative Database converted from paper works to effective database format designed and developed on the database server to keep sales representative information.

(3) Supplier Database replacing the existing manual system to facilitate the work of responsible workers, to manage the data, make a query, and solve the problems occurring from the current system.

(4) Product Database replacing the existing manual system to solve many problems. For example, it is hard to search for, update, and delete product information when using the existing manual system. Therefore, it wastes time and cannot meet the customer's satisfaction.

(5) Order History Database, Invoice Database, and Order Details Database are developed to replace the existing manual system to facilitate the work of responsible workers such as calculating customer order, keeping track of customer orders and invoices, and managing all customer orders and invoices. With this new computerized system, many problems used to occur

will be eliminated. For example, complexity in arranging customer orders and invoices, and a lot of hard copy filing.

(6) Purchase Order Database, On Order Database, and Receive Database are developed to replace the existing manual system to facilitate the work of responsible workers such as calculating the cost of product purchased, keeping track of purchase orders and status of products purchased, and managing all purchase orders. With this new computerized system, many problems can be solved. For example, complexity in arranging purchase orders, and time consuming in reaching required purchase orders details.

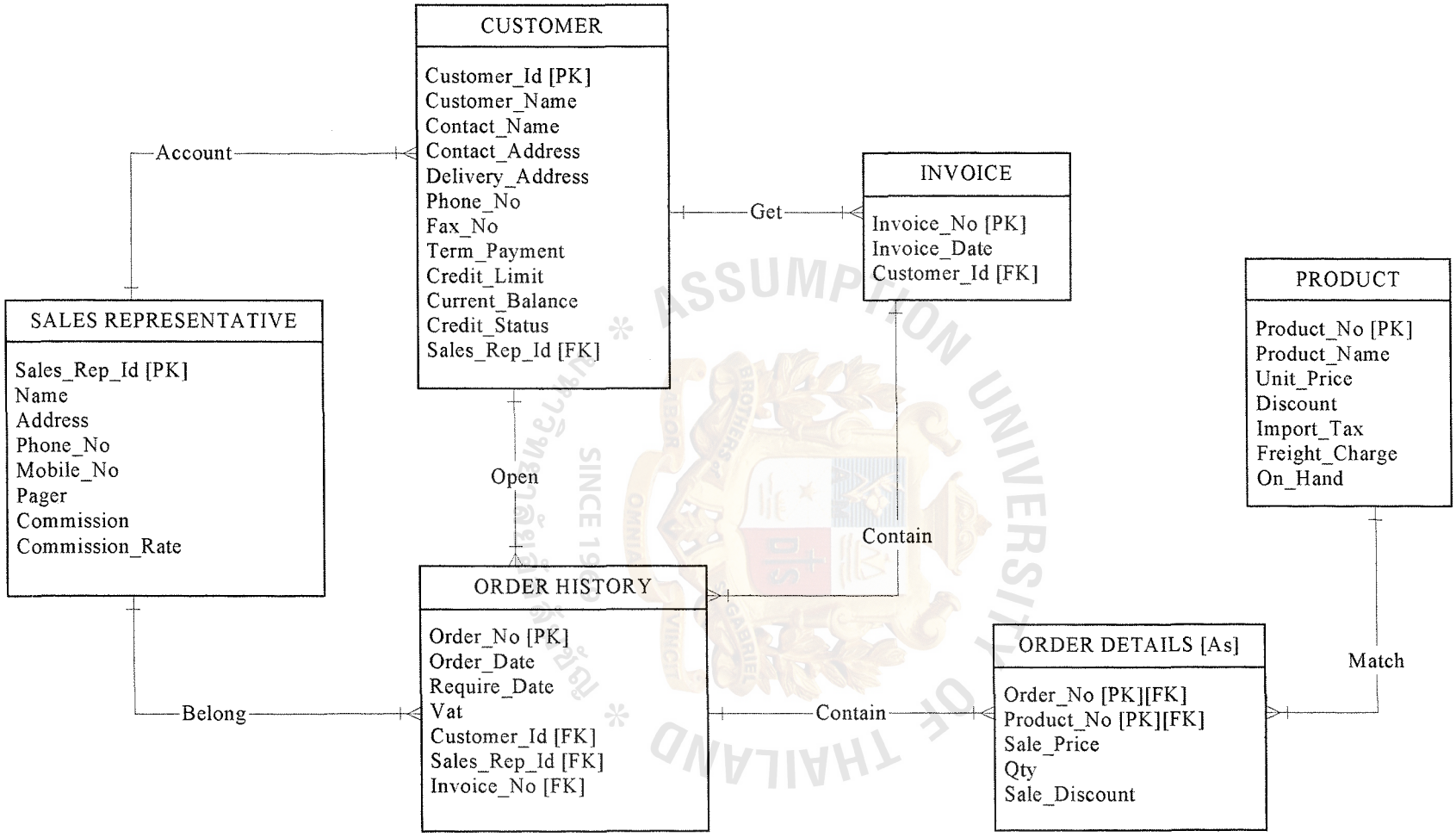

Figure 3.1. Entity Relationship Diagram.

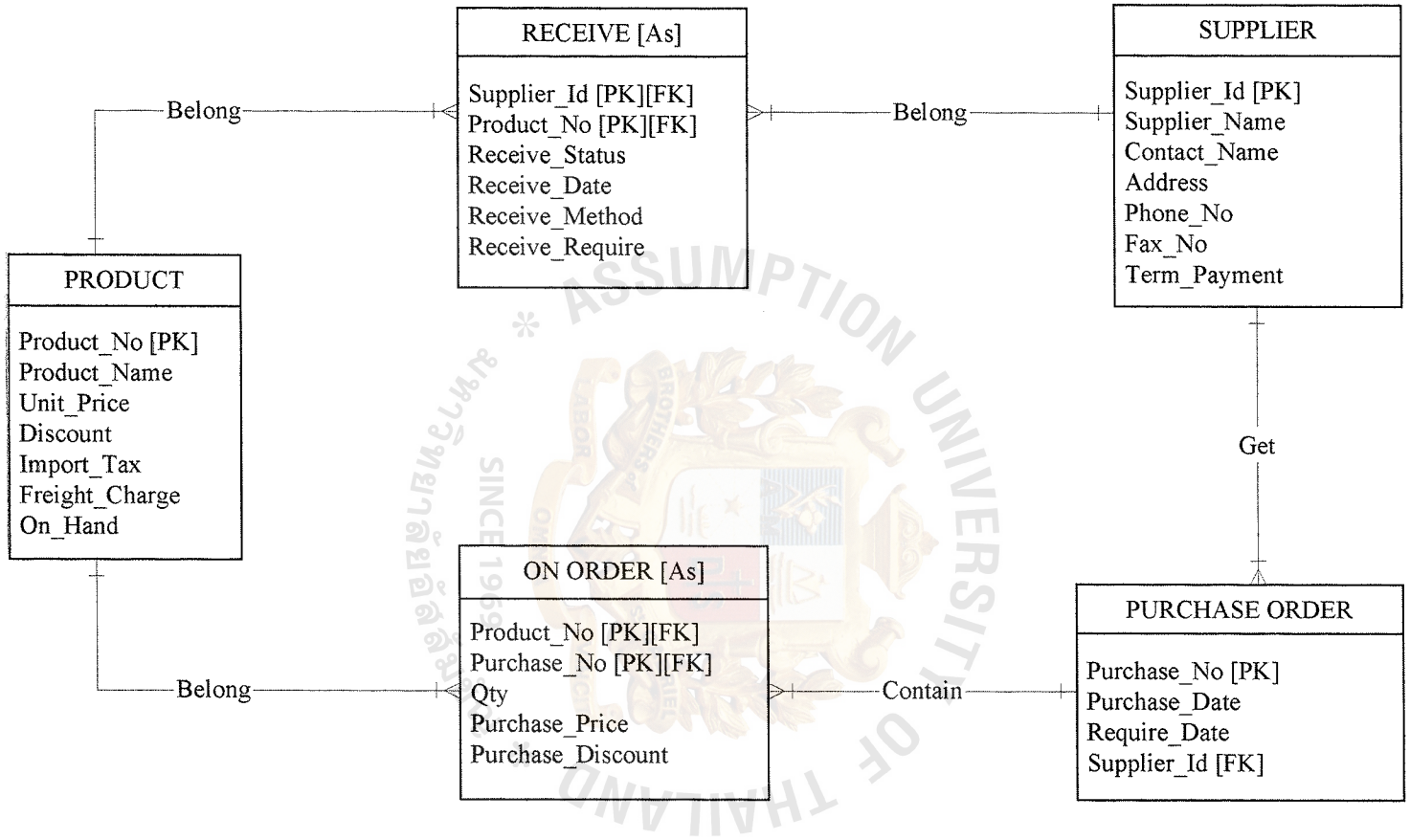

Figure 3.2. Entity Relationship Diagram (Continued).

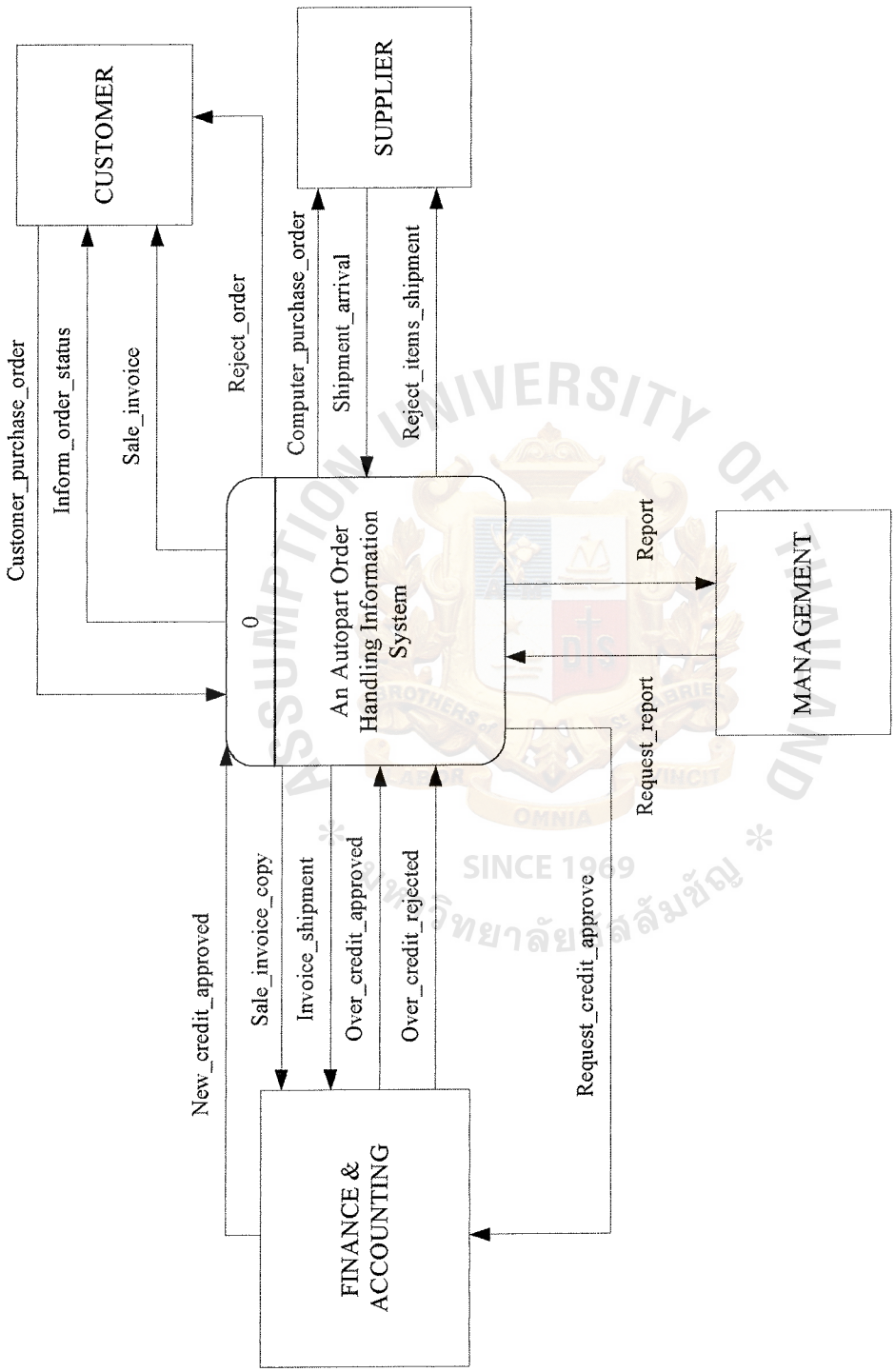

Figure 3.3. Context Level Data Flow Diagram of the Autopart Order Handling Information System.

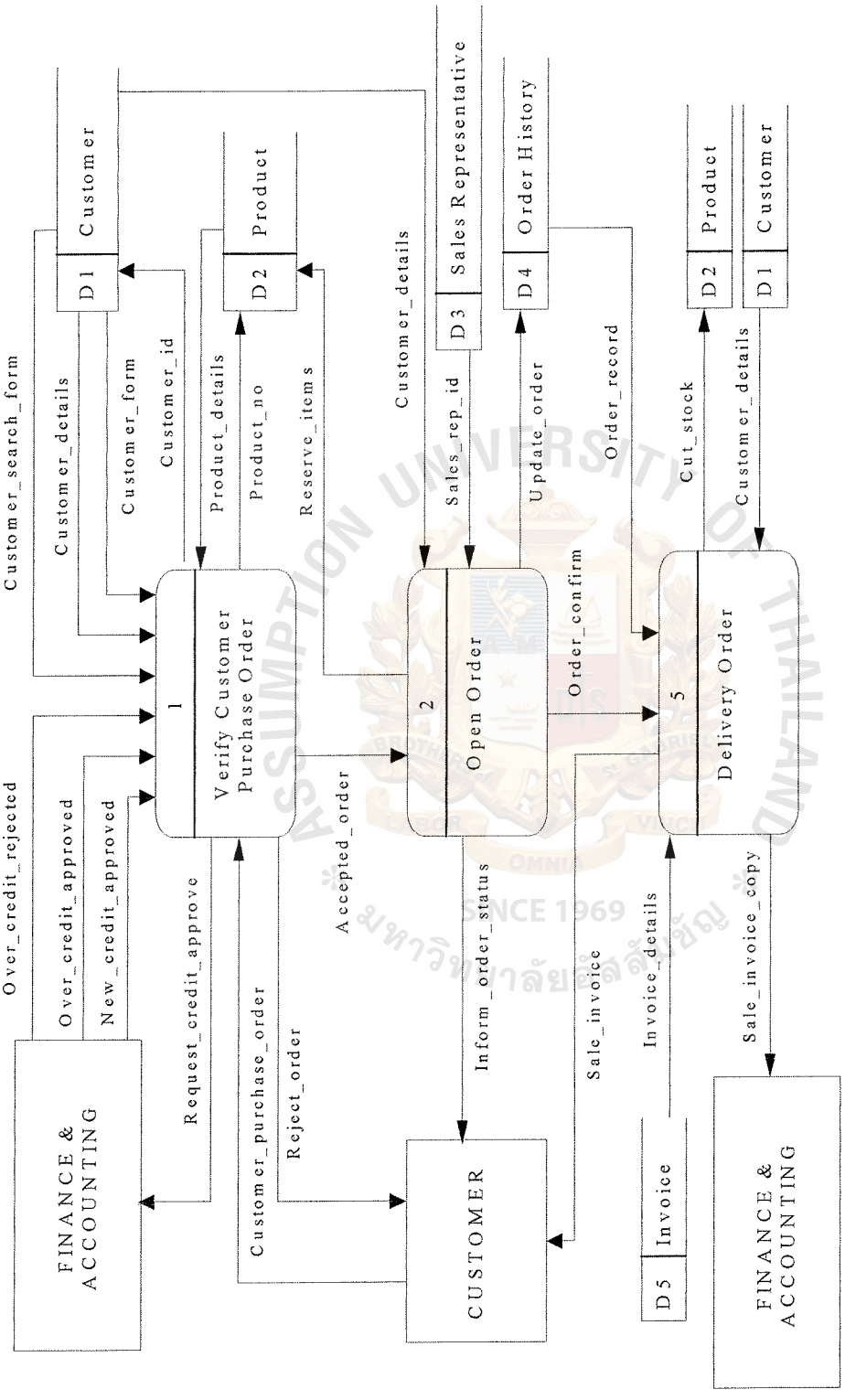

Figure 3.4. Level 0 Data Flow Diagram of the Autopart Order Handling Information System.

