Used Car Information System for SCH Company

by

Ms. Arissara Limsathayurat

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

# MS (CIS)

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CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
Assumption University

July 2001

Project Title        Used Car Information System for SCH Company

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Project Advisor        Air Marshal Dr. Chulit Meesajjee

Academic Year        July 28, 2001

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

Approval Committee:

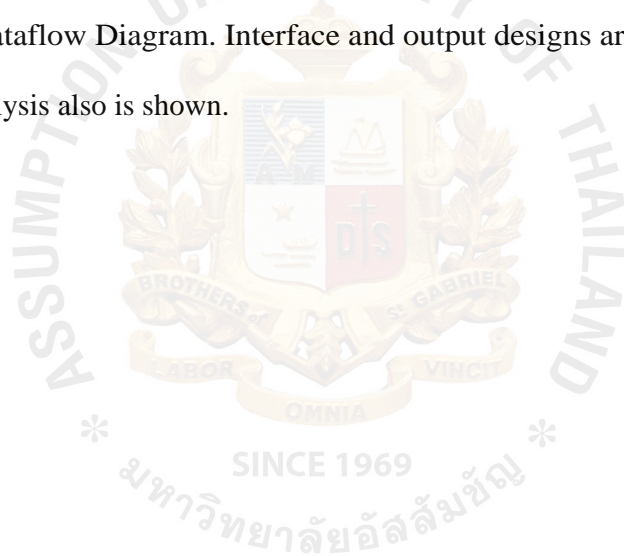| | |
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July 28, 2001

# ABSTRACT

The project presents the study of a Used Car Company. The operation of this company is a manual system. The company wants to improve the productivity and quality by using computerized system. The report also emphasizes on the Sales/Marketing department and the promotion.

This system development project covers the System Analysis, System Design and Implementation.

The information is collected from the requirement of user and management team. This proposed system is designed to solve the existing problem involving the Context Diagram and Dataflow Diagram. Interface and output designs are provided in the report. Cost/Benefit analysis also is shown.

# A CKHOWLEDGEMENTS

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# I. INTRODUCTION

## 1.1 Background of the Project

SCH Company is a small-size company that is one of SB Group in Chumporn province. SCH Company sells various brands and models of used car. SCH Company was established during economic recession but SCH Company got more profit because cars are still wanted in many business places especially in agricultural province.

Normally, customers who want to buy cars and used cars, want to see, reserve and order cars at the car office by themselves. So staff at the office should be enough to serve the customers. A salesperson has 5 main responsibilities to hand customers. First, salesperson collects the customer's information into the card. P card is for potential customers and to reserve customers. C card is for new customers. Second, the salesperson presents the products by asking for the need of customers and bringing them to see product with the detailed lists of used car. Third, the salesperson creates the advertising to promote the product to customers that use black/white catalog and local radio. In most provinces in Thailand, there are large areas and many households scattering around. Therefore SCH Company wants to promote its used car to customers. Forth, the salesperson deals with the payment condition consists of cash and hire purchase. Then salesperson sends the detail to other related departments. Fifth, the salesperson makes daily, monthly, quarterly and yearly report to the manager. The staff spends more time to make the report, which wastes the time to do other things. As the result, the report may not be completed and that incorrectly analyzes the market and forecast.

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According to high sales volume, every department processes many jobs. However Sales/Marketing department is selected to improve before others because this department directly serves the customer. SCH Company wants to reach customer satisfaction by providing convenience for customers, fast operation, promoting attractive advertising and collecting correct information.

Moreover, there are large volumes of documents to be processed and collected. A salesperson spends more time to process them because they use manual system. So the management team has decided to improve the manual system to be a computerized system.

**1.2 Objectives of the Project**

(1)  To study and design efficient used car system for Sales/Marketing Department.

(2)  To control and to improve the flow of information and to search the document easily.

(3)  To increase the quality of staff and people in provinces.

(4)  To promote used car information with photos to customers who are scatter in provinces.

(5)  To motivate the customer to purchase the product by using the attractive media.

(6)  To reduce the cost of promotion and the complexity to process the stock.

(7)  To reduce paper and space for collecting the document.

(8)  To create efficient report for decision-making.

(9)  To create the list of potential customers for follow-up.

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**1.3 Scope of the Project**

The project will cover the major work of Sales/Marketing Department including promotion. It can be classified as follows:

(1)    Keeping the used car database that consists of photo, details of used car, purchasing date, selling date, price and other related information.

(2)    Updating, creating, and deleting the information that are performed only by head office.

(3)    Processing the payment by other departments after the deal.

(4)    Inputting all documents by a salesperson via the system. Other related departments will extract those documents to process in next step.

(5)    Keeping the reserved car database that consists of reserved cars and customer information if customer reserves a car over the appointment date and do not buy it, reserve condition is to be deleted.

**1.4 Deliverables**

The following are the deliverable of the project.

(1) Project Introduction

    (a)    Background of project

    (b)    Objectives

    (c)    Scope

(2) Description of the current system

    (a)    Background of the existing system

    (b)    Current problems and areas to be improved

(3) Description of the new proposed system

    (a) System (user) requirement

        (1) Context Diagram

(2) Data flow Diagram

    (b)    System design

    (c)    Hardware and software requirement

    (d)    Security and controls

    (e)    Cost/ benefit analysis

(4) Project implementation

    (a)    Overview of project implementation

    (b)    Test plan and results

(5) Conclusions and recommendations

## 1.5 Project Plan

This project covers four months that are April 2001-July 2001. The project plan of SCH Company is shown in Figure 1.1.

| No. | Task Name |
|-----|-----------|
| I. | Analysis of the Existing System |
| 1 | Define the Objective and Scope |
| 2 | Study the Existing System |
| 3 | Identify the Existing Problems |
| 4 | Develop Context Diagram |
| 5 | Develop Data Flow Diagram |
| 6 | Cost and Benefit Analysis |
| II. | Analysis and Design of the Proposed System |
| 7 | Web Interface Design |
| 8 | Report Design |
| 9 | Database Design |
| 10 | Network Design |
| III. | Implementation of the Proposed System |
| 11 | Coding |
| 12 | Testing |
| 13 | Hardware Installation |
| 14 | Software Installation |
| 15 | Conversion |

Figure 1.1.   Project Plan of Sales Order System.

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## II. THE EXISTING SYSTEM

### 2.1 Background of the Organization

SB Group consists of 1 head office and 3 new car company branches, 1 head office and 4 motorcycle company branches, and 1 used car company head office. Used Car Company was named SCH company. SCH Company was found in January 1998. The place is situated next to the new car head office in the same area. The location is at 123/4 Chumporn–Wongpai Road, T. Tarkdad, A.Muang Chumporn. SCH Company consists of 5 main departments that are Sales/Marketing Department, Financing Department, Stock Department, Human Resource and Accounting Department as follows:

(1)  Sales/Marketing Department

It handles orders and reservations from customers and makes plans promotion to motivate and inform customers.

(2)  Financial Department

It is responsible for receiving the payment the customers.

(3)  Stock Department

It updates used car information and informs the stock to Sales/Marketing Department and evaluates used car price.

(4)  Human Resource Department

It is responsible for human resources of the company.

(5)  Accounting Department

It is deals with accounting transaction.

The organization chart of SCH Company is shown in Figure 2.1.
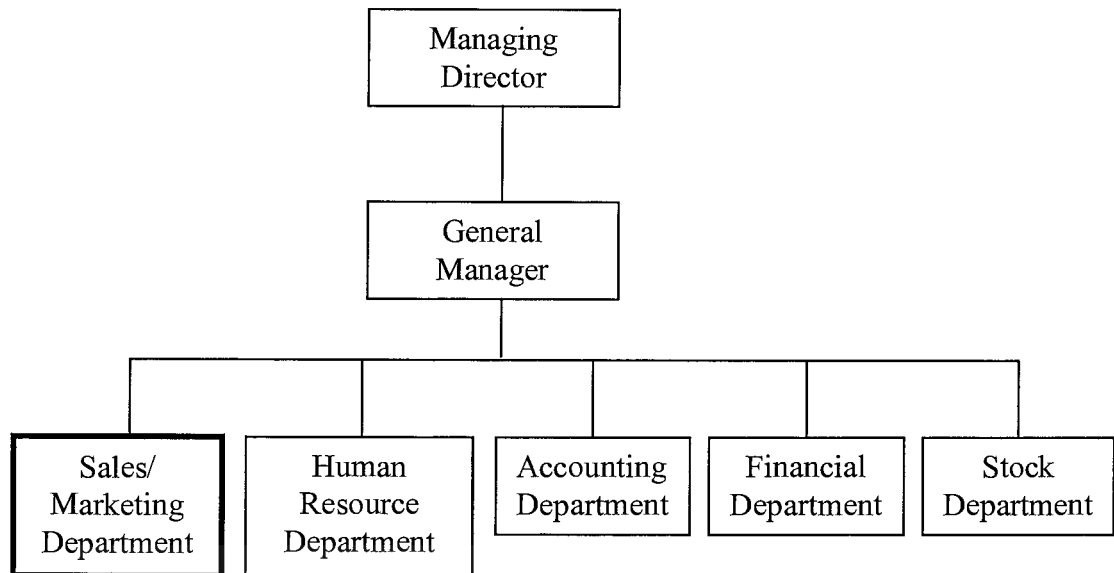
Figure 2.1.  The Organization Chart of SCH Company.

All departments process by manual system. Sales/Marketing is the main Department that has many problems concerning sales and to customers. There are 1 Sales/Marketing Manager and 5 sales officer and 6 outbound salespersons in Sales/Marketing Department. This department should solve the problems first.

## 2.2  Current Problems and Areas for Improvement

According to economic recession, customers want to get the quality product at a reasonable price. SB Group founded SCH Company to sell used car in response to economic current. Until now, SCH Company has got more profit that was over the forecast.