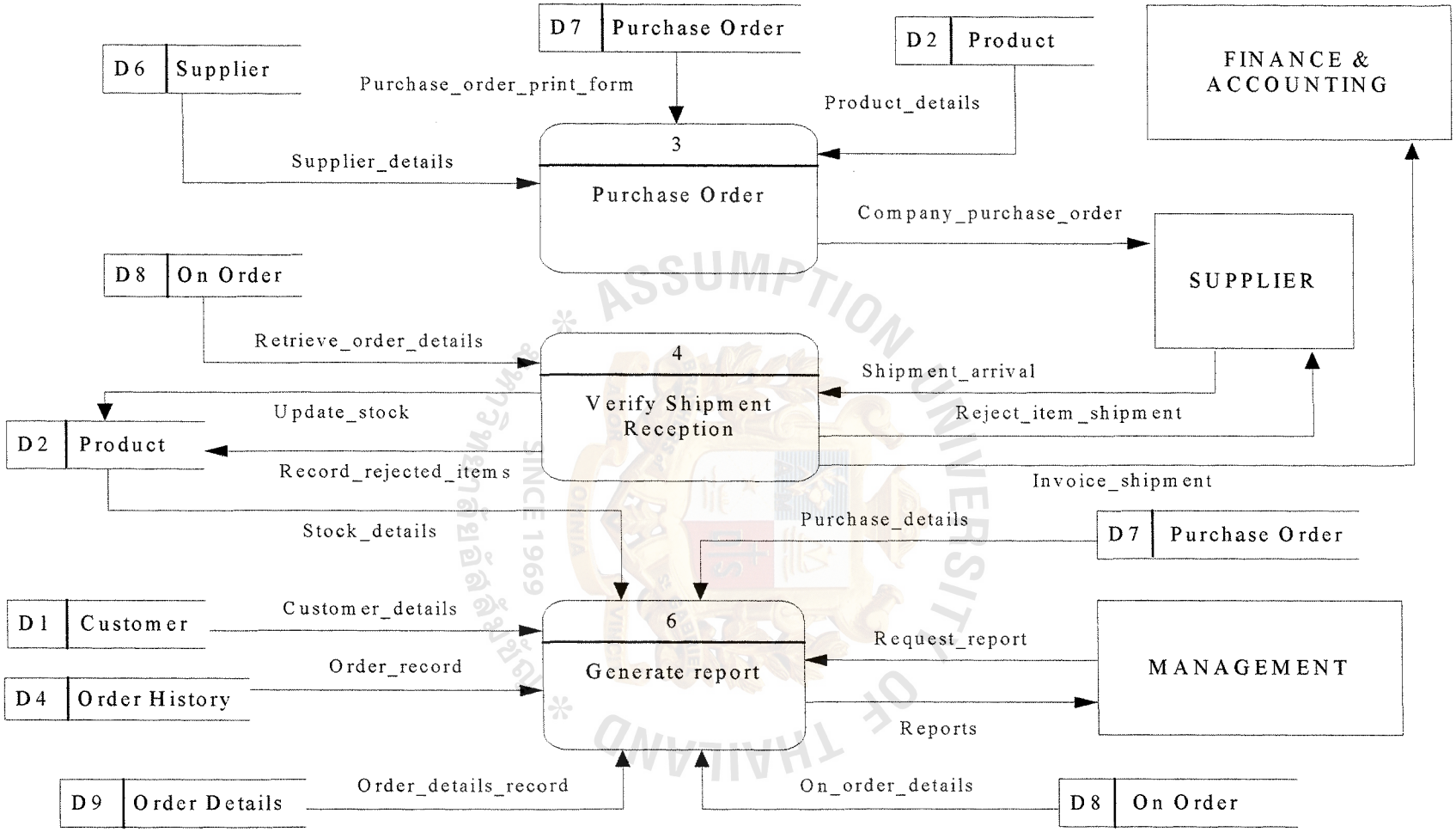

Figure 3.5. Level 0 Data Flow Diagram of the Autopart Order Handling Information System (Continued).

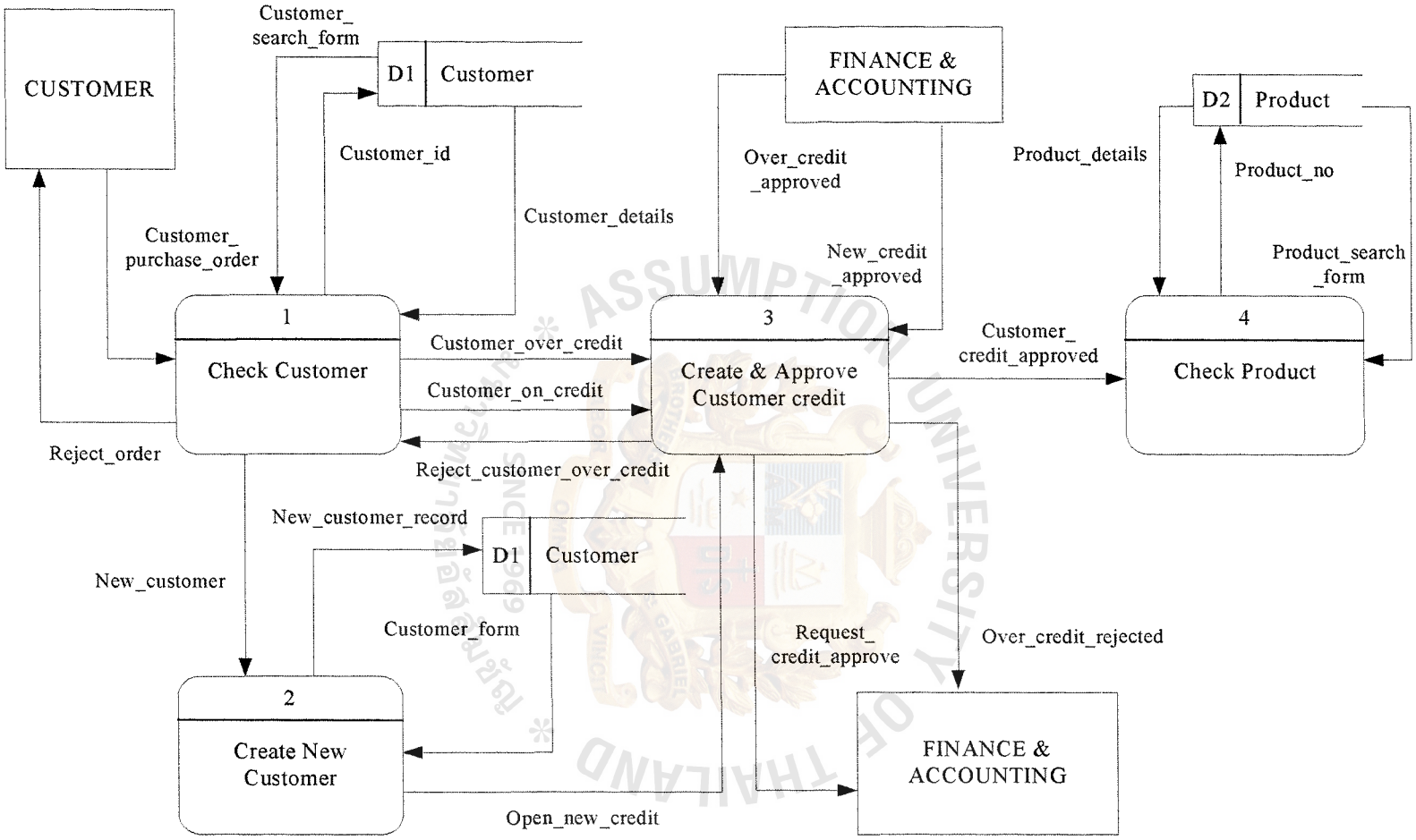

Figure 3.6. Level 1 Data Flow Diagram of Verify Customer Purchase Order.

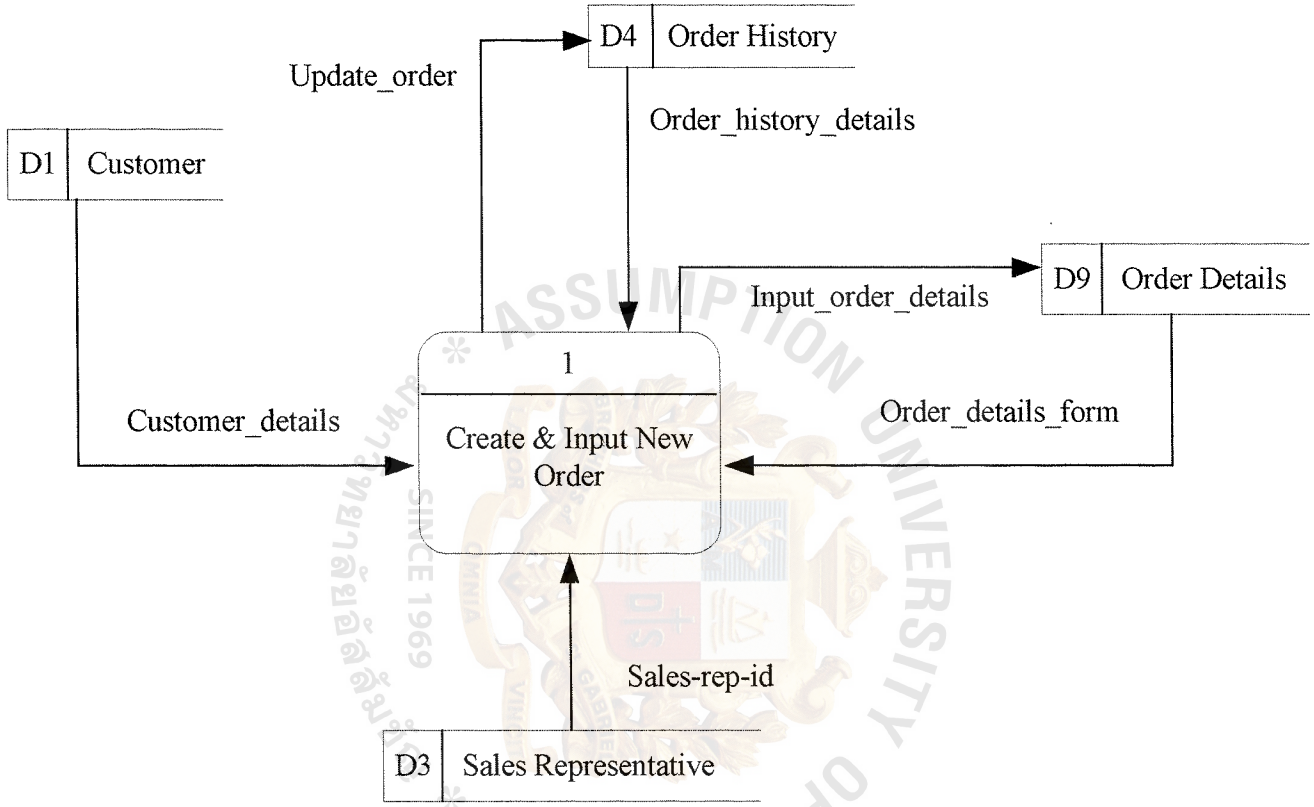

Figure 3.7. Level 1 Data Flow Diagram of Open Order.

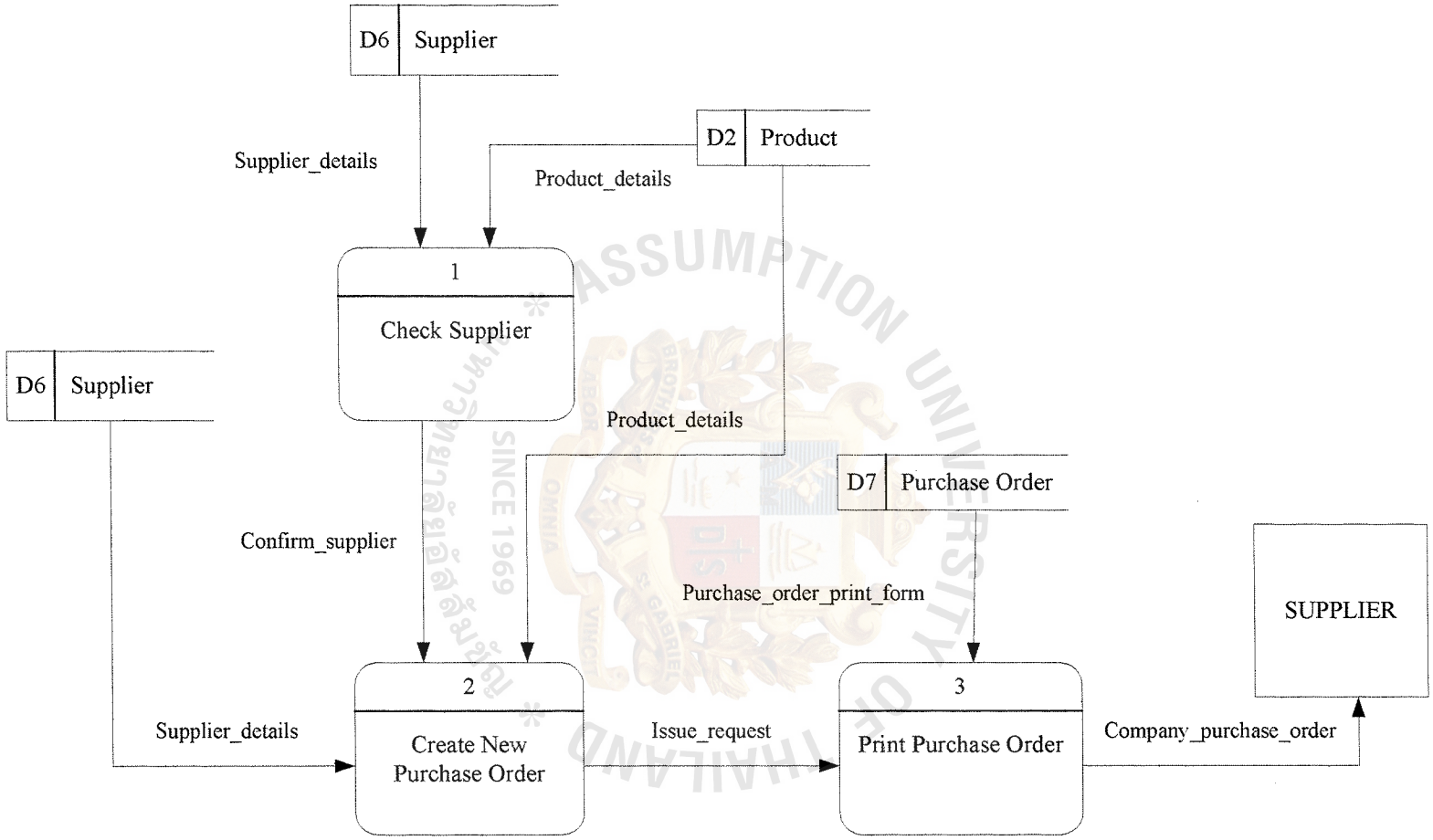

Figure 3.8. Level 1 Data Flow Diagram of Purchase Order.

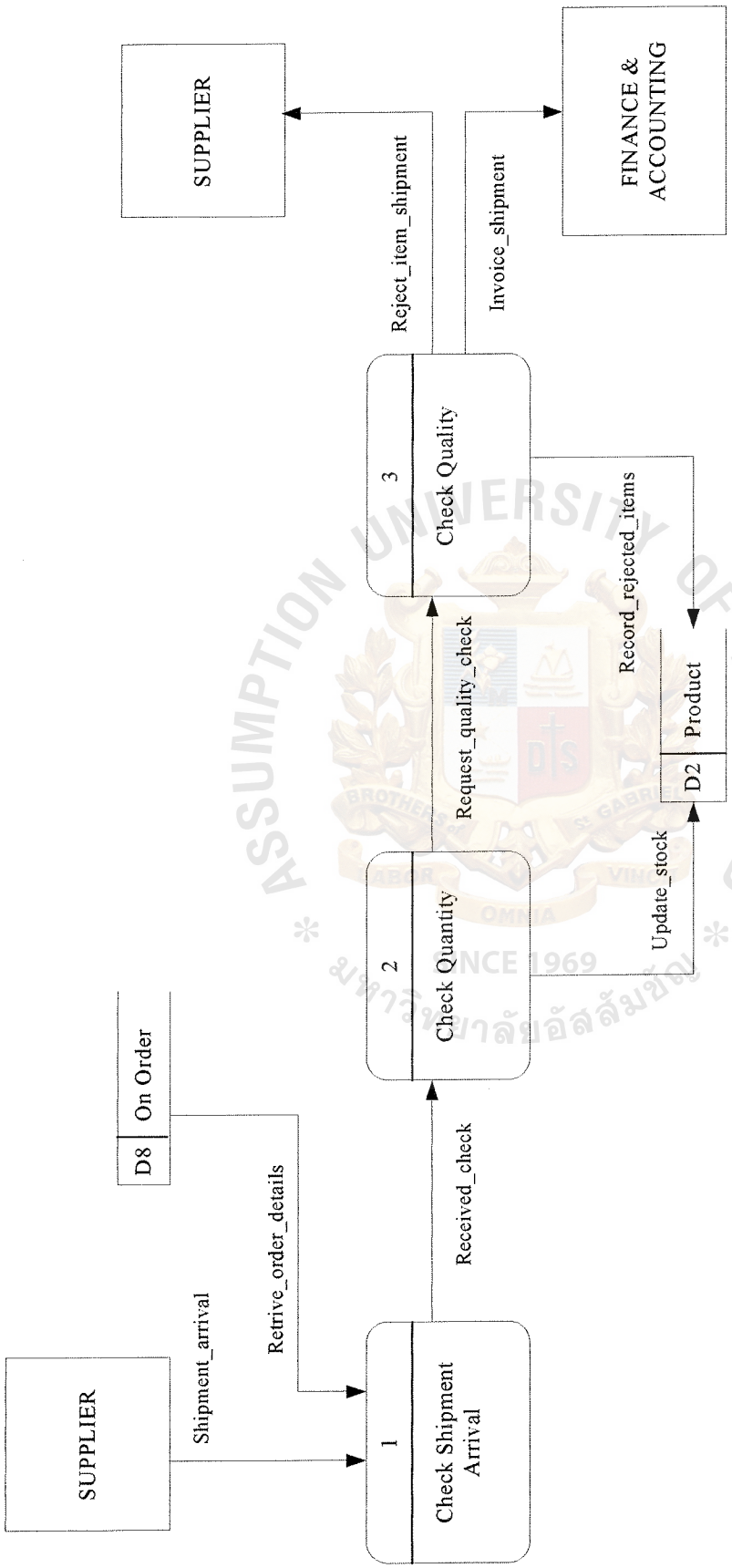

Figure 3.9. Level 1 Data Flow Diagram of Verify Shipment Reception.

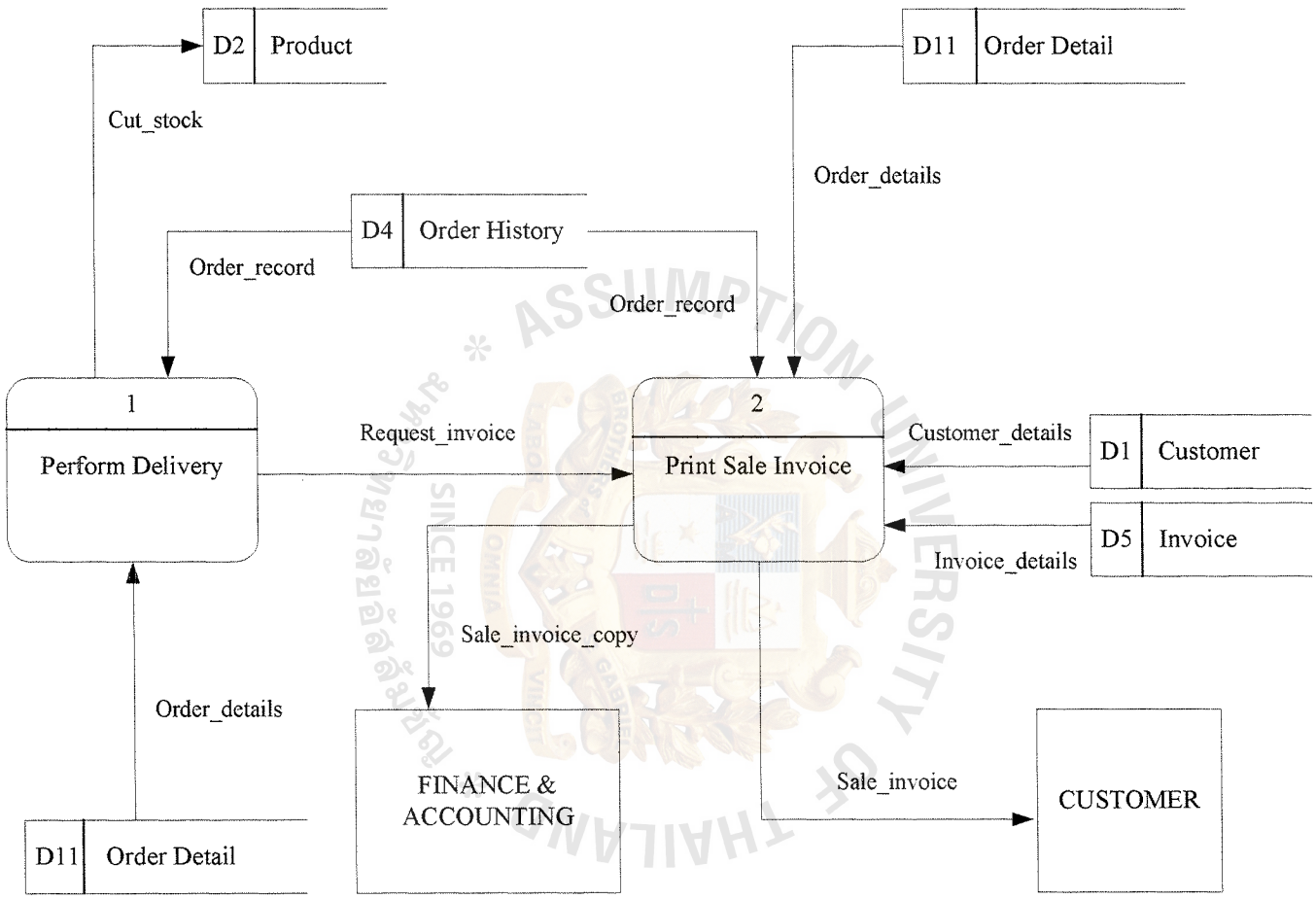

Figure 3.10. Level 1 Data Flow Diagram of Delivery Order.

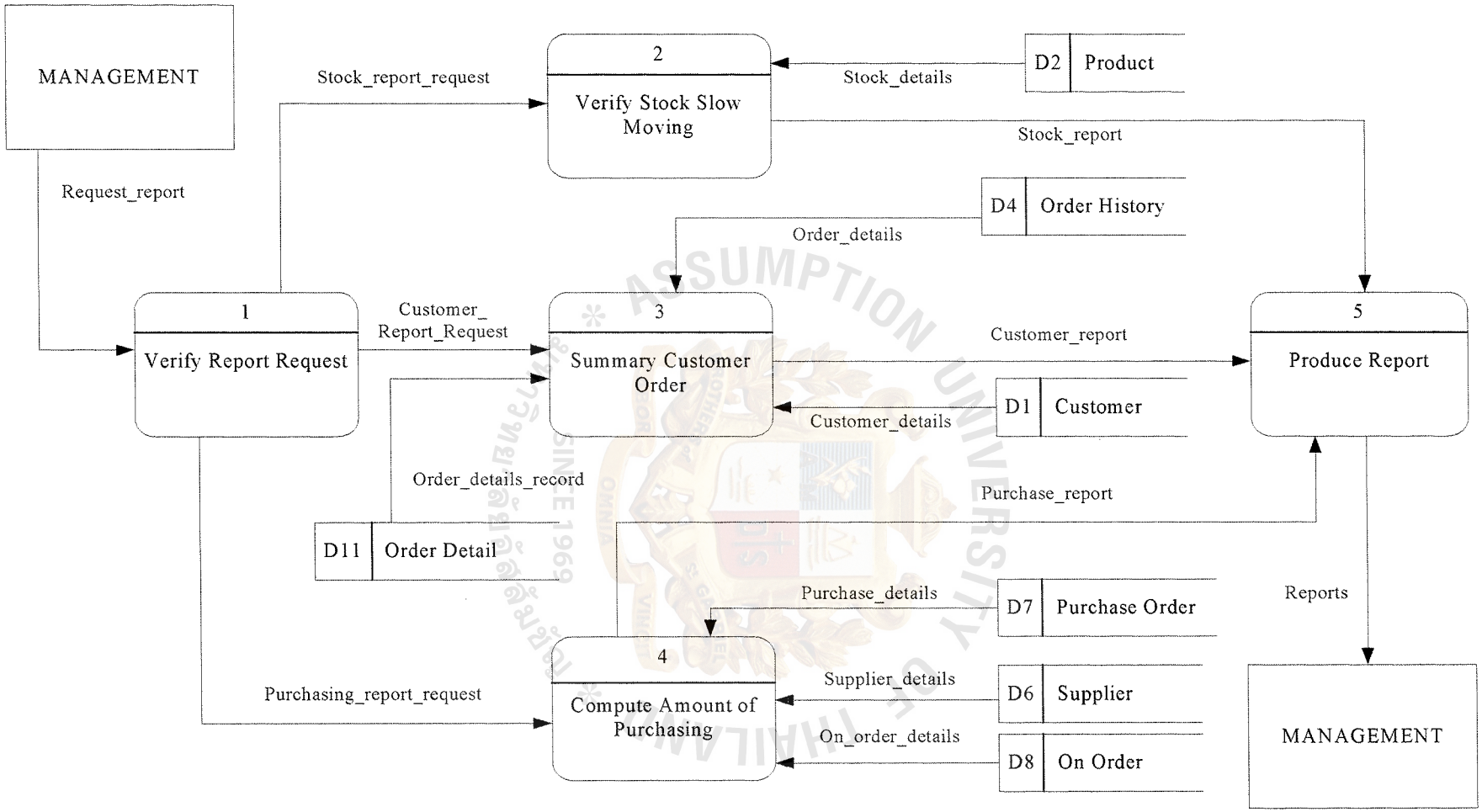

Figure 3.11. Level 1 Data Flow Diagram of Generate Report.

3.3 Hardware and Software Requirement

An Autopart order handling information system for LRP AUTOPART Ltd.,Part will consist of a computer server that store the database for system and back up of programs.

The server must have the hardware specification that can was run Microsoft Windows NT and Microsoft SQL. The hardware and software specifications for the proposed system are shown in the Table 3.1 and Table 3.2 respectively.

Table 3.1. The Hardware Specifications for the File Server.

Hardware	Specification
CPU	Intel Pentium III 866 MHZ
Ram	256 MB SDRAM (Max 512 MB)
Hard Drive	30 GB Hard Drive
Floppy Disk	1.44 MB Floppy Drive
CD ROM Drive	50x Speed CDROM
Display Card	VGA Card SB SIS 6326 AGP 8 MB
Monitor	15" Super VGA Color Monitor
Mouse and Keyboard	Microsoft
Back up	Back up tape

Table 3.2. The Software Specifications for the File Server.

Hardware	Specification
Operating System	Microsoft Windows NT Server 4.0

Table 3.2. The Software Specifications for the File Server (Continued).

Hardware	Specification
Database Server	Microsoft SQL Server 6.5

Table 3.3. The Hardware Specification for Each Client Machine.

Hardware	Specification
CPU	Celeron 333 MHz
Ram	64 MB SDRAM (Max 128 MB)
Hard Drive	2.1 GB Hard Drive
Floppy Drive	1.44 MB Floppy Drive
CD ROM Drive	24x Speed CDROM
Display Card	VGA Card S3 SIS 6326 AGP 8MB
Monitor	15" Monitor
Mouse and Keyboard	Microsoft
Other Hardwares	3 Com Ether Link XL PCI 10 Base-T Lan Card, 3 Com Office Connect Hub/8 TPC, Cabling systems, UPS
Printer	Epson LQ-21701 24 pin, 132 col, 413 cps, 64 KB HP Laser Jet 5 mp 600 dpi, 6 ppm, 2 MB

Table 3.4. The Software Specification for Each Client Machine.

Hardware	Specification
Operating System	Microsoft Windows 98 Thai Edition
Application Software	Microsoft Office 97 Professional Thai Edition

Table 3.4. The Software Specification for Each Client Machine (Continued).