There are 5 main departments. All of them process by manual system. Stock Department evaluates used car price and makes the stock to salespersons. There are a lot of documents to be updated in daily. Sales/Marketing Department motivates customers to purchase the product by using black/white catalog and broadcast via local radio. These media are familiar to the province. Prospect customer is input in P card, then

salespersons try to change potential customers to be customers. Customer's information also is put in C card with payment condition and additional information. Many documents are used to collect those details. Large space is required to store large volume of document. Every salesperson makes the report to the manager daily.

After dealing with payment condition, Financial and Accounting Department processes later. Human resource Department has the responsibility to handle the company's resource.

The management team decides to improve efficiency and effective of Sales/Marketing Department first. The problems occurring in Sales/Marketing Department to be solved are as follows:

(1) High cost of promotion: Normally, a used car is a product that is sold quicker than a new car because of cheaper price. Moreover, varieties of brands and models are exchanged in a short period. Sales/Marketing Department uses black/white catalog as media to present used cars to customers and potential customers. Sometimes, the customers are interested in some products in the catalog but the catalog is sent late to customers. Sales/Marketing Department makes catalog in a small volume because used cars are often changed. Surely, it is high cost.

(2) Unclear photos of used cars and details: According to high cost of production, catalogs are ordered at a low cost of material in a small volume. The photos and details of used cars are printed in black/white and in small size pamphlets. Customers cannot see them clearly. Black/white catalogs are not attractive media.

(3) Low speed of workflow: when a customer walks in to the company, the salesperson asks for the customer's information to be collected into

potential customer database that is hand written in P card. The salesperson takes the cards to follow up the potential customer to persuade to buy the product. It takes more time to search for the suitable card for each salesperson. Once the customers want to buy the product, the customer's information is written in C card. Those customers may come from potential customers or walk-in customers. If the customer already is a potential customer, data is input again so data is redundant. When the customer makes a decision to buy, the payment condition is calculated. For hire purchases, salesperson has to calculate different prices and conditions. Customers spend more time to waiting in the office. It is not only inconvenient for them but also for the salesperson to spend too much time to serve the customers. It loses the opportunity to serve other customers.

(4)     Unclear handwriting: The information is written by handwriting in P card and C card. Some information is incorrect such as customer's name, address, telephone and price. Some cannot read some words that are written by another one, so errors occur.

(5)     Large volume of documents and high cost of paper: When information is written in the card, large space is required to store it. It is difficult to analyze the need of customers, the ability of salespersons and forecast sales volume because of a large volume of documents. There is also high cost of paper. Database is very important so the quality paper is used for a long time. At the time of making the report, overloaded job occurs, salespersons waste time searching for the card and writing the report again to the manager.

## 2.3 Existing System

The existing system of SCH Company is a manual system. When a customer walks in to see the used car, a salesperson asks for the customer's information to write in P-card (potential card). This card is collected and then distributed to every salesperson both sales officers and outbound salespersons to follow up their potential customer to buy the product.

When customers buy the used car, customer's information and type of used car are written in P-card. If the customer is already the input data P-card, the salesperson finds that P-card and writes additional information. After the customers buys the used car, a salesman writes additional information such as guarantor and net balance into C-card (customer card). C-card needs a big paper and it takes more time to write in because there are many details. However, the manager or the authorized person has to approve every used car before selling it. A salesperson also has the responsibility to generate daily, monthly, quarterly, yearly reports to manager. Salespersons have to create the advertising of used car to promote to the customer. They create the B/W catalog to present the used cars and broadcast the advertising via local radio.

## III.  THE PROPOSED SYSTEM

### 3.1   System Specification

After studying the existing system of SCH Company, it is found that SCH Company requires the computerized system instead of a manual system. The intended system can be beneficial to the management level and operational level and to customers. The system specifications for the proposed system are defined as follows:

(1)    The salesperson gets efficient and appropriate media to promote the product. The media should be created in an easy way to be used and updated. Low cost of promotion and high reach to customers are required.

(2)    The proposed system is user-friendly. It should be easy to understand. The user can input both Thai and English depending on the details.

(3)    The proposed system reduces the processing time and data redundant.

(4)    The data in the system should be completed. When the salesperson is busy, the other one can take care of the customers instead for the next service of the same customer.

(5)    Calculation part is flexible. It can calculate both cash and hire purchase.

(6)    Reliable security and control management is required to protect the risk that occurs to the system. Each salesperson has his own password to protect others from changing the data. The proposed system can identify users' access authority and allow only authorized persons to work on their authorized jobs.

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## 3.2 System Design

### 3.2.1 Application Architecture

    (1)    Network architecture

SCH Company requires to use the computerized system in the organization and links the advertising via the branch. Distributed Database Computing (two- tiered client/ server) is suitable in client/server. This architecture places the information system's stored data on a server and the business logic and user interface on the client. Database is only stored in the head office. Only the advertising's information is linked to show at the branches.

For the topology of the network architecture, SCH Company decides to use Ring Topology that connects multiple computers and some peripherals into a ring-like structure. Each computer can transmit instructions and data to other computer on the network.

One of the branches sets up leased line in advance to support other businesses in the SB Group. So this branch will be get useful to leased line that can connect all the time without dialing up the call. Another 2 branches use modem as a device to connect between the head office and themselves to advertise the product. Network Configuration is shown in Figure 3.1.

    (2)    Data architecture

The proposed system uses the Distributed Relational Database System (Distributed DBMS) that is designed in relational data model. In database, we use data replication in order to store all data into all clients. To update, insert and delete, the data is automatically changed at a time although the data is input at only one client.

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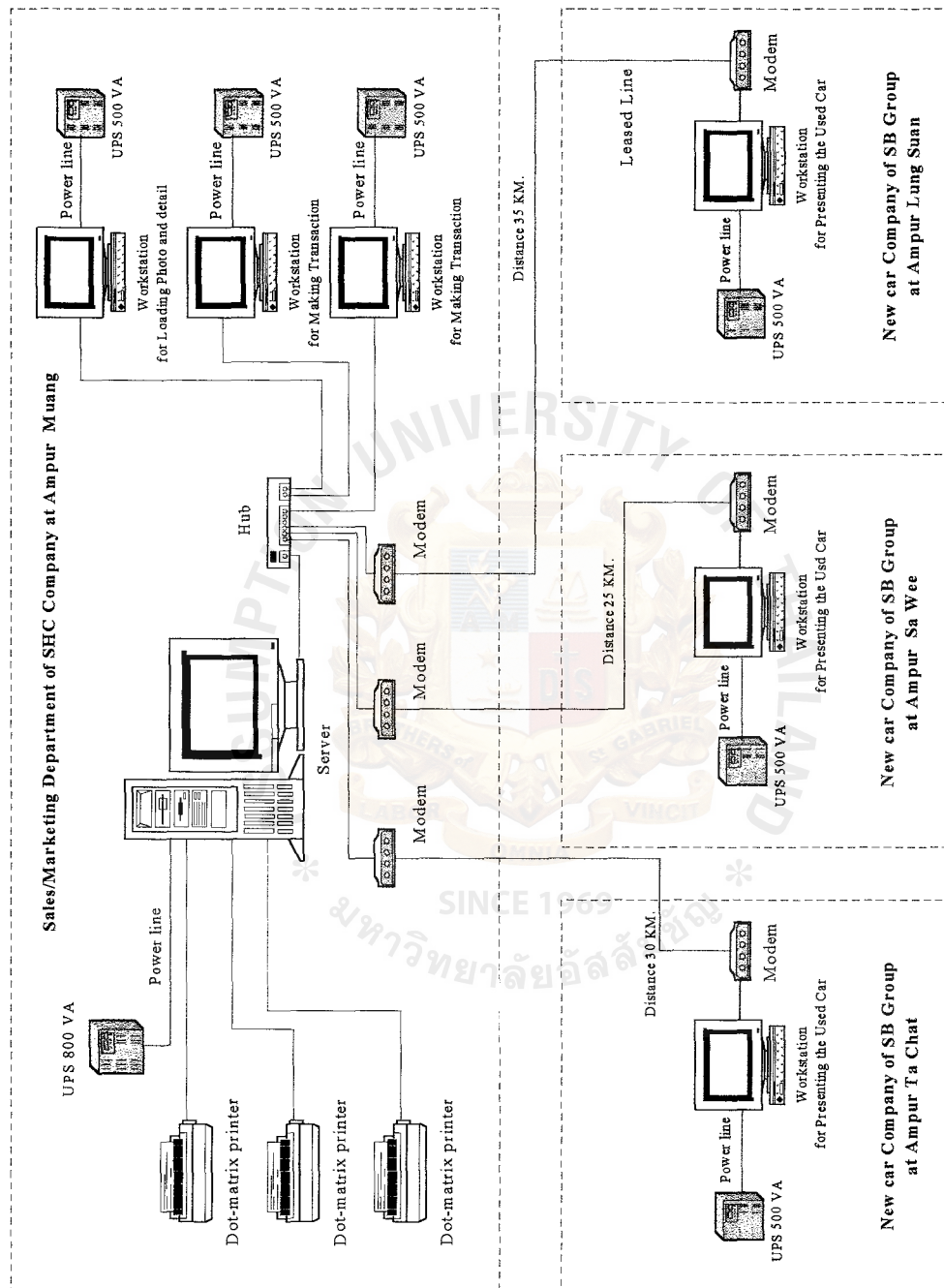
Figure 3.1. Network Configuration of Proposed System.

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(3)  Interface architecture

In the proposed system, when user inputs the information, it has to be processed automatically by the system. Some information can be changeable by editing. Some information controls the changes such as salesman's code. The data is keyed in by using the keyboard. Most of data is keyed in the text box. User can enter to continue the next box. Some text box can fill no data. The data that have many selections can be selected from the list box. Each type of data is arranged in good proportion with different colors. The image is loaded by mouse clicking the program. For web interface, data is Thai only and it is easy to use and understand. The information input on interface can generate the varieties of the report.