Hardware	Specification
Application	Microsoft Visual Basic Pro 5.0 for 32 bit Win

3.4 Security and Control

The good system should have security to deal with the prevention and detection of unauthorized actions by users of a computer system. These following procedures are represented for the proposed system.

(1) Authentication

This procedure is the protection for unauthorized actions or users by using ID and password. Therefore, only authorized users can access information in this system. This is the network security. Moreover, encrytion technique is used for password, so no one can understand and retrieve password from the system.

(2) Keep logon Record

To set Program to keep security of each logon_id. Who use Program and write the record every time that someone change or update record file.

(3) Using UPS

UPS will prevent the loss of data and information during power failure for whatever reasons.

(4) Back up and Recovery

Back up all files daily and then keep them in a safe place. Moreover, back up should have both before and after updating data routine.

(5) Hardware security

This security refers to all equipment related to the computer system such as the computer machines, hard disk, LAN card, network equipment, etc.

(a) All network wiring should be looked after to prevent the damage to cable.

(b) We should stock necessary spare parts to replace any damaged equipment to prevent process interruption.

(c) Server computer should be in a safe place from unauthorized persons.

(6) Database security

Database is designed to keep data integrity. Also, protection of duplication should be checked for existence of enter data with the database.

(7) Other control

(a) The computers will be kept in an air-conditioned room.

(b) Computers and equipment should be cleaned every month.

(c) Ensure that the users receive adequate training on the use of the computer.

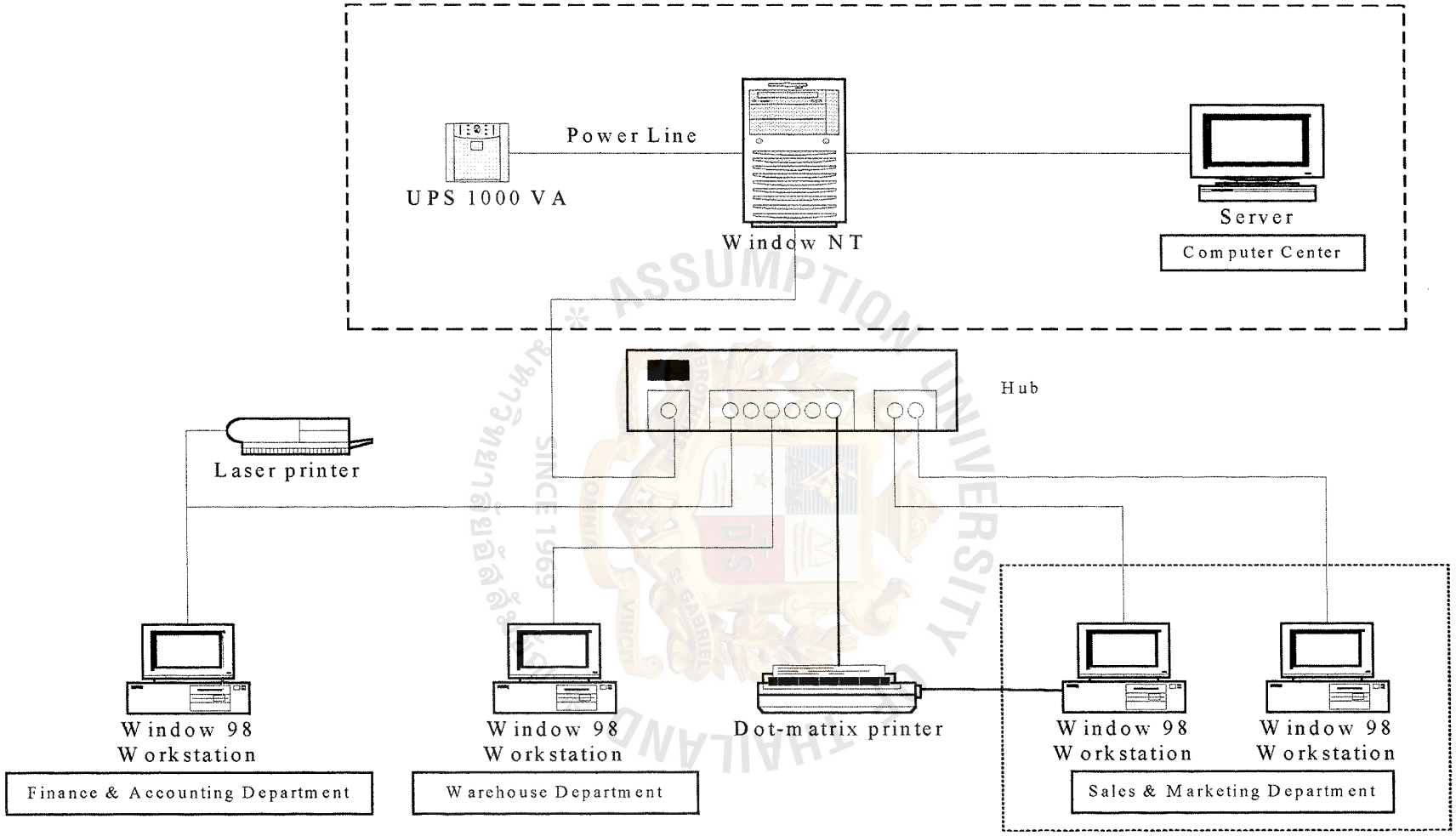

Figure 3.12. The Hardware Configuration of The Autopart Order Handling Information System.

3.5 Cost and Benefit Analysis

(1) Cost of Manual System

Table 3.5. Manual System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Costs					
Typewriter 1 unit @ 5,500	5,500	-	-	-	-
Electronic Typewriter 1 unit @ 9,000	9,000	-	-	-	-
Calculator 4 units @ 500	2,000	-	-	-	-
Total Fixed Cost	16,500	-	-	-	-
Operating Costs					
Salary Cost:					
Manager 1 person @ 15,000	180,000	198,000	217,800	239,580	263,538
Financial Staff 2 persons @ 7,500	180,000	198,000	217,800	239,580	263,538
Stock Officer 2 persons @ 8,000	192,000	211,200	232,320	255,552	281,107

Table 3.5. Manual System Cost Analysis, Baht (Continued).

Cost items	Years				
	1	2	3	4	5
Cashier 2 persons @ 7,000	168,000	184,800	203,280	223,608	245,969
Clerk 2 persons @ 7,000	168,000	184,800	203,280	223,608	245,969
Total Monthly Salary Cost	74,000	81,400	89,540	98,494	108,343
Total Annual Salary Cost	888,000	976,800	1,074,480	1,181,928	1,300,121
Office Supplies & Miscellaneous Cost:					
Paper for Annual	44,400	46,100	47,500	48,000	50,200
Stationary for Annual	9,600	9,750	9,550	9,800	9,930
Miscellaneous for Annual	24,000	24,300	23,840	24,170	24,222
Utility for Annual	48,000	48,250	48,100	47,500	48,500
Total Annual Office Supplies & Miscellaneous Cost	126,000	128,400	128,990	129,470	132,852
Total Annual Operating Cost	1,014,000	1,105,200	1,203,470	1,311,398	1,432,973

Table 3.5. Manual System Cost Analysis, Baht (Continued).

Cost items	Years				
	1	2	3	4	5
Total Manual System Cost	1,030,500	1,105,200	1,203,470	1,311,398	1,432,973

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

Year	Total Manual Cost	Accumulated Cost
1	1,030,500	1,030,500
2	1,105,200	2,135,700
3	1,203,470	3,339,170
4	1,311,398	4,650,568
5	1,432,973	6,083,541
Total	6,083,541	-

(2) Cost of Computerized System

Table 3.7. Computerized System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Costs					

Table 3.7. Computerized System Cost Analysis, Baht (Continued).

Cost items	Years				
	1	2	3	4	5
Hardware Costs:					
Computer Server Cost	30,000	30,000	30,000	30,000	30,000
4 workstation Cost	28,000	28,000	28,000	28,000	28,000
Printers	9,300	9,300	9,300	9,300	9,300
Other Equipment	900	900	900	900	900
Total Hardware Cost	68,200	68,200	68,200	68,200	68,200
Maintenance Costs:					
Maintenance Cost	-	-	13,000	13,000	13,000
Total Maintenance Cost	-	-	13,000	13,000	13,000
Software Costs:					
Software Cost	14,000	14,000	14,000	14,000	14,000
Network Cost	4,000	4,000	4,000	4,000	4,000
Total Software Cost	18,000	18,000	18,000	18,000	18,000
Implementation Costs:					
Training Cost	32,000	-	-	-	-
Installation Cost	18,000	-	-	-	-
Total Implementation Cost	50,000	-	-	-	-

Table 3.7. Computerized System Cost Analysis, Baht (Continued).

Cost items	Years				
	1	2	3	4	5
Office Equipment					
Costs:					
Calculator 2 units @ 500	1,000	-	-	-	-
Total Office Equipment Cost	1,000	-	-	-	-
Total Fixed Cost	137,200	86,200	99,200	99,200	99,200
Operating Costs					
Salary Cost:					
Manager 1 person @ 20,000	240,000	264,000	290,400	319,440	351,384
Financial Staff 1 person @ 8,500	102,000	112,200	123,420	135,762	149,338
Stock Officer 2 persons @ 8,000	192,000	211,200	232,320	255,552	281,107
Cashier 1 person @ 8,000	96,000	105,600	116,160	127,776	140,554
Clerk 2 persons @ 7,000	168,000	184,800	203,280	223,608	245,969

Table 3.7. Computerized System Cost Analysis, Baht (Continued).

Cost items	Years				
	1	2	3	4	5
Total Monthly Salary Cost	66,500	73,150	80,465	88,512	97,363
Total Annual Salary Cost	798,000	877,800	965,580	1,062,138	1,162,352
Office Supplies & Miscellaneous Cost:					
Paper for Annual	22,200	23,050	23,750	24,000	25,100
Stationary for Annual	7,500	7,750	7,530	7,910	7,800
Miscellaneous for Annual	14,400	14,700	14,000	14,550	14,690
Utility for Annual	60,000	60,300	60,180	59,950	60,800
Total Annual Office Supplies & Miscellaneous Cost	104,100	105,800	105,460	106,410	108,390
Total Annual Operating Cost	902,100	983,600	1,071,040	1,168,548	1,276,742
Total Computerized System Cost	818,800	793,700	807,840	874,694	933,483

Table 3.8. Five Years Accumulated Computerized System Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	1,039,300	1,039,300
2	1,069,800	2,109,100
3	1,170,240	3,279,340
4	1,267,748	4,549,088
5	1,375,942	5,925,030
Total	5,923,030	-

Table 3.9. The Comparison of System Cost, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,030,500	1,039,300
2	2,135,700	2,109,100
3	3,339,170	3,279,340
4	4,650,568	4,549,088
5	6,083,541	5,925,030

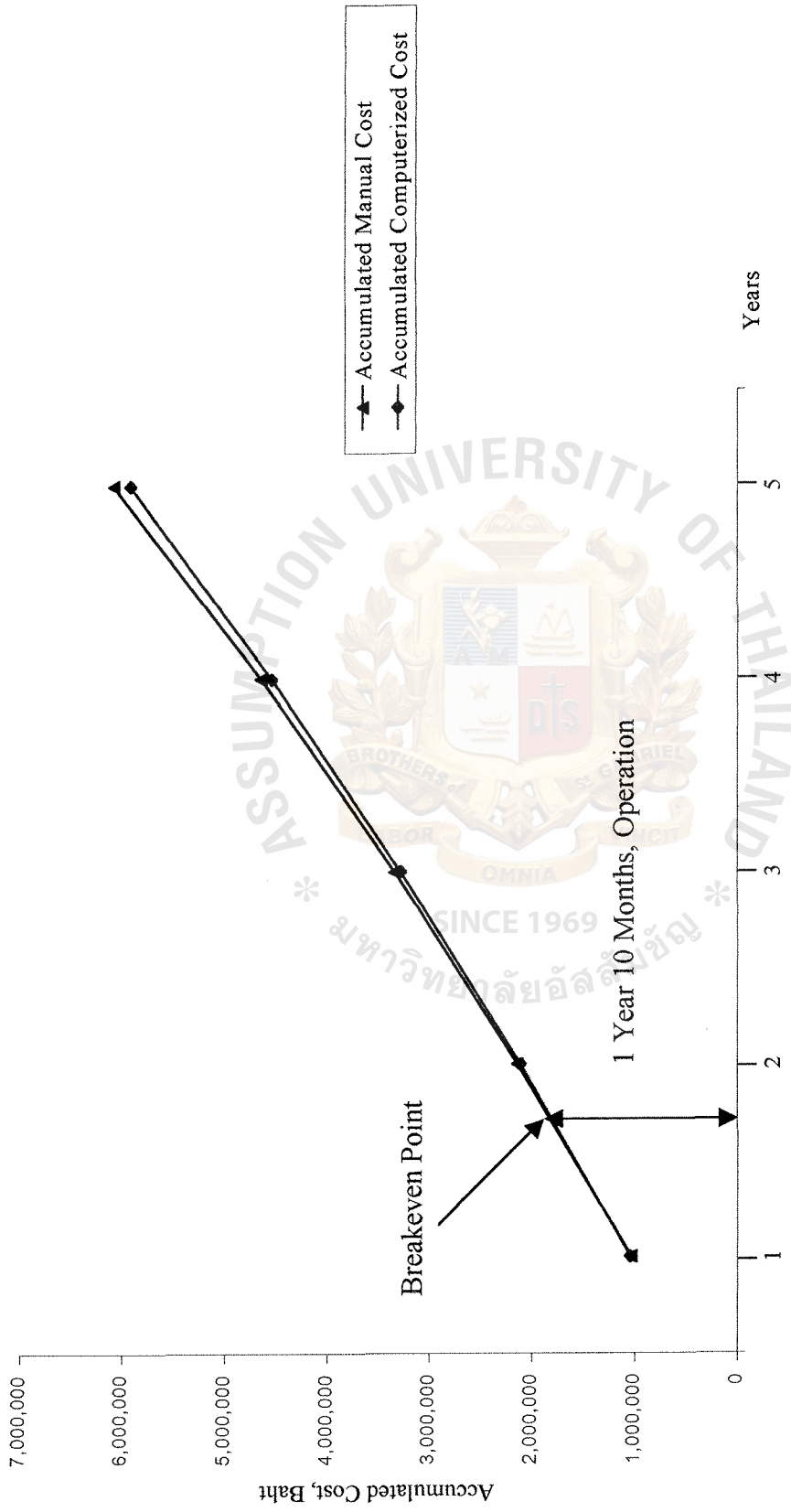

Figure 3.13. Breakeven Point Analysis.

Table 3.10. Estimated Costs for the Autopart Order Handling Information System of the LRP AUTOPART Ltd.,Part, Baht.