(4)  Process architecture

An application in terms of software language and tools will be developed. From Network Architecture, SCH Company uses MySQL for the client-based programming language to connect the server database engines. The programming language uses Perl and PHP programming to develop the web page to link with MySQL.

3.2.2 Data Flow Diagram of Proposed System

Process 1: Promotion

(1)  Verify the user

(2)  Check the stock

(3)  Add new item and photo

(4)  Update reserve status

(5)  Delete sold cut used car

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Process 2: Reserve Control

    (1)    Verify the user

    (2)    Input customer's info with reserve's car

    (3)    Verify the manager account

    (4)    Approve the reserve's condition by manager

    (5)    Print reserve slip to customer

    (6)    Input all customer's detail for ordering the product with payment condition

    (7)    Generate the report of reserve's customer

    (8)    Delete reserve information

Process 3: Customer Order

    (1)    Verify the user

    (2)    Input customer's information

    (3)    Update reserve data store to customer data store

    (4)    Input additional information

    (5)    Generate the report

    (6)    Delete the order

    (7)    Approve the delete the product by manager

Process 4: Potential Customer

    (1)    Verify the user

    (2)    Input new potential customer

    (3)    Update the status of potential customer

    (4)    Generate the report for follow-up by salesperson

3.2.3 Database Design

Database design is used for organizing and documenting the data in the system that reduces data inconsistency, data redundancy and gets the efficiency sharable information. Entity Relationship Model is a model to design the database. Database should be designed to meet Normalization. The model is shown in Appendix C including the table showing database design with detail in data type, data domain, attributes, foreign key and etc. Its data dictionary is shown in Appendix D.

3.2.4 Structure Design

It is one technique to create top-down hierarchy of modules. This technique deals with the size and sampling of program by breaking the program into a hierarchy of modules. It shows how the program has been partitioned into smaller, more manageable module, organization of those modules and the communication interface between modules. The structure design is shown in Appendix E.

3.2.5 Input and Output Design

Interfaces of input designs are shown in Appendix G. Output designs are shown in Appendix F.

**3.3 Hardware and Software Requirement**

The proposed specification consists of two parts that are hardware and software specifications.

3.3.1 Hardware Requirement

(1)    Web Server 1 set

    (a)    CPU Intel Pentium III 1 GHz.

    (b)    SDRAM 256 MB Bus 133 MHz.

    (c)    Cache memory 512 MB

    (d)    Hard Disk IDE 40.0 GB Seagate

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        (e)     Medium Tower Case

        (f)     Disk Drive 1.44 MB

        (g)    CD ROM 54x

        (h)    Monitor 17" Super VGA Color-digital

        (i)     Keyboard 104 keys

(2)   Workstation 7 sets

        (a)    CPU Celeron II 700 MHz.

        (b)    RAM 32 MB

        (c)    Hard Disk 20 GB Seagate

        (d)    Mini Tower Case

        (e)    Disk Drive 1.44 MB

        (f)     CD ROM 32x

        (g)    Monitor 15" SVGA

        (h)    Keyboard 104 keys

(3)   Printer

        (a)    Dot-matrix Printer (Epson LQ2170i  3 sets)

(4)   Network Peripheral

        (a)    Hub 8 ports 2 sets

        (b)    Ethernet LAN card 10/100 Mbps.

        (c)    Modem

        (d)    UPS 800/500 VA

## 3.3.2 Software Requirements

(1)   Software specification for Server

        (a)    Operating System: Microsoft Windows 98

        (b)    Web Server: Apache Server 1.3

        (c)     Application Server: Perl and PHP

        (d)     Database Server: MySQL

    (2)     Software specification for Client

        (a)     Operating System: Microsoft Windows 98

        (b)     Web browser: Microsoft Internet Explorer 5.0 or higher

        (c)     Application Software: Macromedia Dreamweaver

## 3.4 Security and Control

Security and control can be divided into three categories as follows:

### 3.4.1 Data Security

    (1)     The data will be backed up everyday by using magnetic type in one company of SB Group in order to present the loss of data and to make recovery when the data in SCH Company are damaged.

    (2)     Data integrity uses data replication in order to store all data into all clients. When the data are input, updated and deleted, the data of all clients are automatically updated.

    (3)     Security logs of all changes made to data items.

### 3.4.2 User Security

    (1)     Salesperson, manager and related staff have verify their username and password in their each authorized area to prevent unauthorized person from changing the data.

    (2)     When customers see the advertising on the web browser, they can only see the advertising. They cannot access to other function in the client.

### 3.4.3 Network Security

    (1)     Firewall is installed to prevent intruders from hacking the customer's profile and other information.

### 3.5 Cost/Benefit Analysis

3.5.1 Cost Analysis

(1) Cost of Manual System

Table 3.1. Manual System Cost Analysis, Baht.

| Cost items | | Years | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Fixed Cost | | | | | | |
| Copy Machine | | 50,000.00 | - | - | - | - |
| Camera | 2units@10,000 | 20,000.00 | - | - | - | - |
| Typewriter | 3 units @ 9,000 | 27,000.00 | - | - | - | - |
| Calculator | 8 units @ 2,000 | 16,000.00 | - | - | - | - |
| Total Fixed Cost | | 113,000.00 | - | - | - | - |
| Operating Cost | | | | | | |
| Salary Cost: | | | | | | |
| Sales and Marketing Manager | 1 person @ 17,000 | 17,000.00 | 17,680.00 | 19,448.00 | 21,392.80 | 23,532.08 |
| Staff: | | | | | | |
| Sales/Marketing officer | 5 persons @ 7,500 | 37,500.00 | 39,000.00 | 42,900.00 | 47,190.00 | 51,909.00 |
| Outbound Salesperson | 6 persons @ 7,500 | 45,000.00 | 46,800.00 | 51,480.00 | 56,628.00 | 62,290.80 |
| Total monthly salary Cost | | 99,500.00 | 102,485.00 | 107,609.25 | 115,141.88 | 125504.67 |
| Total Annual Salary Cost | | 1,194,000.00 | 1,229,820.00 | 1,291,311.00 | 1,381,695.00 | 1,506056.02 |
| Office Supplies & Miscellaneous Cost: | | | | | | |
| Stationary | Per Annum | 30,000.00 | 50,000.00 | 55,000.00 | 60,500.00 | 66,550.0.00 |
| Paper | Per Annum | 70,000.00 | 90,000.00 | 99,000.00 | 108,900.00 | 119,790.00 |
| Film | Per Annum | 4,800.00 | 6,000..00 | 6,600.00 | 7,260..00 | 7,9860.00 |
| Utility | Per Annum | 20,000.00 | 60,000.00 | 66,000.00 | 72,300.00 | 79,860.00 |
| Miscellaneous | Per Annum | 20,000.00 | 40,000.00 | 44,000.00 | 48,400.00 | 53,240.00 |
| Total Annual Office Supplies & Miscellaneous Cost | | 144,800.00 | 246,000.00 | 270,600.00 | 297,600.00 | 327,426.00 |
| Total Annual Operating Cost | | 1,338,800.00 | 1,681,100.00 | 1,787,719.00 | 1,927,743.00 | 1,833,482.02 |
| Total Manual System Cost | | 1,451,800.00 | 1,681,100.00 | 1,787,719.00 | 1,927,743.00 | 1,833,482.02 |

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Table 3.2. Five Years Accumulated Manual System Cost, Baht.

| Year | Total Manual cost | Accumulated Cost |
|------|-------------------|------------------|
| 1 | 1,451,800.00 | 1,451,800.00 |
| 2 | 1,681,100.00 | 3,132,900.00 |
| 3 | 1,787,719.00 | 4,920,619.00 |
| 4 | 1,927,743.00 | 6,848,362.00 |
| 5 | 1,833,482.02 | 8,681,844.02 |
| Total | 8,681,844.02 | - |

(2)  Costs of Computerized System

There are three alternative candidates for proposed system. Each candidate has a different cost. The Candidate matrix is shown in Table 3.3 and alternative candidate requirement analysis is in Table 3.4. The feasibility analysis matrix in Table 3.5 shows that candidate 1 is chosen for his proposed system.

Table 3.3.  Candidate Matrix.

| Characteristics | Candidate 1 | Candidate 2 | Candidate 3 |
|---|---|---|---|
| Portion of System Computerized : A description of the portion of the computerized system. | Sales/Marketing control process and internal web process. | Express package form business software and internal web process. | Same as candidate2 |
| Benefit: The benefit of each alternative that the company should consider in order to make a decision. | To gain competitive advantage and fasten processing. | To support business process. | Same as candidate2 |
| Servers and Workstations: The needs of server and workstation to support alternatives. | Pentium III 1GHz., RAM 128 MB for server, Pentium Celeron 700 MHz., RAM 64 MB for client with Ups | Pentium III 500 MHz., RAM 128 MB for server, Pentium Celeron 500 MHz., RAM 64 MB for client with Ups | AMD Athlon 500 MHz., RAM 128 MB for server, AMD K6-3 450 MHz., RAM 64 MB for client. |
| Software Tools Needed: Tools needed for facilitating each candidate such as computer programming languages. | Internet Explorer 5.0 or higher Macromedia Dreamweaver Apache server Microsoft Windows 98. | Internet Explorer 5.0 or higher Microsoft FrontPage Microsoft Internet Information System 2.0 Microsoft WindowsNT. | Netscape Navigator EditPlus Apache server Linux. |
| Method of Data Processing: An alternative solution to data processing. | Client/Server. | Client/Server. | Client/Server. |
| Output Devices and Implications: The devices that will be used to show, present as well as document information. | Epson LQ2170I Dot-matrix. | Same as candidate1 | HP LaserJet 6MP with Jetdirect EPSON LQ217i. |
| Input Devices with Implications: A device that will be used to enter data into the system in order to store or process. | Keyboard and mouse Sony Digital camera. | Keyboard and mouse Scanner. | Keyboard and mouse Scanner. |
| Storage Devices and Implications: A description of the storage device that will allow information to be retrieved from databases. | MySQL. | Oracle 7.0. | Microsoft Access 97. |
| Training: A description of the alternative way of training and preparing our personnel for the new system. | To train the actual employees in company both web process and Sales/Marketing control process | To train new employees who have some knowledge. | To train actual employees in company. |
| Technical Staff: A description of the alternative way for the company to hire the people who have the knowledge about the new technology. | To hire the new employees who have knowledge. | Actual employees in company. | Same as candidate1 |