Cost Items	Description	Amount	Unit Price	Price
1. Development Cost				
	1.1 Personnel Cost:			
	System Analyst (250 hrs/person)	1	250	62,500
	System Designer (250 hrs/person)	1	250	62,500
	Programmer (120 hrs/person)	1	200	24,000
	Database Specialist (120 hrs/person)	1	150	18,000
	Telecommunications Specialist (100 hrs/person)	1	150	15,000
	Subtotal 1:			182,000
	1.2 New Hardware:			
	Computer Server Cost	1	200,000	200,000
	Workstation Cost	4	43,750	175,000
	Printers	2	25,000	50,000
	Other Equipments			17,500
	Subtotal 2:			442,500
	1.3 New Software:			
	Software Cost			125,000
	Network Cost			20,000
	Subtotal 3:			145,000
	Total Development Cost			769,500
2. Operating Cost				
	2.1 Personnel Cost:			
	Manager	1	240,000	240,000
	Clerks	2	558,000	558,000

Table 3.10. Estimated Costs for the Front Office Information System of the Carlton Pattaya Hotel, Baht (Continued).

Cost Items	Description	Amount	Unit Price	Price
	Total Operating Cost			798,000
	Total Projected Annual Cost			1,567,500

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

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-1,567,500	-	-	-	-	-
Operation & maintenance cost	-	-	-	-10,000	-10,000	-10,000
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs (adjusted to present value)	-1,567,500	-	-	-7,120	-6,360	-5,670
Cumulative time-adjusted Costs over lifetime	-1,567,500	-1,567,500	-1,567,500	-1,574,620	-1,580,980	-1,586,650
Benefits derived from operation of new system	-	2,300,000	3,000,000	3,500,000	4,000,000	4,200,000
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted benefits (adjusted to present value)	-	1,833,100	2,136,000	2,226,000	2,544,000	2,381,400

Table 3.11. Payback Analysis for the Proposed System, Baht (Continued).

Cost Items	Years					
	0	1	2	3	4	5
Cumulative time-adjusted benefits over lifetime	-	1,833,100	3,969,100	6,195,100	8,739,100	11,120,500
Cumulative lifetime time-adjusted cost + benefit	-1,567,500	265,600	2,401,600	4,620,480	7,158,120	9,533,850

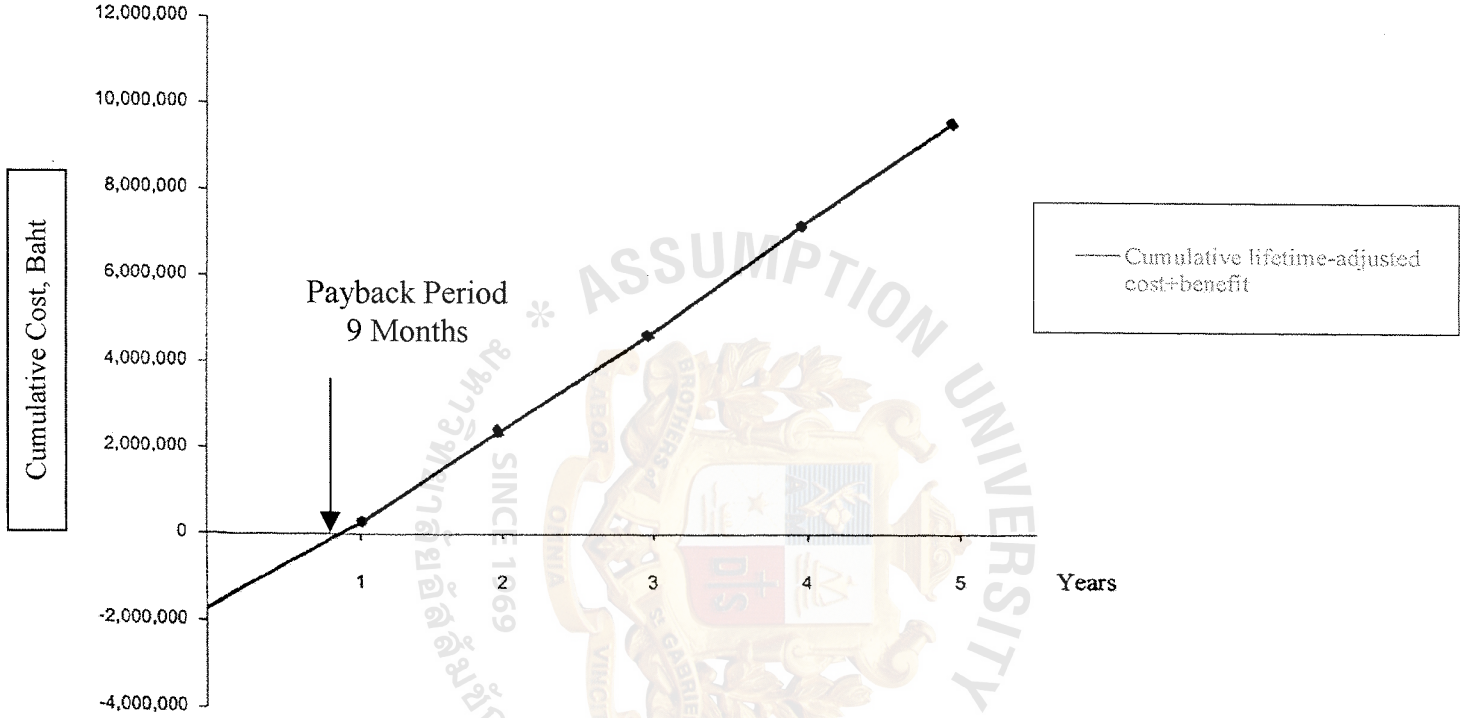

Figure 3.14. Payback Period Analysis.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

Implementation includes all the activities that related to preparing the system for end users.

The following activities are carried out in implementation phase:

(1) Site preparation

(2) Hardware installation

(3) Software installation

(4) User training

(5) Data conversion (Input initial data into system)

(6) Parallel run

(7) System review

(8) Live run

(9) Post implementation review

Site Preparation

Site preparation involves with installation of electrical and network equipment. Electrical installation includes the electrical wiring and placement of outlets, if they are not already in place. Then the UPS is installed and tested. Network installation includes the network wiring and placement of outlets. These activities takes 3 days to completed.

Hardware Installation

After the site preparation is completed, all the hardware will be put in place and tested. This can be done in a few hour.

Software Installation

The installation of the software includes installing operation system, Windows NT server and Windows 98 for clients, Microsoft SQL server, Visual Basic, and Autopart order handling information system on the server. The network system is tested to ensure that the client workstations can access programs and database on the server. Then users and security scheme are created and set up in the system. This takes 3 days.

User Training

User training can be done prior to or in parallel with the three activities above. The personnel who will be associated with or affected by the system, must know in detail what their role will be, how they can use the system, and what the system will or will not do. Both systems operators and users need training.

(1) System operators are personnel who are responsible for keeping the equipment's running as well as for providing the necessary support service. Their training must ensure that they are able to handle all possible operations. Those personnels are such as EDP manager or computer operator. The training needed for system operators are Window NT, Windows 98 , Microsoft SQL server Autopart order handling information system.

(2) Users are personnels who will be using the system in assistance to their work. User training involves equipment usage and the how to operate the system implemented. The operation of system training emphasises on the data-handling activities and procedures. This includes adding data or new

transaction, editing data, formulating enquiries, deleting data and producing report in all the modules in the system.

Data Conversion or Input Initial Data into the System

If there is an existing system in operation, all the data fields in files or tables must be identified. Then they must be compared with the data structure of the new system so that the correct data are transferred into the new system. For the data fields that do not exist in the existing system and required by the new system, it is the responsible of users to define the values of those data and input them into the system. If the amount of data in the existing system are not a lot. The data can be manually input to the new system. This method is highly recommended as to get users familiar with the system and validation of data is properly done through the entry procedure of the new system. But in the case where there are too much to data to handle, conversion program will be developed to get data from the existing system and transfer to the new system.

Test Run (Parallel Run)

When all the data are entered into the system and everything is in place, the system is ready to run. At he beginning, the system should be operate in parallel with the existing system. Since users are not yet familiar with the new system and unexpected problem could occurs. This step should go on for around 2 weeks or until users are confident with the new system.

System Review

System review is carried out throughout the test run of the new system. The system review is the process conducted by user and system analysis to determine how well the system is working, how it has been accepted and whether the adjustments are needed. If any unexpected error occurs, they can be correct before the system goes live.

Live Run

Finally, after the revision of the system and all the errors have been corrected, the system is now ready to turn over to the users and go on live.

Post Implementation Review

Post implementation review is a critical examination of the system after it has been put into production. The evaluation is conducted three month of the live run of the system. The post implementation reviews focus on the following:

(1) A comparison of the system's actual performance and the anticipated performance objectives.

(2) Errors and unexpected problems that occurred during the production.

(3) Actual cost of running the system in comparison of the anticipated cost

4.2 Test Plan

A complete schedule of testing involves the following:

(1) Test Database

Using Live Test Data

After a system is partially constructed, programmers or analysts often ask users to key in a set of data from their normal activities.

Creating Test Data

Data testing can be done by creating an extensive set of test data to cover all interconnecting program testing.

(2) Test New Software

Unit Testing

Unit testing focuses on the modules, independently of one another, to locate errors. To detect errors in coding and logic that are contained within that module alone.

System Testing

System testing is carried out by running the whole system to make sure that the whole system programs run completely.

Performance Time Testing

The length of time system used by the system to process transaction data. All share common data and files when users process at the same time.

(3) Test Network

To test all the equipment of the systems that is able to be link together, for example; printer.

(4) Backup and Restart Testing

Backup and restarting testing is performed to prevent any file from being destroyed by accident and to make sure that the system can be restarted in case of a disaster.

4.3 Conversion

Conversion includes the creation of all required master and transaction files, establishing backup copies of the master file and databases and converting tested program to operating status.

Data conversion must be carefully planned and do cross checked to see that it is done right. It would be step by step to convert the system. We should let the staff to be

familiar with the computer system and train them, too. We will use the parallel system that the new system is operated side by side with the old one to ensure that data will not be lost if a problem arise. We can test the conversion or completeness of the information, report of the new system on the real world and compare with the old system.

Parallel system is safety and ensures that the work will not be failure. But it wastes the times to finish the same work. And the cost is higher because we must duplicate works, produce the redundant reports. We must prepare the budget to serve this point.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

(a) With system cost comparison between the existing cumulative system cost and the proposed cumulative system cost. It can be determined that the cumulative cost of the proposed system is higher than the cumulative cost of the existing system in the first year due to high investment cost (fixed cost) of the proposed system such as hardware cost , software cost, and others. On the contrary, after the first year, the cumulative cost of the proposed system is lower than the cumulative cost of the existing system due to the lower operating cost of the proposed system such as peopleware cost and office supplies & miscellaneous cost. From breakeven analysis, breakeven is at year 1.9, the cost of the proposed new system intersect the costs of the old system. At this breakeven point, the proposed new system begins to generate a positive monetary return in comparison with the old system. From now on, the amount invested in the new system will be offset by the savings the new system allows.

(b) Degree of Achievement of the Proposed system compared with the Existing system. Table5.1 shows the time spent comparing between the existing system and the proposed system. It shows that the existing system time spent for the all processes which spend more than the proposed system. This can be explained that the proposed system is more efficient and effective in term of investment time than the existing system.

Table 5.1. The Degree of Achievement of Proposed System Compared with the Existing System.

Process	Existing system	Proposed system
1. Check customer account	10-45 minutes	30 seconds
2. Decision making of compatible spare parts	30-60 minutes	30 seconds
3. Check out of stock & create new purchase order	2-4 hours	1 minute
3. Compute amount of purchasing for each customer account	4-6 hours	2 minutes

Explanation of the degree of achievement of the proposed system as follows:

(1) Check customer account

When customer orders products, clerks have to check the name of the company or business firstly in the book to know that the company has the contract with us already. This process wastes time because they have to searching for it by alphabet and there are a lot of customers in the books. When clerks find the name of business, then customer can buy required products. Therefore, the process for buying and selling must wait for this process before.

(2) Decision making of compatible spare parts

When customer orders some products that are out of stock, clerks will check compatible products that can be replaced. But, in this process clerks have to check in the "Compatible spare parts books" by searching for each

of types, each of models and each of brands. By using computer, when customers order some products that are out of stock, the compatible spare parts that can be used will be shown in the screen immediately.

(3) Check the products (out of stock) & create new purchase order

In the old system, clerks have to check the products that are out of stock by checking the products in each shelves. In this process, it wastes a lot of time and errorness always occur. However, in the new system, when the products are sold, the number of these products will be update automatically. Moreover, if the products are out of stock, the system will show the name of the products on the screen and create new purchase ordering to supplier automatically.

(4) Compute amount of purchasing for all customer accounts

Firstly, clerks have to gather all bills for each customer accounts, and then calculate total amount of purchasing. Finally, clerks write down the total amount for each account on "Invoice". This process will be performed monthly. It's so faster in the computerized system, the total amount for each account can be printed immediately and quickly.

The area under study is an Autopart Order Handling Information System. Many problems are found in the existing system. To solve these problems, the existing system is replaced by the proposed computerized systems.

In the existing system, the main tasks are manual system and performed by staff. Those tasks include with customer order, purchasing order to supplier, stock checking and concerning tasks. There are many redundancies process occurred and consumed the

times that will effect to the other routine jobs. The workloads comparing with staffs are inadequate.

The proposed system can provide the more efficient process for the staff to perform their work. It reduces the time that is wasted from the manual system. At the same time, staffs can develop their work for the better performance. The proposed system is built to support in the way of Local Area Network so the share resources can be used and provide the expansion of system in the future.

At present, the computer information system is used as the strategic way of doing business so the success in business will come together with the success in the computer information system.

5.2 Recommendations

The proposed system is an Autopart Order Handling Information System of LRP AUTOPART Ltd., Part. It is possible to apply these concepts to use in an Order Handling Information System of other businesses. However, it needs some modifications to fit the requirements of each system because each system has some different processes and requirements.

The system developed in this project still need a lot of development, revision and modification to meet the future requirement. The ongoing development has to be occurred for reserving changing from the management policy, procedures, controls, operating system, and future trend.

The proposed system environment is LAN network that provides the facilities to expand the network connection and will serve the need of future technology and expanding the business. It can increase the efficiency and effectiveness of the system in the future.

Moreover, the firm can extent the business to the Internet by implementing e-commerce technology. This technology will increase sales potential for the firm and also reduce some costs especially when it connects with the inside firm's computer system.