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Table 3.4. Alternative Candidate Requirement Analysis.

| Characteristic | Candidate 1 | Candidate 2 | Candidate 3 |
|---|:---:|:---:|:---:|
| Portion of System Computerized | | | |
| - Sales/Marketing Control Process | X | | |
| - Express Package | | X | X |
| Benefit | | | |
| - Competitive advantage | X | | |
| - Support business process | | X | X |
| Server | | | |
| - Pentium III 500 MHz. | | X | |
| - Pentium III 1GHz. | X | | |
| - AMD Athlon 500 MHz. | | | X |
| Workstation | | | |
| - Pentium Celeron 500 MHz. | | X | |
| - Pentium Celeron 700 MHz. | X | | |
| - AMD K6-3 450 MHz. | | | X |
| Operation System | | | |
| - Microsoft Windows 98 | X | | |
| - Microsoft WindowsNT | | X | |
| - Linux | | | X |
| Software Tools | | | |
| - Internet Explorer | X | X | |
| - Netscape Navigator | | | X |
| - Macromedia Dreamweaver | X | | |
| - Microsoft Frontpage | | X | |
| - EditPlus | | | X |
| - Apache server | X | | X |
| - Microsoft Internet Information System | | X | |
| Method of Data Processing | | | |
| - Client/Server | X | X | X |
| Output Devices and Implications | | | |
| - EPSON LQ217i | X | X | X |
| Input Devices and Implications | | | |
| - Keyboard&Mouse | X | X | X |
| -Sony Digital Camera | X | | |
| Storage Devices and Implications | | | |
| - MySQL | X | | |
| - Oracle 7.0 | | X | |
| - Microsoft Access 97 | | | X |

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Table 3.5. Feasibility Analysis Matrix.

| Feasibility Criteria | Wt. | Candidate 1 | Candidate 2 | Candidate 3 |
|---|---|---|---|---|
| **Operational Feasibility** Functionality: A description of to what degree the candidate would benefits the organization.<br><br>Political: A description of how well received this solution would be received. | 30% | Fully supports user required functionality<br><br><br>IBM well accepted by all management since it is recommended by system development.<br><br>Score: 100 | Same as candidate 1<br><br><br>Same as candidate 1<br><br><br>Score: 100 | Same as candidate1<br><br><br>AMD, not recommended by system development team but has lower price.<br><br>Score: 70 |
| **Technical Feasibility** Technology: A description of the maturity of the technology used in each candidate.<br><br><br><br>Expertise: An assessment of the technical expertise needed to develop, operate, and maintain the candidate system. | 30% | Pentium III is widely accepted and supported by various computers. The technical aspect of this candidate has been developed for some times and its has reached its maturity stage.<br><br>Employees will have the experience supporting the developed system.<br><br>Score: 90 | Same as candidate 1<br><br><br><br><br><br>Current employees are promoted and trained to support the system, they may not have any on hand experience.<br>Score: 90 | AMD is not as widely used compare to Pentium III but its performance is comparable to it. However not as much computer components support it compare to Pentium III.<br><br>Employees will have the experience supporting the developed system.<br><br>Score: 75 |
| **Economic Feasibility** Cost to Develop (Baht): Payback Period: Net Present Value | 30% | 798,400<br>3.3 years<br>886,872.39<br>Score: 95 | 1,266,500<br>4.4 years<br>328,572.39<br>Score: 70 | 810,500<br>3.4 years<br>873,822.39<br>Score: 95 |
| **Schedule Feasibility** An assessment of how long the solution will take to design and implement. | 10% | 5 months<br><br>Score: 90 | 6 months<br><br>Score: 80 | 5 months<br><br>Score: 90 |
| Ranking | 100% | 94.5 | 86 | 81 |

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Table 3.6.    Computerized System Cost Analysis, Baht.

| Cost items | Years | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **Fixed Cost** | | | | | |
| Hardware Cost: | | | | | |
| Computer Server Cost | 20,000.00 | 20,000.00 | 20,000.00 | 20,000.00 | 20,000.00 |
| Workstation Cost | 35,000.00 | 35,000.00 | 35,000.00 | 35,000.00 | 35,000.00 |
| Printer Cost | 6,600.00 | 6,600.00 | 6,600.00 | 6,600.00 | 6,600.00 |
| Digital Camera | 5,000.00 | 5,000.00 | 5,000.00 | 5,000.00 | 5,000.00 |
| Modem | 1,680.00 | 1,680.00 | 1,680.00 | 1,680.00 | 1,680.00 |
| UPS | 5,400.00 | 5,400.00 | 5,400.00 | 5,400.00 | 5,400.00 |
| Total Hardware Cost | 73,680.00 | 73,680.00 | 73,680.00 | 73,680.00 | 73,680.00 |
| Maintenance Cost: | | | | | |
| Computer Maintenance | 30,000.00 | 30,000.00 | 30,000.00 | 30,000.00 | 30,000.00 |
| Web Pages Maintenance | 5,000.00 | 5,000.00 | 5,000.00 | 5,000.00 | 5,000.00 |
| Total Maintenance Cost | 35,000.00 | 35,000.00 | 35,000.00 | 35,000.00 | 35,000.00 |
| Software Cost: | | | | | |
| Computer Server Cost | – | – | – | – | – |
| Network Cost | 15,000.00 | 15,000.00 | 15,000.00 | 15,000.00 | 15,000.00 |
| Software Tool Cost | 15,000.00 | 15,000.00 | 15,000.00 | 15,000.00 | 15,000.00 |
| Total Software Cost | 30,000.00 | 30,000.00 | 30,000.00 | 30,000.00 | 30,000.00 |
| Implementation Cost: | | | | | |
| Advanced Training Cost | 50,000.00 | – | – | – | – |
| Basic Training Cost | 20,000.00 | – | – | – | – |
| Set up Cost | 5,000.00 | – | – | – | – |
| Total Implementation Cost | 75,000.00 | – | – | – | – |
| People-Ware Cost: | | | | | |
| System Analyst    1 person @ 30,000 (3 months) | 90,000.00 | – | – | – | – |
| Programmer    1 person @ 20,000 (2 months) | 40,000.00 | – | – | – | – |
| IT Specialist    1 person @ 25,000 (3 months) | 75,000.00 | – | – | – | – |
| Total People-Ware Cost | 205,000.00 | – | – | – | – |
| **Total Fixed Cost** | 391,680.00 | 138,680.00 | 138,680.00 | 138,680.00 | 138,680.00 |
| **Operating Cost** | | | | | |
| People-Ware Cost: | | | | | |
| Sales and Marketing Manager    1 person @ 20,000 | 20,000.00 | 22,000.00 | 24,200.00 | 26,620.00 | 29,282.00 |
| Staff: | | | | | |
| IT Specialist    1 person @ 20,000 | 19,800.00 | 21,780.00 | 23,958.00 | 26,353.80 | 28,989.18 |
| Sales/Marketing Officer    3 persons @ 8,500 | 25,500.00 | 28,050.00 | 30,855.00 | 33,940.50 | 37,334.55 |
| Outbound Salesperson    3 persons @ 8,500 | 25,500.00 | 28,050.00 | 30,855.00 | 33,940.50 | 37,334.55 |
| Total Monthly Salary Cost | 90,800.00 | 99,880.00 | 109,868.00 | 120,854.80 | 132,940.28 |
| Total Annual Salary Cost | 1,089,600.00 | 1,198,560.00 | 131,841.60 | 1,450,257.60 | 1,595,283.36 |
| Office Supplies & Miscellaneous Cost: | | | | | |
| Stationary    1,000 per month | 12,000.00 | 13,200.00 | 14,520.00 | 15,972.00 | 17,569.20 |
| Paper    1,000 per month | 12,000.00 | 13,200.00 | 14,520.00 | 15,972.00 | 17,569.20 |
| Utility Cost    1,000 per month | 12,000.00 | 13,200.00 | 14,520.00 | 15,972.00 | 17,569.20 |
| Miscellaneous    1,000 per month | 12,000.00 | 13,200.00 | 14,520.00 | 15,972.00 | 17,569.20 |
| Annual Office Supplies & Miscellaneous Cost | 48,000.00 | 52,800.00 | 58,080.00 | 63,888.00 | 70,276.80 |
| **Total Operating Cost** | 1,137,600.00 | 1,251,360.00 | 1,376,496.00 | 1,514,145.60 | 1,665,560.16 |
| **Total Computerized System Cost** | 1,529,280.00 | 1,390,040.00 | 1,515,176.00 | 1,652,825.60 | 1,804,240.16 |

Table 3.7.   Five Years Accumulated Computerized Cost, Baht.

| Year | Total Computerized Cost | Accumulated Cost |
|------|-------------------------|------------------|
| 1 | 1,529,280.00 | 1,529,280.00 |
| 2 | 1,390,040.00 | 2,919,320.00 |
| 3 | 1,515,176.00 | 4,434,496.00 |
| 4 | 1,652,825.60 | 6,087,321.60 |
| 5 | 1,804,240.16 | 7,891,561.76 |
| Total | 7,891,561.76 | - |

### 3.5.2 Benefit Analysis

Benefit analysis can be divided in two categories, tangible benefits and intangible benefit shown as follows:

(1)   Tangible Benefits (estimated amount per annual)

|  |  |  |
|---|---|---|
| (a) | Reduction of stationary and paper usage | 100,000 baht |
| (b) | Reduction of human labor | 408,000 baht |
| (c) | Reduction of duplicate work | 50,000 baht |
| (d) | Reduction of advertisement and postal service | 240,000 baht |
| (e) | Reduction of overtime wage | 300,000 baht |
| (f) | Information Look up | 50,000 baht |
| (g) | Reduction of office equipment | 100,000 baht |
|  | Total of tangible benefit | 1,244,000 baht |

(2) Intangible Benefit

    (a) Improving customer goodwill, customers satisfaction quickly and the flow of work. To serve the customers with high technology action, they feel that this company has high quality and high efficiency.

    (b) The salesperson can process quicker the transaction so has more time to serve the customer and follow up the potential customer.

    (c) The report is up- to -date information to make a decision.

    (d) Improving working environment. The space to store paper is reduced so the place is arranged in good environment and convenient to welcome the customers.

    (e) Getting the information about used car from the browser is very attractive to customers. It also increases the quality of people in province.

    (f) Reducing the duplicate work.

3.5.3 Payback Analysis

Payback analysis is a technique for determining if and when an investment will pay for itself. On the other hand, it determines how much time will lapse before accrued benefits overtake accrued and continuing costs. This period of time is called the payback period. The payback period of this proposed system is 3.3 years. The calculation of proposed system and the candidate is shown in Appendix H.

3.5.4 Net Present Value (NPV)

Net Present Value is a sophisticated capital budgeting technique, which is calculated by subtracting the project's initial investment from the present value of cash inflows discounted at a rate to the firm's cost of capital. If NPV is positive, investment

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is good. Otherwise, the investment is bad. NPV for proposed system is 886,872.39 baht. NPV analysis of all candidates is shown in Appendix H.

3.5.5 Breakeven Analysis

Breakeven analysis is a technique, which is used to find the period that accumulative cost of current system is equal to accumulate cost of new system. The point that they are equal is called breakeven point. The comparison of the system costs between computerized cost and manual cost is shown in Table 3.8. Breakeven point between current system and proposed system is shown in Figure 3.2.

Table 3.8.  The Comparison of the System Costs, Baht.

| Years | Accumulated Manual Cost | Accumulated Computerized Cost |
|-------|-------------------------|-------------------------------|
| 1 | 1,451,800.00 | 1,529,280.00 |
| 2 | 3,132,900.00 | 2,919,320.00 |
| 3 | 4,920,619.00 | 4,434,496.00 |
| 4 | 6,848,362.00 | 6,087,321.60 |
| 5 | 8,681,844.02 | 7,891,561.76 |
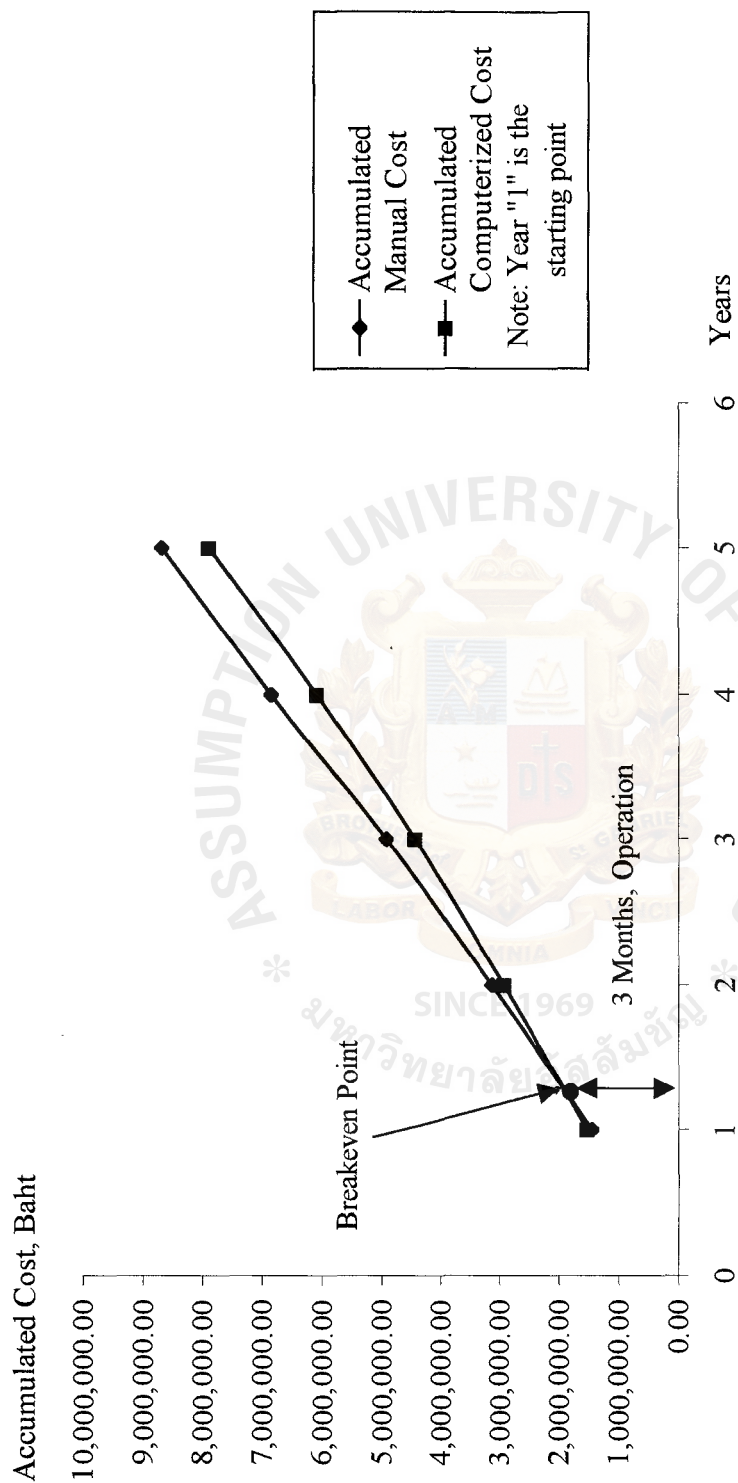
Figure 3.2. Cost Comparison between Manual and Computerized System.

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# IV. PROJECT IMPLEMENTATION

## 4.1 Overview of Project Implementation

System implementation is the construction of a new system and delivery of that system into production (day to day operation). So we can separate system implementation into 2 phases. They are construction phase and delivery phase. The system implementation activities are testing, training and conversion.

## 4.2 Test Plan

The testing system is the final step before the new system will be on production. There are many topics of testing as follows:

4.2.1 Network Testing

    (1)    Review the network design outline.

    (2)    Construct and then test new network.

    (3)    Revise network specification for future reference.

4.2.2 Database Testing

    (1)    MySQL testing for database server testing.

4.2.3 Program Testing

    (1)    Conduct system testing to make sure that all programs work properly. If the program does not work correctly or the procedures are not the needed output, the programmer must debug or rewrite the programs and continue testing until they operate correctly and properly.

    (2)    Update the project repository with revised program documentation for future reference.

    (3)    Place the new program and reusable components on the software library.

4.2.4 Security and Control Testing

    (1)    User logon and system authentication.

    (2)    Access level testing.

**4.3   Training**

Training involves system operators and users who will use the proposed system in every process and how to use the equipment. The activities are as follows:

    (1)    The salesperson and the manager are trained how to use the system both theoretical and practical, and review user training.

    (2)    Collecting documentation that may be useful in developing user documentation and training guide.

    (3)    Writing user documentation manuals that are clearly understood.

**4.4   Conversion**

Conversion is the step for converting system, from old system to proposed system. System conversion is very important for the staff who works in province. Most of them use manual system and do not have experience to use computer. So SCH Company selects to use parallel conversion. Both old and new systems will be operated for a while. This is done to ensure that the proposed system does not correctly work, there is an old system to support operation. Then we have time to solve problems of the proposed system. All major problem will be solved before the old system is discarded.

Parallel conversion minimizes the risk of problems of the proposed system causing irreparable harm to the business. Although it increases cost of running two systems over the same period and consumes more time with double workload of employees, it is suitable for converting from manual system to computerized system.

# V. CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Conclusions

SCH Company will get many benefits from the proposed system in Management, Information Technology, Organization, Information, Business Solution, and Cost and Benefit. For Management, the proposed system improves the workflow of many processes to have high efficiency. Input process is arranged in sequence and it is convenient for user. Input interface is designed in good proportion with colors. Data that is collected is processed and stored in appropriate database. It supports users to use it any time. The online information can be accessed in several seconds by every client. Security is important. Only the authorized person only can access the system. Output process can make the report easily by managing the system to decision-making. All processes by the proposed system reduce time of operation, large volume of documents and space for collecting the document. To make the transaction and serve the customer are more flexible.

For Information Technology, hardware and software are selected to be suitable with the proposed system and the organization. CPU Intel Pentium III 1GHz is enough to support the Used Car Information System. Proposed system uses Microsoft 98 as operating system that is more compatible. Sometimes, the officers want to confirm the information to the customers, Monitor 17" is big enough for customers to see the information and it is also convenient for users. Internal web site to present the product uses Microsoft Internet Explorer 5.0 or higher which is more compatible and easy to use for the customers. It also can present in Thai.

This proposed system is implemented for Sales/Marketing Department. The staff will be trained about Introduction to Computer and how to use the system that makes

them to have ability to use computer and be familiar to use it with acceptance to the new technology. When staff can use the system with high efficiency, they can serve the customers in high quality and it is fast to reach customer satisfaction.

For the cost and benefit to implement the proposed system, it can achieve breakeven point in nearly second year and payback period is 3.1 years. It can show that this proposed system is in good level in case of the cost of manual system and computerized system.