APPENDIX A

INTERFACE DESIGN

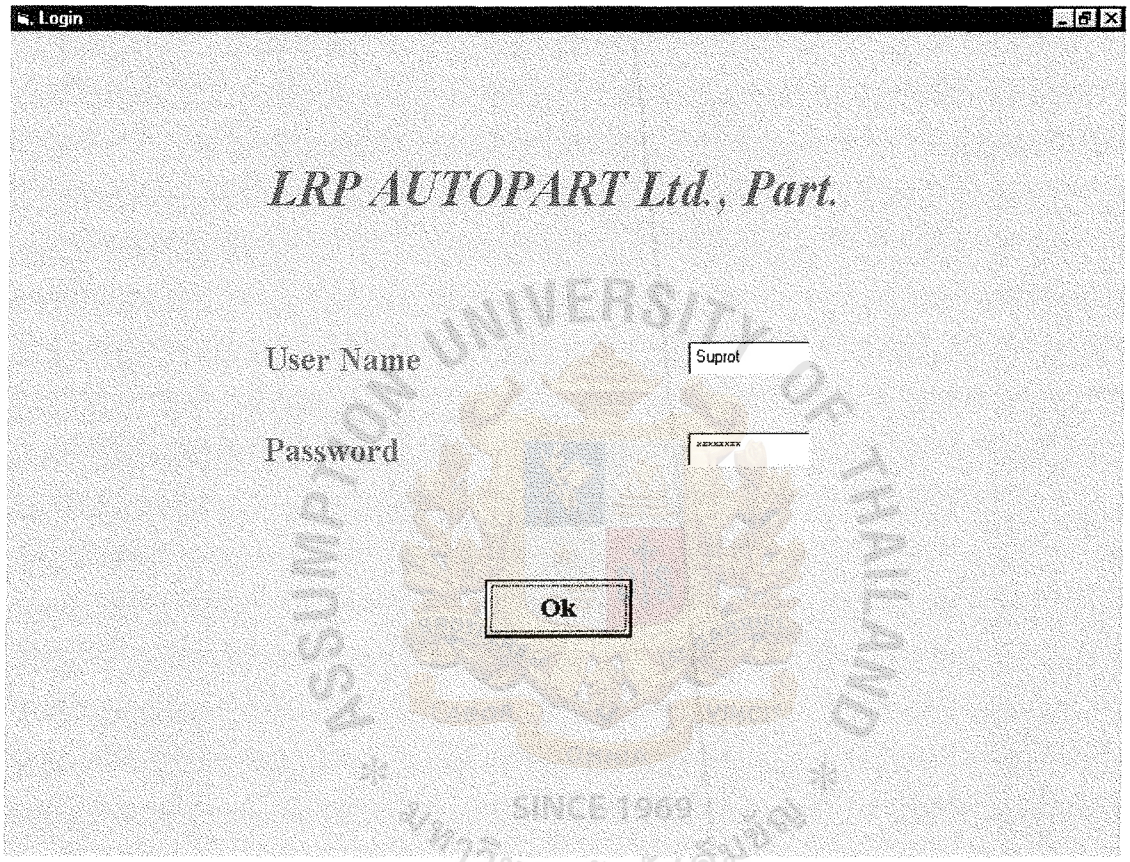

Figure A.1. Log in Screen.

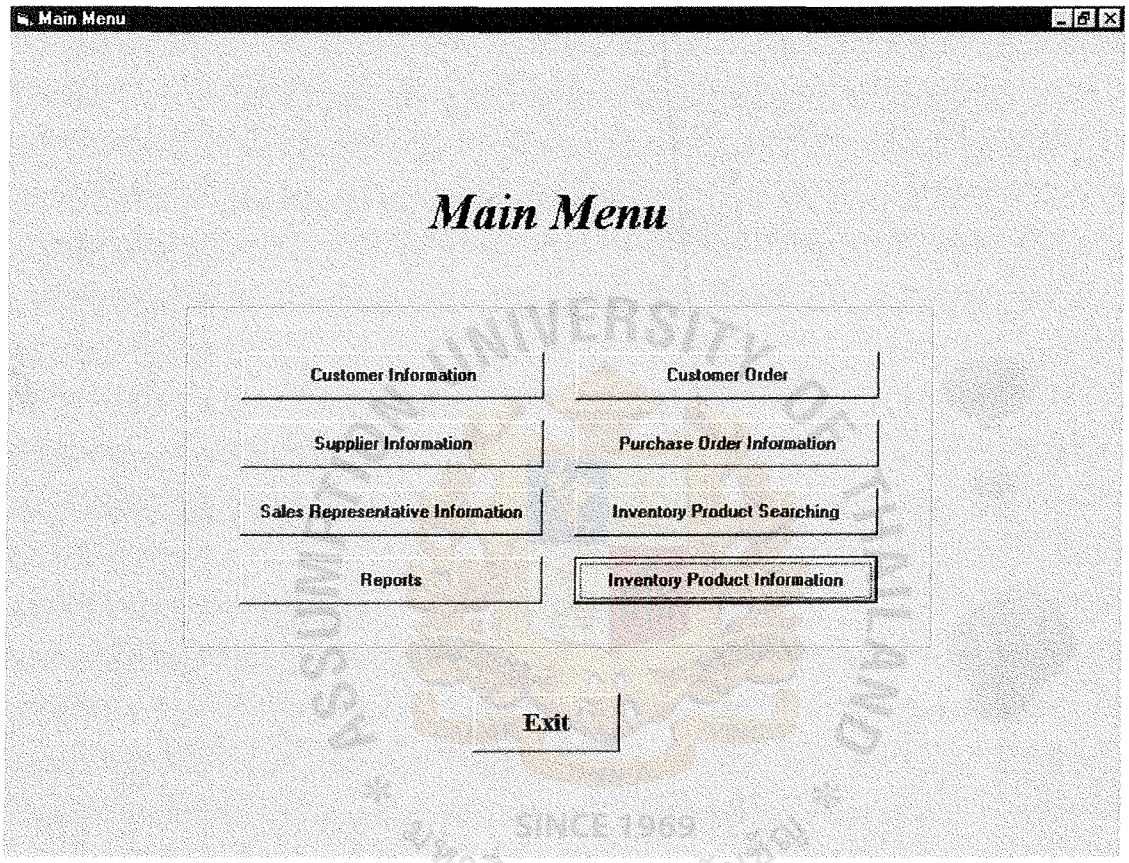

Figure A.2. Main Menu Screen.

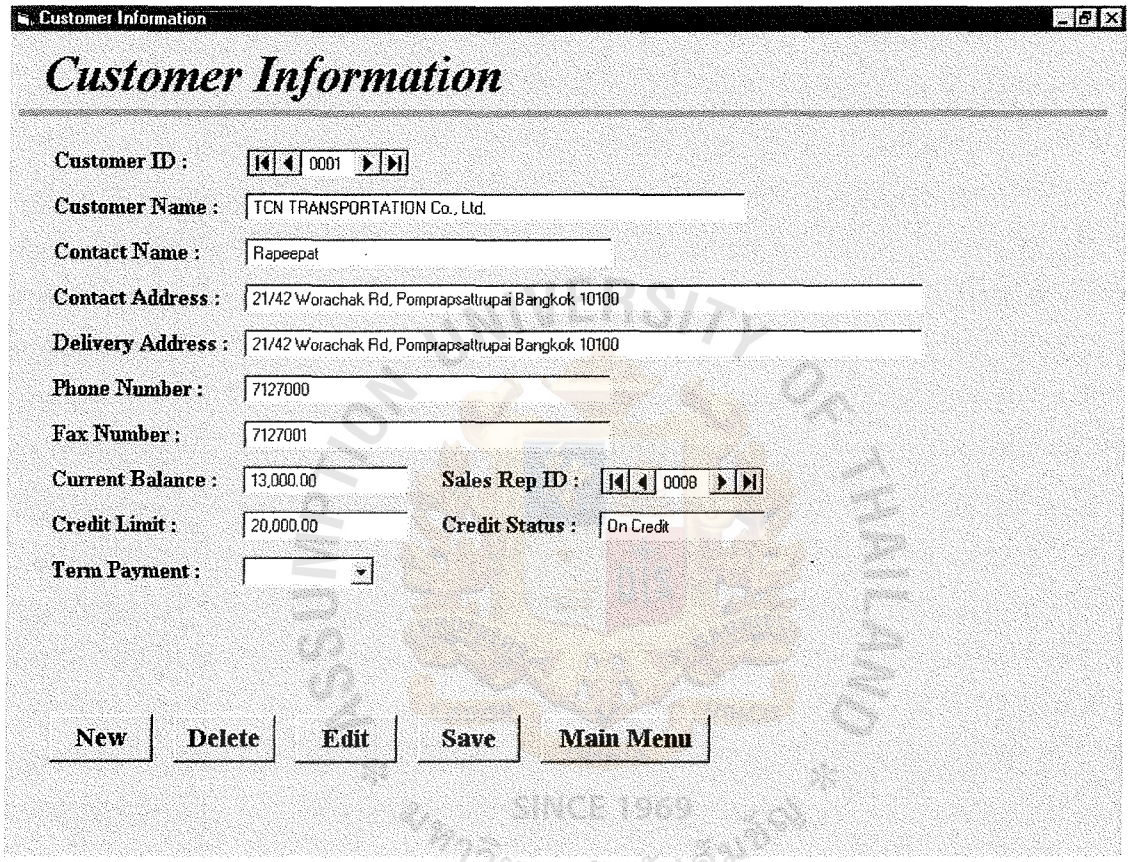

Figure A.3. Customer Information Screen.

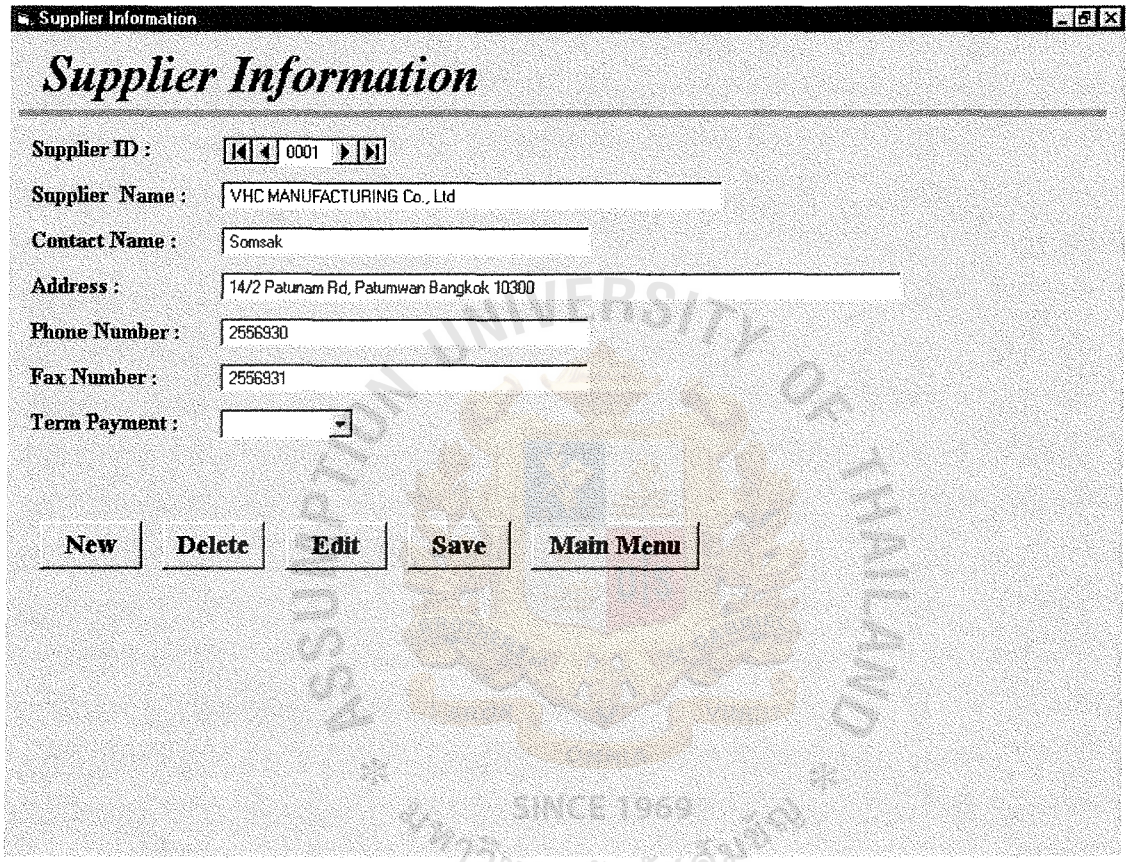

Figure A.4. Supplier Information Screen.

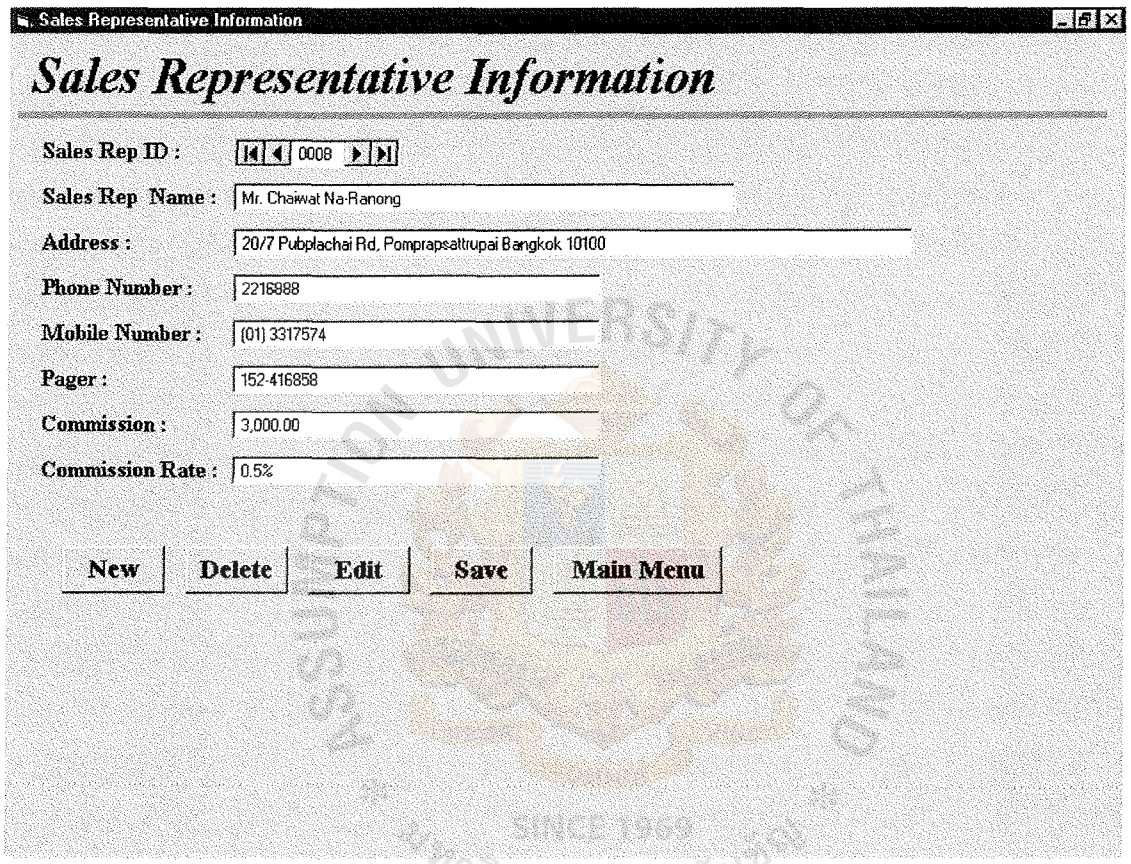

Figure A.5. Sales Representative Screen.