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

| Process | Existing System | Proposed System |
|---|---|---|
| To create and produce the advertising | 2 days | 10 mins |
| To collect the information | 10 mins | 5 mins |
| To search the document | 10 mins | 1 mins |
| Time to serve each customer | 45 mins | 30 mins |
| To generate the report per one salesperson per week | 3 hours | 30 mins |
| To make the prospect customer list to follow up | 1 hour | 15 mins |
| Total | 2 Days, 8 Hours, 5 Mins | 1 Hour, 31 Mins |

This proposed system also achieves the business solution that increases revenue because this business is about sell and service and customers want to get the service. When salespersons do not waste time to search for and collect the document, salespersons can have more opportunity to serve other customers. The document can be searched within 1 minute. The staff inputs the data until finishes to execute it. It collects the information spends only 5 minutes. Due to new technology in both Used Car System and Promotion, customers will get satisfaction and recommend other potential customers to SCH Company. The cost of paper and stationary, advertising and overtime

wage is the major part of reducing the cost and it can make more profits. For advertising, to present the product with internal web site is attractive for customers. The time to produce advertising takes only 5 minutes. The staff takes the photo with digital camera and then downloads to the system. The reports on both used car report and prospect list can be created easily and it takes only a 15-30 minutes depending on the volume of data. When the flow of work is processed more fast, the salesperson has more time to serve other customers. So the time to serve each customer is reduced from 45 minutes to 30 minutes. The degree of achievement of the proposed system is shown in Table 5.1.

## 5.2 Recommendations

This proposed system is applied to Sales/Marketing Department in this time. The system is designed to support other departments, moreover, it is to link all organizations in SB Group. However, the conversion will be analyzed from user feed back before the development. And it will analyze the problem after using the proposed system. For modifying other departments, the system should be developed to be appropriate in each department like Human Resources. This system should collect all profiles of staff, training course with evaluation, and the calculation of salary with evaluation.

For the training course, everyone, not only Sales/Marketing officer, should be trained to get basic computer knowledge. Other staff will feel getting interests from the company and prepare for the future system.

Presently, Internet Technology is very popular and useful. Intranet that is one of Internet Technology is suitable for communication within an organization. The cost of development is not too high. Intranet is user friendly interface, easy to use, to be accessed by everyone, gives quick response and it is high of efficiency for communication.

**APPENDIX   A**
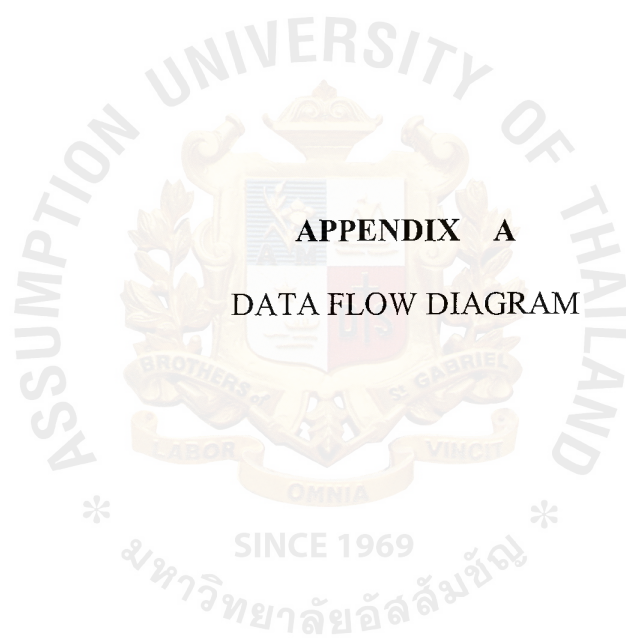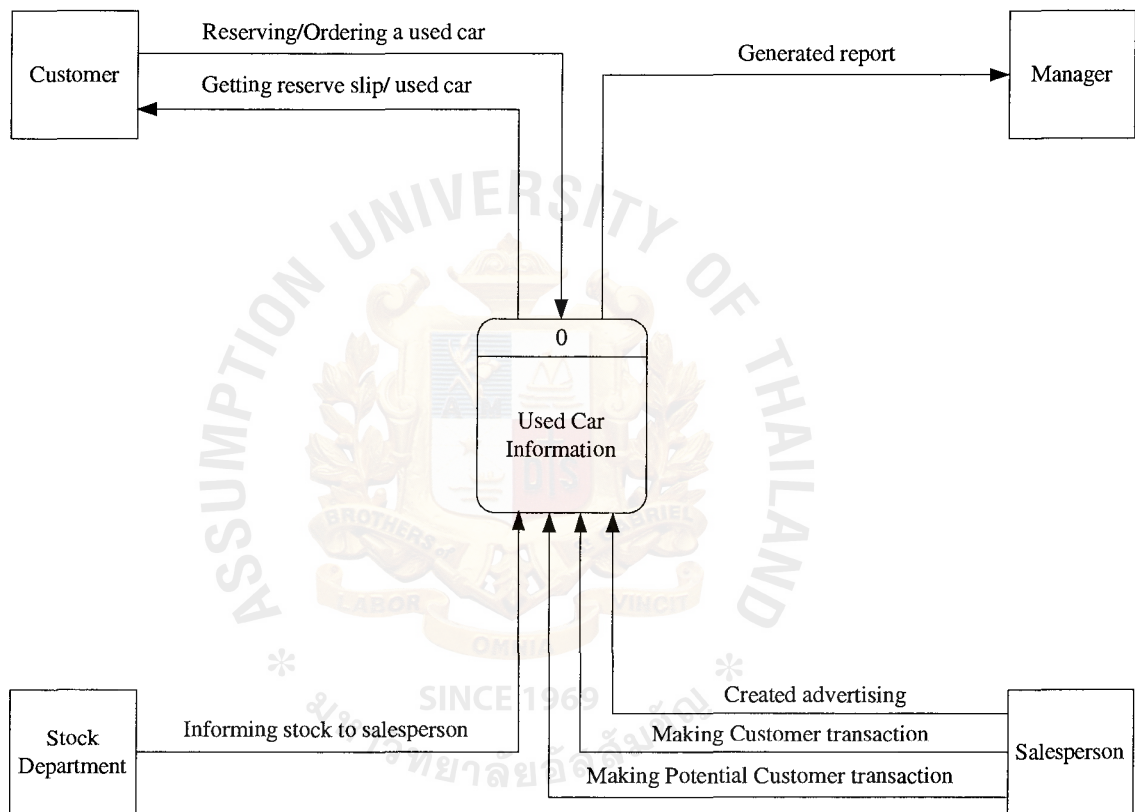
DATA FLOW DIAGRAM

Figure A.1.  Context Diagram of SCH Used Car Company.
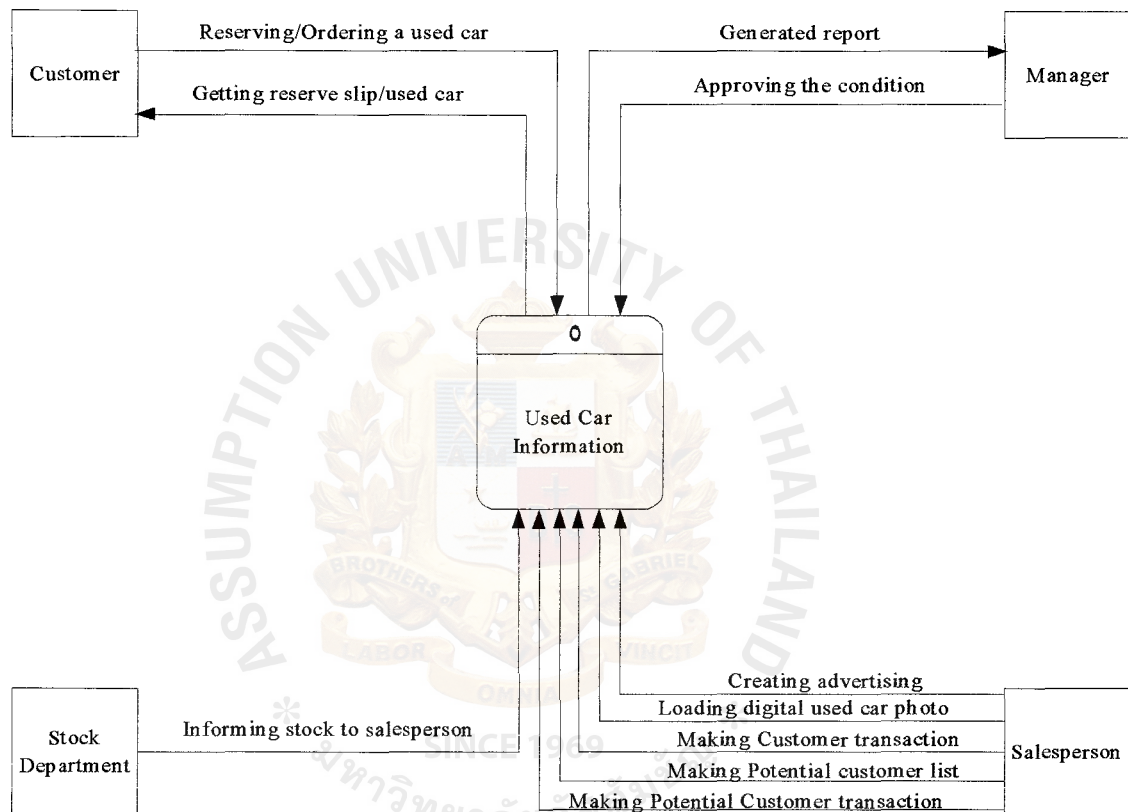
Figure A.2.  Context Diagram of Used Car Information System.
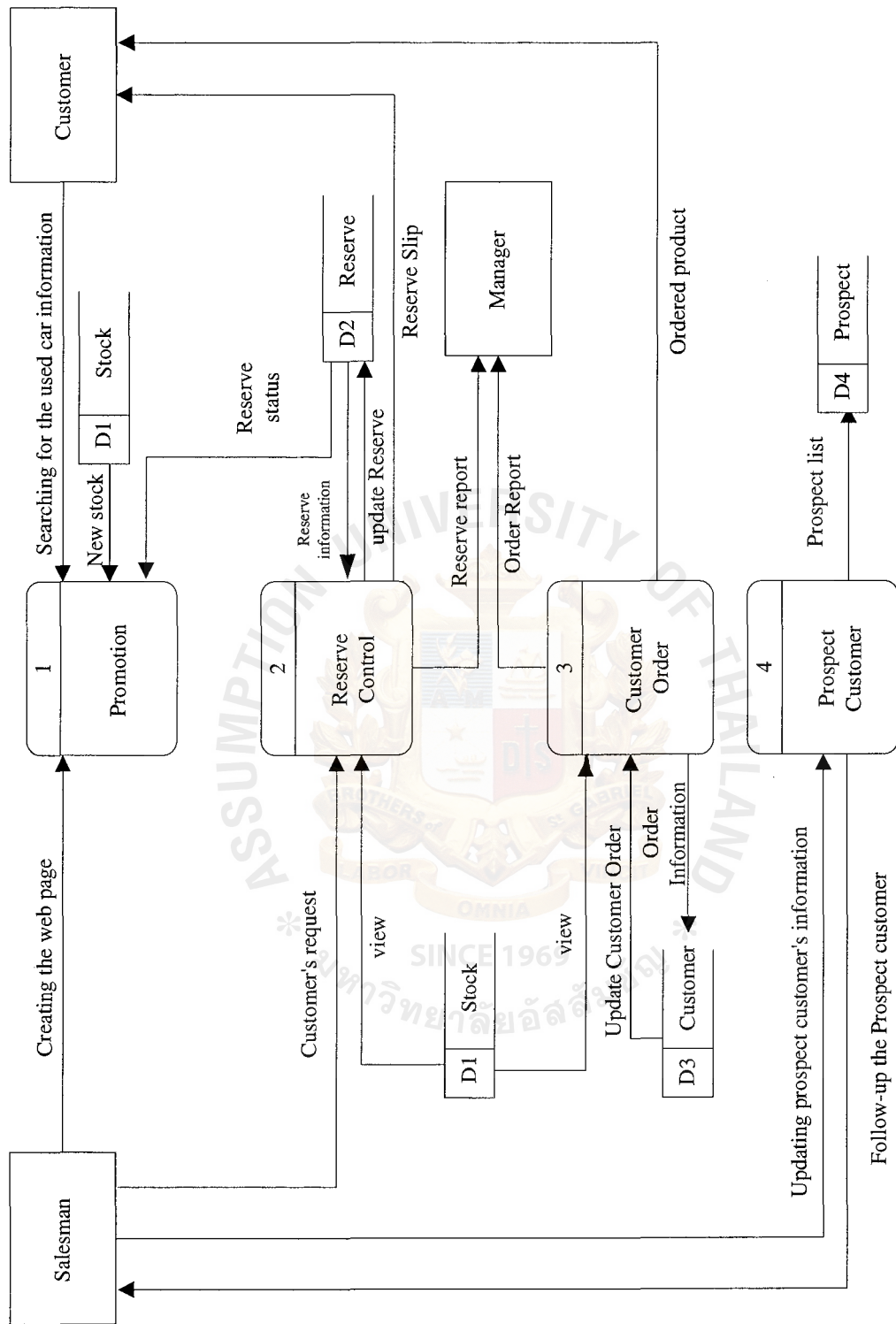
Figure A.3.  Level 0 Data Flow Diagram of Used Car Information System.