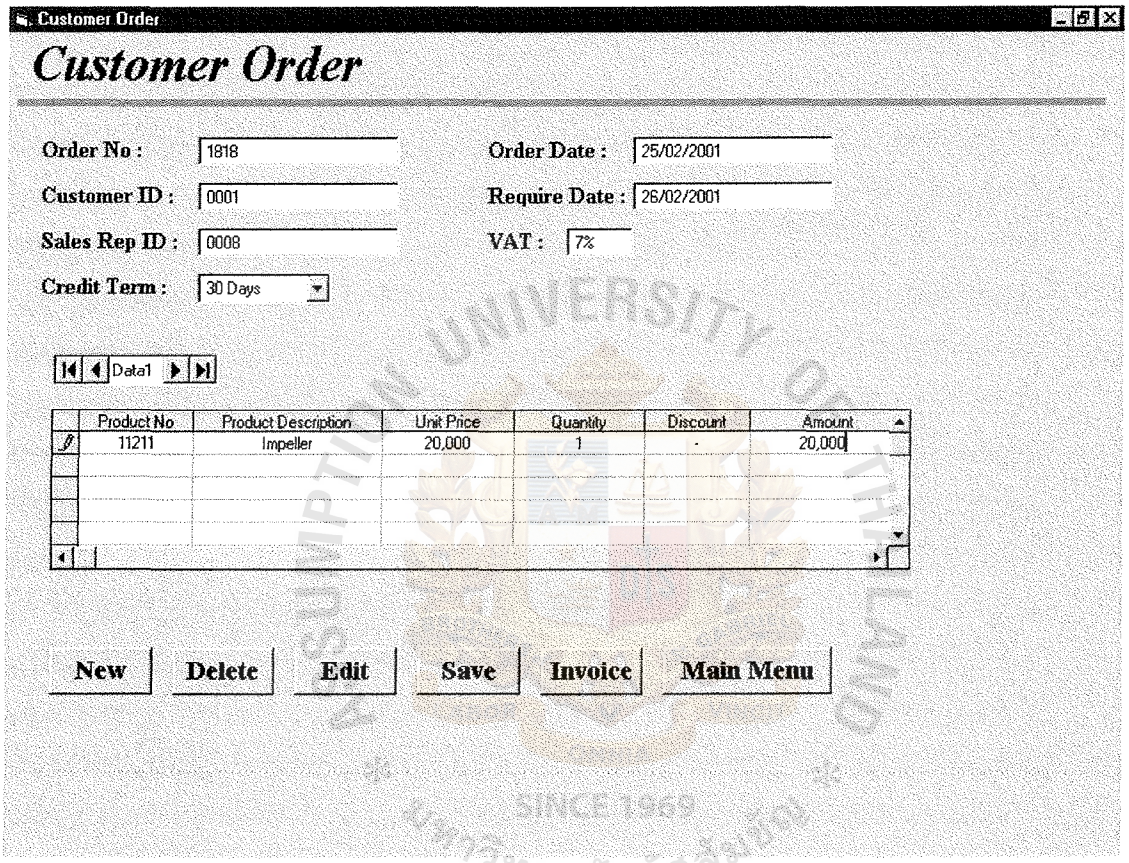

Figure A.6. Customer Order Screen.

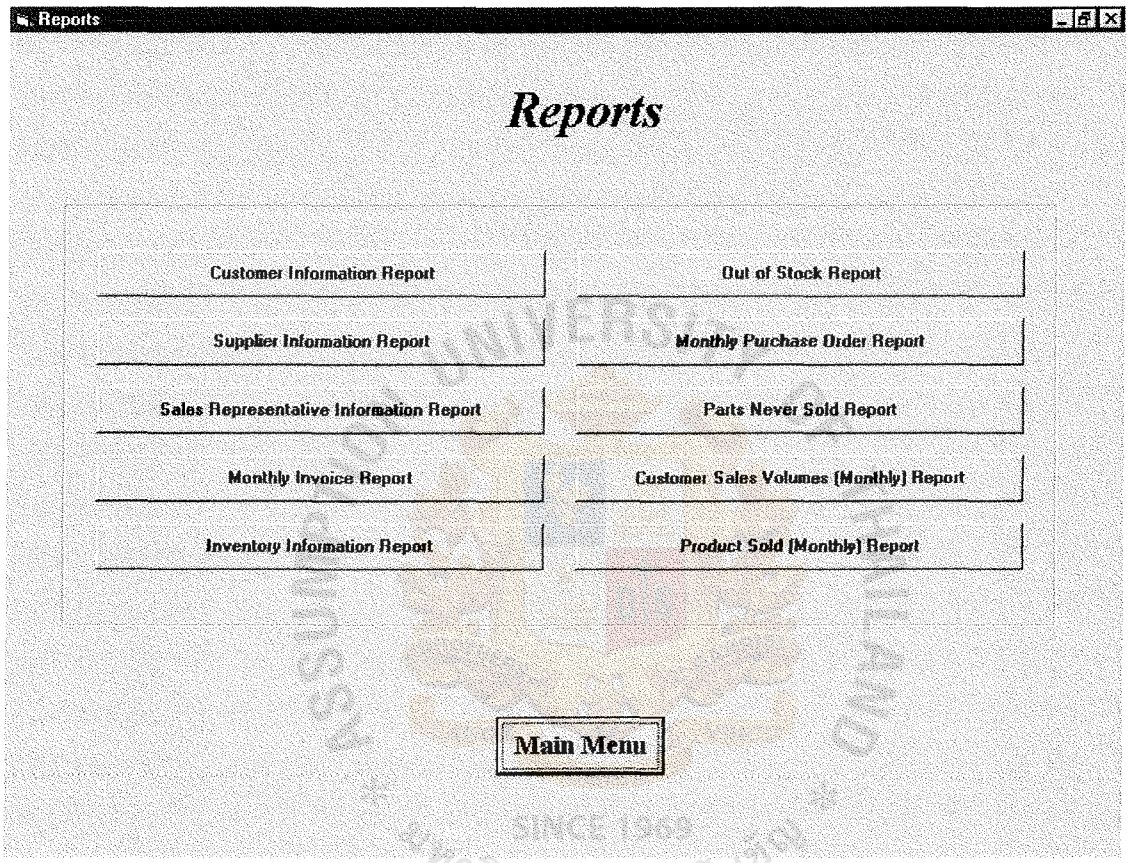

Figure A.7. Report Screen.

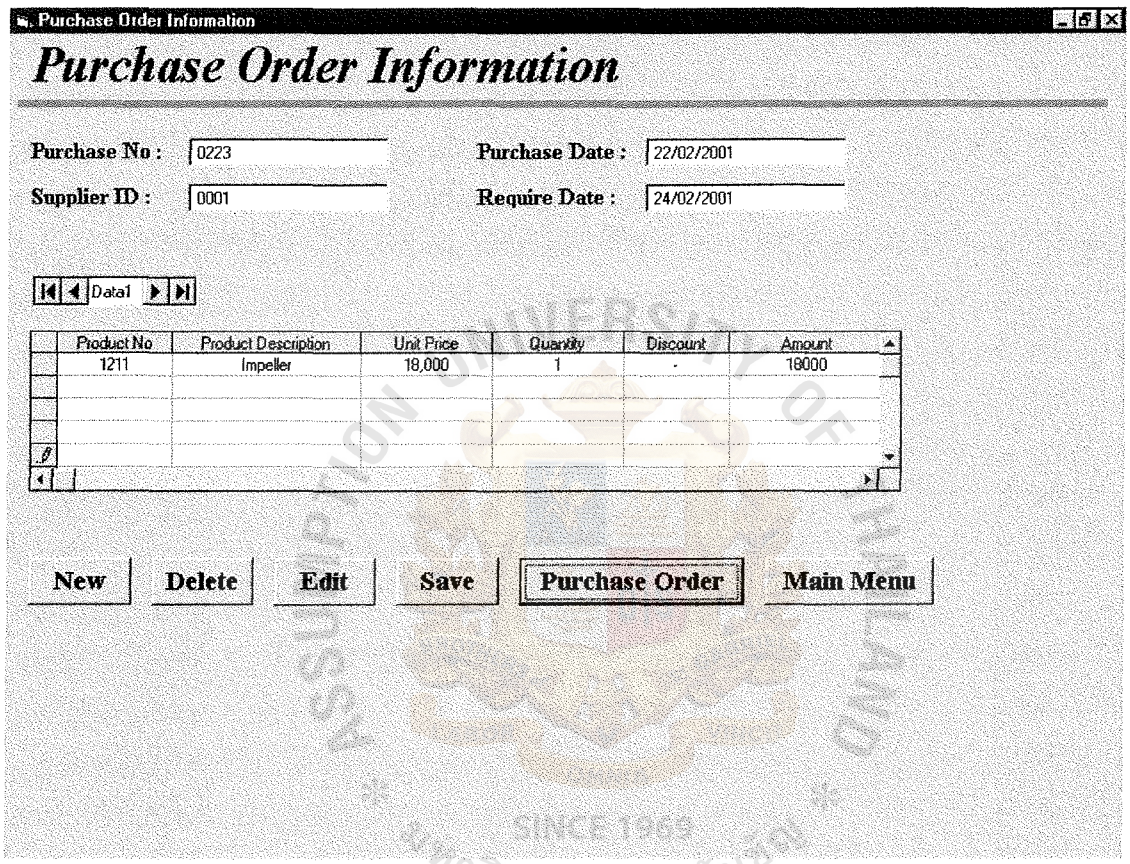

Figure A.8. Purchase Order Screen.

Figure A.9. Inventory Product Searching Screen.

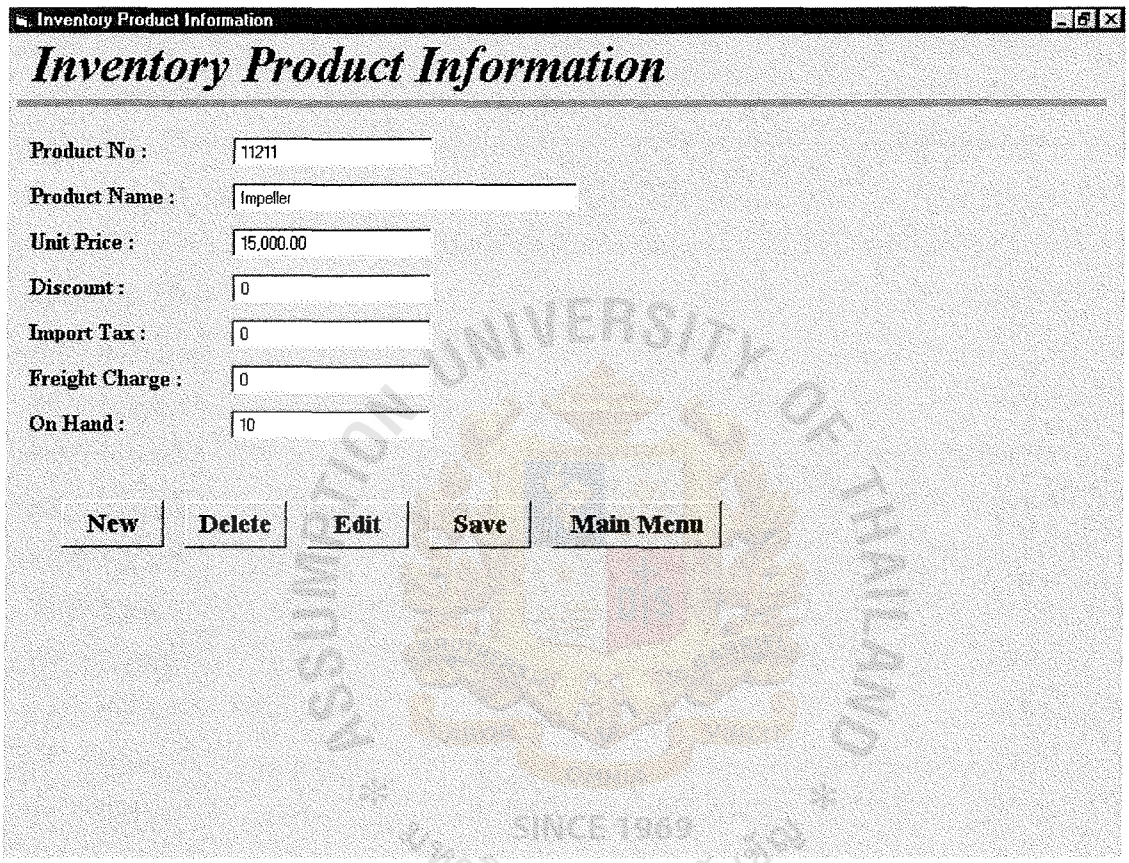

Figure A.10. Inventory Product Screen.

APPENDIX B

REPORT DESIGN

LRP AUTOPART Ltd.,Part.

CUSTOMER SALES VOLUMES (MONTHLY)

PAGE 1
DATE 28/02/2001

CUST.	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
0058	5,000	5,457	15,080	8,666	9,225	24,555	8,887	33,335	4,222	6,458	7,785	22,484	151,555
0788	555	4,698	9,999	8,555	12,114	25,555	9,654	5,555	5,987	7,888	9,852	5,223	96,635
2235	8,888	15,555	21,333	9,696	6,565	22,332	35,125	8,985	17,887	7,888	8,235	8,888	171,377
5855	4,080	x	x	x	x	x	x	x	x	x	x	x	x
9552	9,222	x	x	x	x	x	x	x	x	x	x	x	x
6556	15,555	x	x	x	x	x	x	x	x	x	x	x	x
5215	5,589	x	x	x	x	x	x	x	x	x	x	x	x
TOTAL	48,889	x	x	x	x	x	x	X	x	x	x	x	x

Figure B.1. Customer Sales Volumes (Monthly) Report.

LRP AUTOPART Ltd.,Part.

CUSTOMER INFORMATION REPORT

PAGE 1
DATE 28/02 2001

ID	CUSTOMER NAME	CONTACT NAME	CONTACT ADDRESS	PHONE	FAX	TERM PAYMENT
0001	TCN TRANSPORTATION Co.,Ltd	Mr. Sampan	21/42 Worachak Rd., Pomprap, Bangkok	027127000	027127001	Credit
0002	Macer (Thailand) Co.,Ltd	Mr. Narit	449 Ratchadapisek Rd., Bangkok	025136111	02 5136633	Cash
0003	Amex (Thailand) Co.,Ltd.	Mr. Sorayut	56/1 New petchaburi Rd., Bangkok	022285858	022214455	Credit
0004	x	x	x	x	x	x
0005	x	x	x	x	x	x

Figure B.2. Customer Report.

LRP AUTOPART Ltd.,Part.

PRODUCTS SOLD (MONTHLY)

PAGE 1
DATE 28/02/2001

PRODUCT NO	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
00220	5,555	5,600	9,574	10,055	24,555	17,878	10,986	21,445	25,447	21,114	4,125	5,225	161,559
22558	6,854	6,852	10,471	9,995	10,111	25,241	12,221	13,333	24,445	25,454	24,747	6,524	176,248
01212	5,258	9,258	25,147	4,147	2,588	35,552	14,444	6,587	9,858	7,455	8,889	6,585	135,768
01112	6,852	x	x	x	x	x	x	x	x	x	x	x	x
05885	10,147	x	x	x	x	x	x	x	x	x	x	x	x
02233	25,452	x	x	x	x	x	x	x	x	x	x	x	x
00222	25,255	x	x	x	x	x	x	x	x	x	x	x	x
TOTAL	95,340	x	x	x	x	x	x	x	x	x	x	x	x

Figure B.3. Product Sold (Monthly) Report.

LRP AUTOPART Ltd.,Part.

SALES REPRESENTATIVE INFORMATION REPORT

PAGE 1
DATE 28/02/2001

ID	NAME	ADDRESS	PHONE	MOBILE	PAGER	COMMISSION	COMMISSION RATE
0001	Mr. Surachai	21/444 Sampanthawong Rd, Bangkok	022234944	018889898	-	4,000.00	0.5%
0002	Mr. Chaichan	11/58 Pubplachai Rd, Pomplab, Bangkok	022215555	013449578	-	8,659.00	0.5%
0003	Mr. Wutthidaj	55 Bamrungmeaung, Bangkok	022234545	017808777	-	6,587.00	0.5%
0004	x	x	x	x	x	x	x
0005	x	x	x	x	x	x	x
0006	x	x	x	x	x	x	x

Figure B.4. Sales Representative Report.

LRP AUTOPART Ltd.,Part.

MONTHLY INVOICE REPORT

PAGE 1
DATE 28/02/2001

INVOICE NO.	INVOICE DATE	SALES ORDER NO	CUSTOMER NAME	SALES REPRESENTATIVE	TERM PAYMENT	TOTAL SALES AMOUNT
128554	15/02/2001	1651	Macer (Thailand) Co.,Ltd	Mr. Chaiwat	Cash	20,000.00
128555	15/02/2001	5555	Tech Pacific Co.,Ltd	Mr. Somchai	Cash	7,580.00
128556	16/02/2001	8750	Siam Sintech Co.,Ltd	Mr. Somchai	Credit	15,500.00
187895	16/02/2001	9958	Siam Sintech Co.,Ltd	Mr. Somchai	Credit	30,500.00
199956	17/02/2001	9959	Thai Vasco Co.,Ltd	Mr. Kanit	Credit	50,000.00

Figure B.5. Monthly Invoice Report.

LRP AUTOPART Ltd.,Part.

INVOICE

PAGE 1
DATE 02/28/2001

CUSTOMER ID 0001
NAME TCN TRANSPORTATION Co.,Ltd
ADDRESS 21/42 Worachak Rd, Pomprap, Bangkok

ORDER NO 1818
INVOICE NO 7878

NO	NAME	UNIT PRICE	QTY	DISCOUNT	AMOUNT
11211	IMPELLER	20,000.00	1	-	20,000.00

TOTEL NET	20,000.00
TAX (7%)	1,400,00
TOTAL AMOUNT	21,400.00

Figure B.6. Invoice.

LRP AUTOPART Ltd.,Part.

MONTHLY PURCHASE ORDER REPORT

PAGE 1
DATE 28/02/2001

PURCHASE NO	PURCHASE DATE	SUPPLIER NAME	TERM PAYMENT	TOTAL PURCHASE AMOUNT
025558	02/02/2001	Sri Thai Co., Ltd.	30 Days	5,000.00
033345	03/02/2001	Datsan Co.,Ltd.	30 Days	8,897.00
055879	10/02/2001	American Car Co.,Ltd.	30 Days	25,000.00
088877	x	x	x	x
056212	x	x	x	x

Figure B.7. Monthly Purchase Order Report.

LRP AUTOPART Ltd.,Part.

INVENTORY INFORMATION REPORT

PAGE 1
DATE 28/02/2001

NO	NAME	UNIT PRICE	DISCOUNT	IMPORT_TAX	FREIGHT-CHARGE	ON HAND
11211	Impeller	20,000.00	-	-	-	30
11852	Connecting Rod	12,200.00	-	-	-	15
11788	Front-Seal	5,650.00	-	-	-	50
25852	x	x	x	x	x	x
11233	x	x	x	x	x	x

Figure B.8. Inventory Report.

LRP AUTOPART Ltd., Part PAGE 1

OUT OF STOCK REPORT

NO	NAME	UNIT PRICE	REQUESTED UNIT	TOTAL AMOUNT
11200	Connecting Rod	2,500.00	10	25,000.00
DATE	28 / 02 / 2001		AUTHORIZED	SUPROT L.

Figure B.9. Out of Stock Report.

LRP AUTOPART Ltd.,Part.

PURCHASE ORDER

PAGE 1
DATE 12/02/2001

SUPPLIER ID 0003
NAME Sri Wan Co.,Ltd
ADDRESS 558 Pubplachai Rd, Pomplab, Bangkok

PURCHASE NO 02559
PURCHASE DATE 12/02/2001
REQUIRE DATE 13/02/2001

NO	NAME	UNIT PRICE	QTY	DISCOUNT	AMOUNT
00300	Back-Seal	5,000.00	1	-	5,000.00

TOTEL NET	5,000.00
TAX	350.00
TOTAL AMOUNT	5,350.00

Figure B.10. Purchase Order.

LRP AUTOPART Ltd.,Part.

PARTS NEVER SOLD REPORT

PAGE 1
DATE 28/02/2001

PRODUCT NO	PRODUCT NAME	UNIT PRICE	ON HAND	TOTAL AMOUNT
00222	Back-Seal	5,000.00	10	50,000.00
02585	Cyclinder	12,000.00	5	60,000.00
01158	Connecting Rod	15,000.00	2	30,000.00
01335	x	x	x	x
11258	x	x	x	x

Figure B.11. Part Never Sold Report.

LRP AUTOPART Ltd.,Part.

SUPPLIER INFORMATION REPORT

PAGE 1
DATE 28/02/2001

ID	SUPPLIER NAME	CONTACT NAME	ADDRESS	PHONE	FAX	TERM PAYMENT
0001	VHC MANUFACTURING Co.,Ltd	Mr. Somsak	121/68 Moo6 Sukhapiban Rd., Bangkok	029448867	029478980	Cash
0002	Compex (Thailand) Co.,Ltd	Mr. Surasak	388 Sukhumvit 101,Bangna, Bangkok	025592737	025303932	Credit
0003	Sri Wan Co.,Ltd.	Mr. Chaisit	558 Pubplachai Rd., Pomplab, Bangkok	025559494	022216868	Credit
0004	x	x	x	x	x	x
0005	x	x	x	x	x	x

Figure B.12. Supplier Report.

APPENDIX C

PROCESS SPECIFICATION

PROCESS SPECIFICATION

Table C.1. Process Specification of Process 4.2.1.

Items	Description
Process Name:	Verify Shipment Details
Data In:	Received Check
Data Out:	Match arrival
Process:	(1) Get order details and shipment arrival confirm (2) Match shipment arrival compared with order details (3) Check product items to match with shipment arrival (4) Send verification to Process 4.2.2
Attachment:	(1) Process 4.1 (2) Process 4.2.2

Table C.2. Process Specification of Process 4.2.2.

Items	Description
Process Name:	Record Shipment Details
Data In:	Match arrival Partial shipment record confirmation

Table C.2. Process Specification of Process 4.2.2 (Continued).

Items	Description
Data Out:	Update Stock Received details Incomplete received Request quality check
Process:	(1) Record the update stock details into Product satabase (2) Record the received details into Receive database (3) If product shipment arrival is less than purchase record then send incomplete received into Process 4.2.3 and get partial shipment record confirmation back (4) If product shipment arrival is equal purchase record then request quality check to Process 4.3
Attachment:	(1) Process 4.2.1 (2) Process 4.2.3 (3) Process 4.3 (4) Data Store D6 (5) data Store D7

Table C.3. Process Specification of Process 4.2.3.

Items	Description
Process Name:	Partial Shipment Record
Data In:	Incomplete received
Data Out:	Partial shipment record confirmation Partial received record
Process:	(1) Get inform incomplete received with shipment arrival (2) Send partial shipment record confirmation to Process 4.2.2 (2) Record partial received record into Receive database and prepare quality check
Attachment:	(1) Process 4.2.2 (2) Data Store D7

APPENDIX D

DATA DICTIONARY

DATA DICTIONARY

Table D.1. Data Dictionary of Sales Representative Database.

Field Names	Meaning
SalesRepId	The identification number of sales representative
Name	The first name and surname of sales representative
Address	The address of sales representative
PhoneNo	The phone number of sales representative
MobileNo	The mobile phone number of sales representative
Pager	The pager number of sales representative
Commission	The commission amount that sales representative earns each month
CommissionRate	The commission rate of sales representative

Table D.2. Data Dictionary of Customer Database.

Field Names	Meaning
CustomerId	The identification number of customer
CustomerName	The name of customer
ContactName	The name of person for contacting
ContactAddress	The address of customer for contacting
DeliveryAddress	The address that customer need to delivery order
PhoneNo	The phone number of customer
FaxNo	The fax number of customer
TermPayment	Payment condition for customer
CreditLimit	Limit credit for customer depend on customer history
CurrentBalance	The amount of credit that customer holds at present
CreditStatus	Status of credit for customer

Table D.3. Data Dictionary of Invoice Database.

Field Names	Meaning
InvoiceNo	The invoice number that issue when delivery product

Table D.3. Data Dictionary of Invoice Database (Continued).

Field Names	Meaning
InvoiceDate	The date that invoice has been issued

Table D.4. Data Dictionary of Order History Database.

Field Names	Meaning
OrderNo	The identification number for order history
OrderDate	The date that receives order from customer
RequireDate	The date is required by customer for receiving the shipment
Vat	The tax that added in calculation for sale

Table D.5. Data Dictionary of Order Details Database.

Field Name	Meaning
SalePrice	The selling price of each product sold in each order
Qty	The quantities of each product sold in each order
SaleDiscount	The discount of each product sold in each order

Table D.6. Data Dictionary of Product Database.

Field Names	Meaning
ProductNo	The identification number for product
ProductName	The name of product
UnitPrice	The cost of product
Discount	The discount of product
ImportTax	The import tax that need to pay to custom when shipment arrival
FreightCharge	The freight charge occurs when orders product outside country

Table D.6. Data Dictionary of Product Database (Continued).

Field Names	Meaning
OnHand	The amount of each product remain in stock

Table D.7. Data Dictionary of Receive Database.

Field Names	Meaning
ReceiveStatus	The received status of product on order
ReceiveDate	The date that collect when product received
ReceiveMethod	The method of shipment that informed by supplier
ReceiveRequire	The date is requested to supplier to prepare shipment

Table D.8. Data Dictionary of Supplier Database.

Field Names	Meaning
SupplierId	The identification number of supplier
SupplierName	The name of supplier
ContactName	The name of person for contacting
Address	The address of supplier
PhoneNo	The phone number of supplier
FaxNo	The fax number of supplier
TermPayment	The payment condition of supplier

Table D.9. Data Dictionary of Purchase Order Database.

Field Name	Meaning
PurchaseNo	The identification number for purchase order

Table D.9. Data Dictionary of Purchase Order Database (Continued).

Field Name	Meaning
PurchaseDate	The date that issues purchase order
RequireDate	The date is requested to supplier to prepare shipment

Table D.10. Data Dictionary of On Order Database.

Field Names	Meaning
Qty	The quantities of each product purchased in each purchase order
PurchasePrice	The price of each product purchased in each purchase order
PurchaseDiscount	The discount of each product purchased in each purchase order

APPENDIX E

STRUCTURE CHART

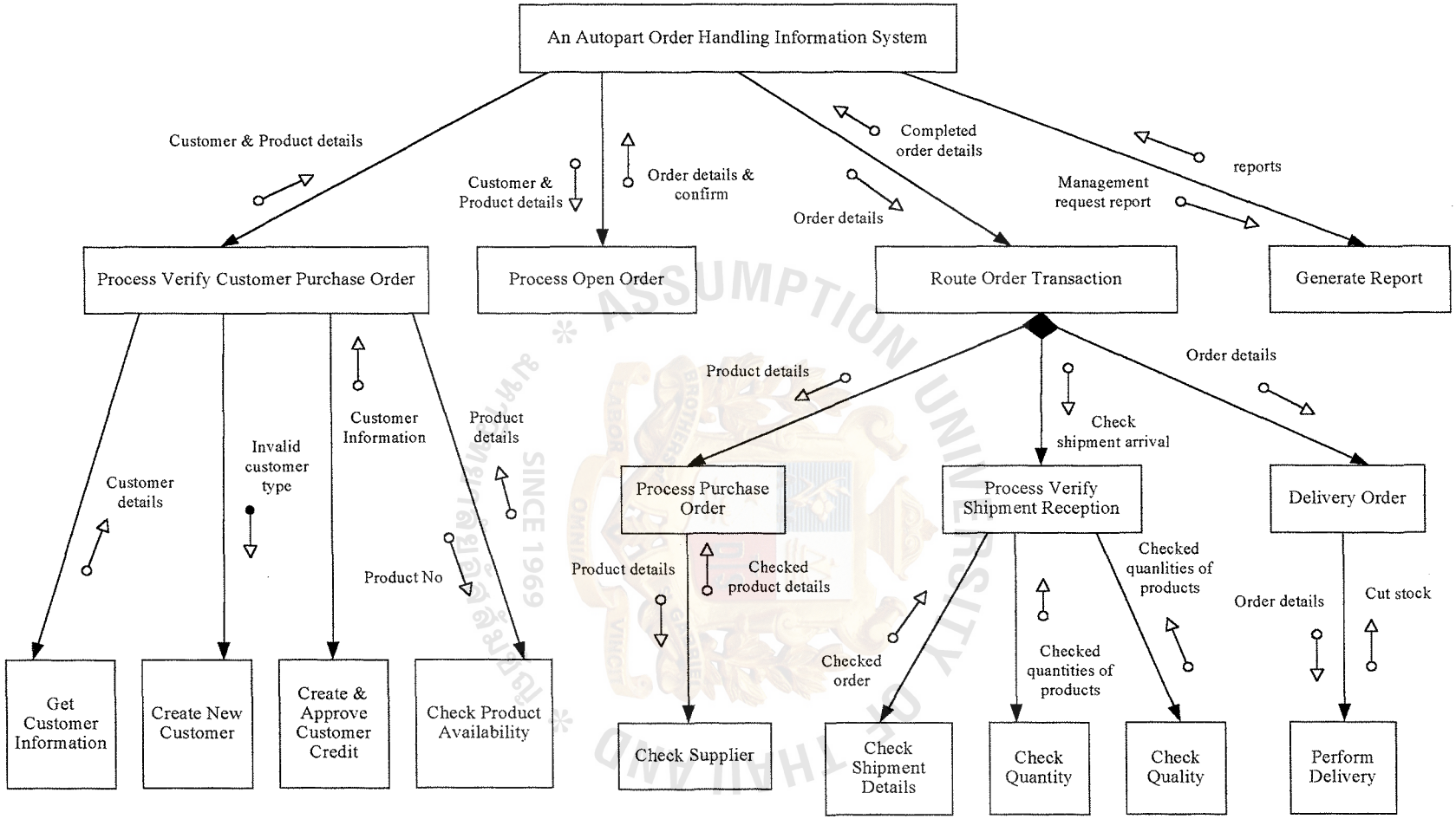

Figure E.1. Structure Chart of the Autopart Order Handling Information System.