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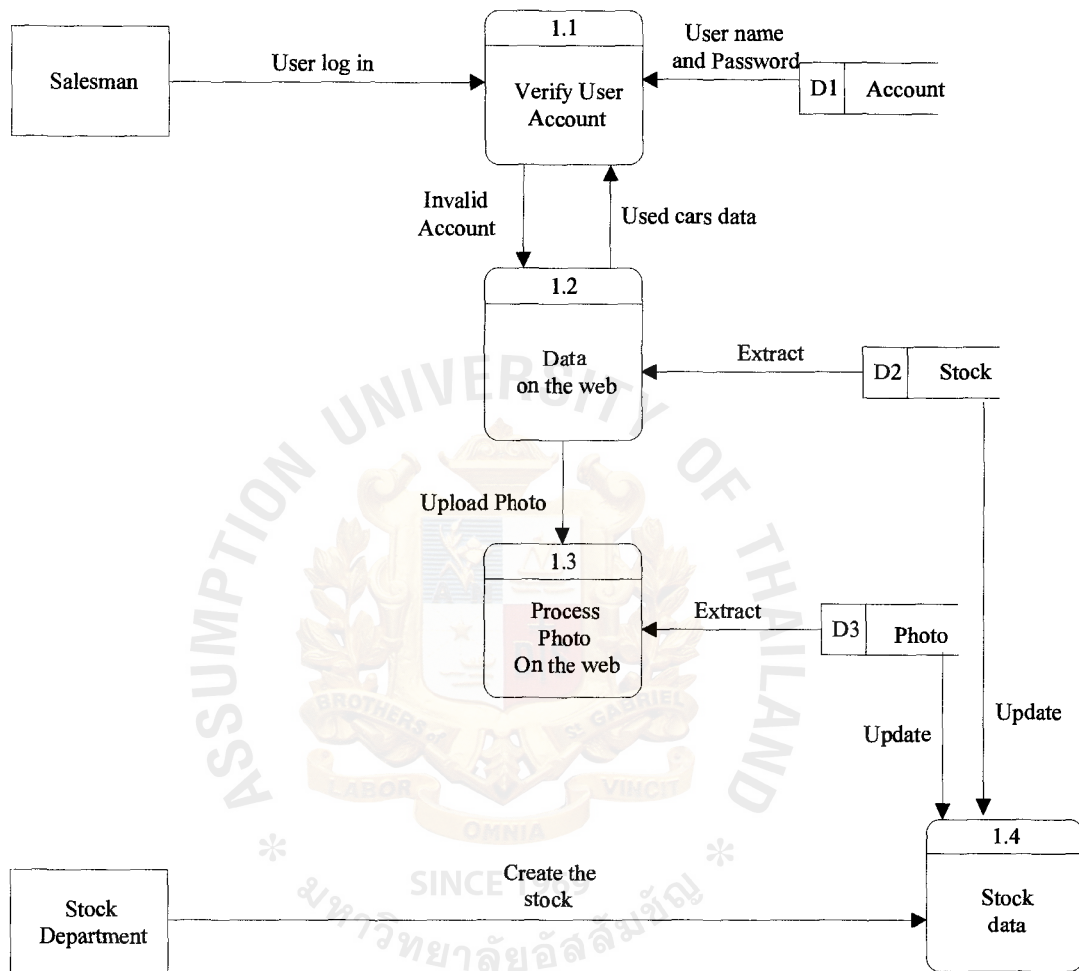
Figure A.4. DFD Level 1 of Promotion Process of Used Car Information System.
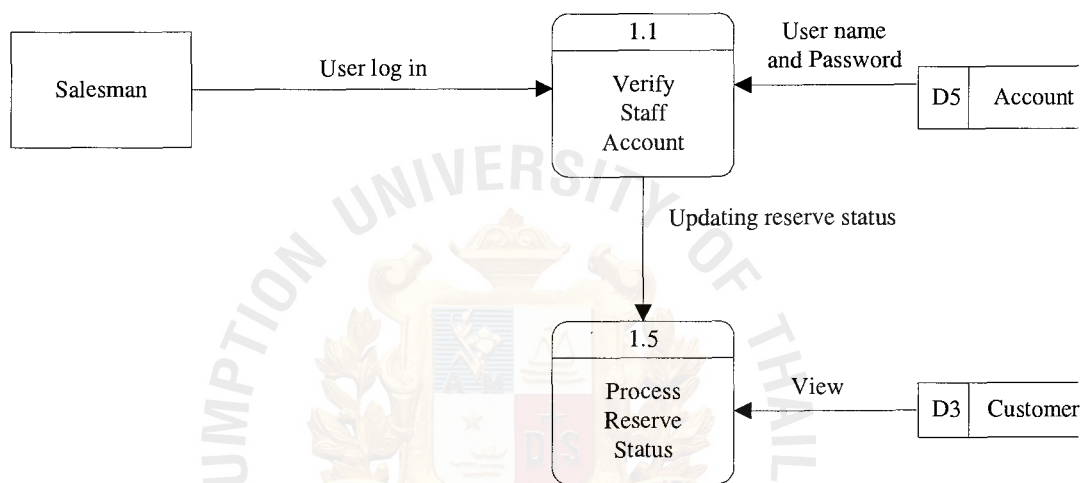
Figure A.5.    Level 1 Data Flow Diagram of Update Reserve Status.
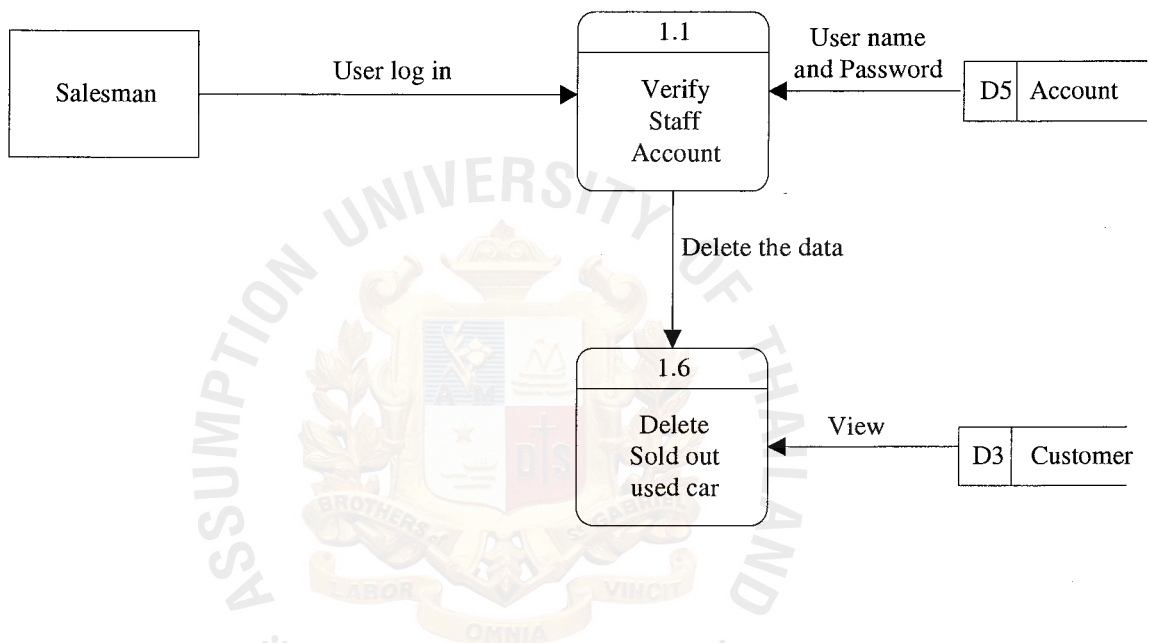
Figure A.6.    Level 1 Data Flow Diagram of Delete Sold Out Used Car.
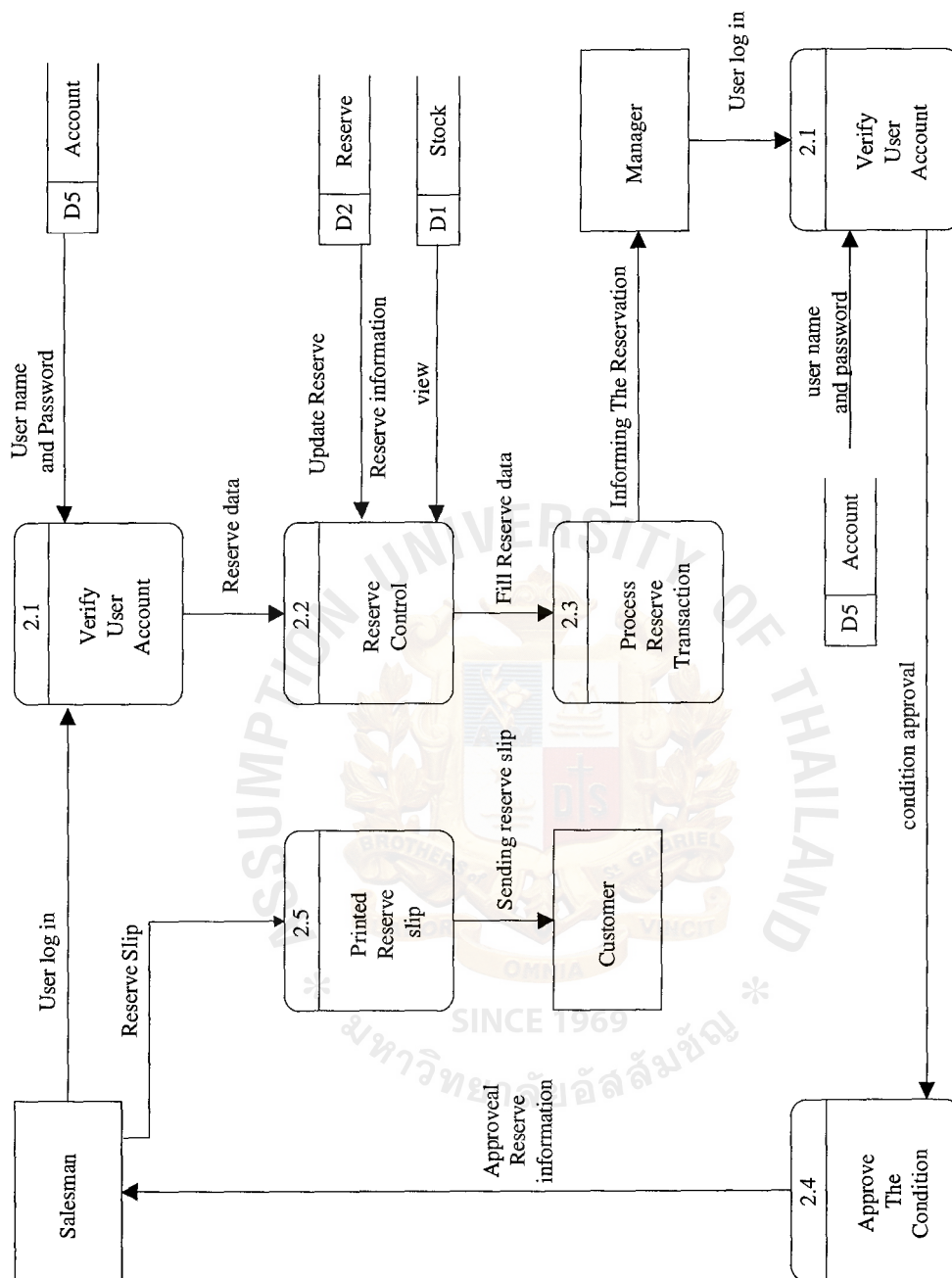
Figure A.7. Level 1 Data Flow Diagram of Process Reserve Control.
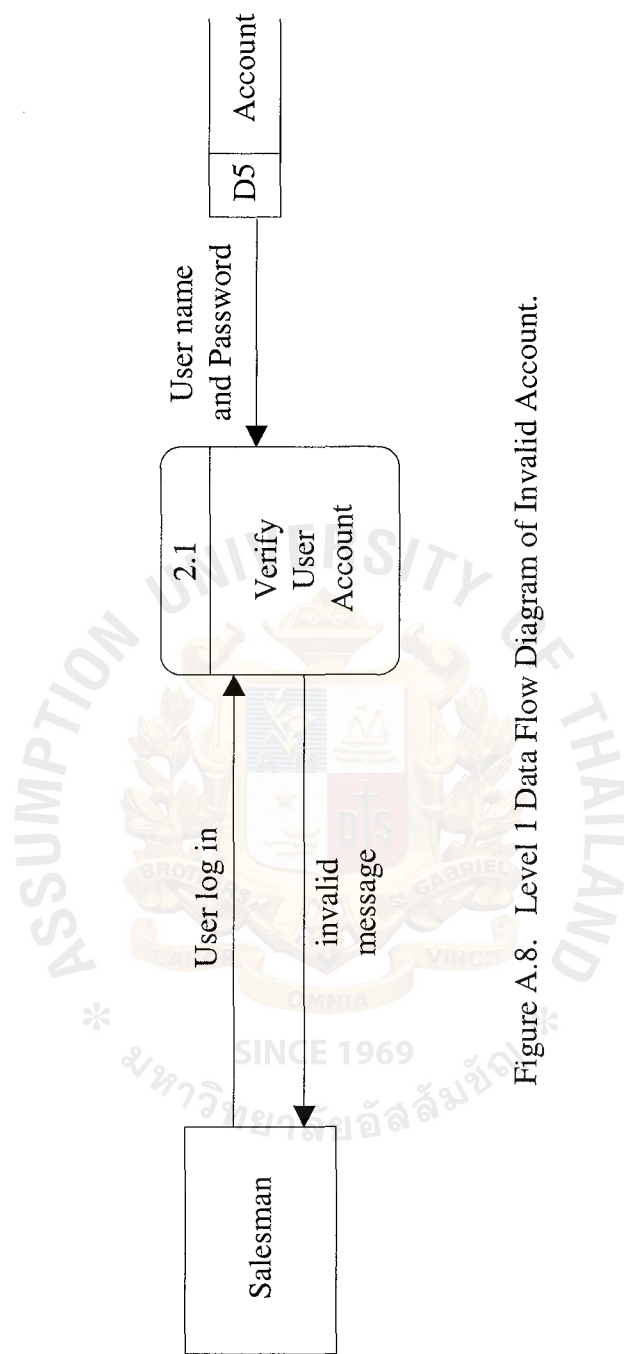
Figure A.8.  Level 1 Data Flow Diagram of Invalid Account.

41
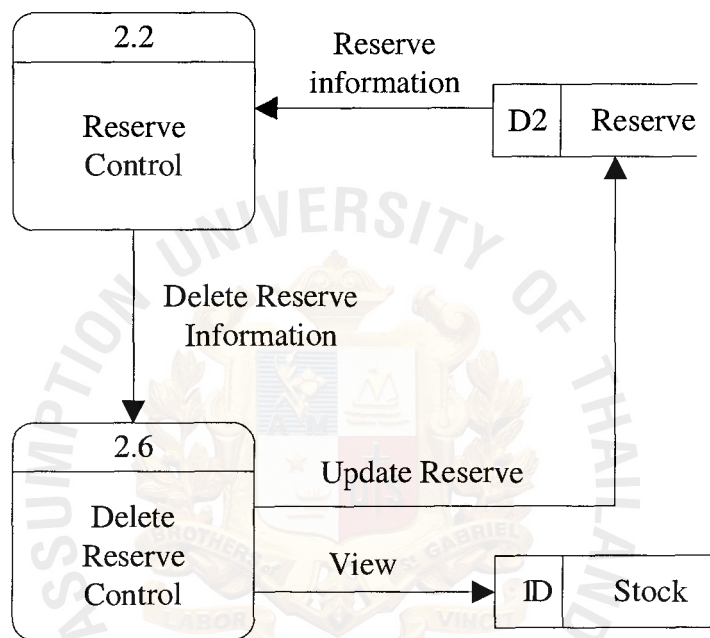
Figure A.9. Level 1 Data Flow Diagram of Delete the Reserve.
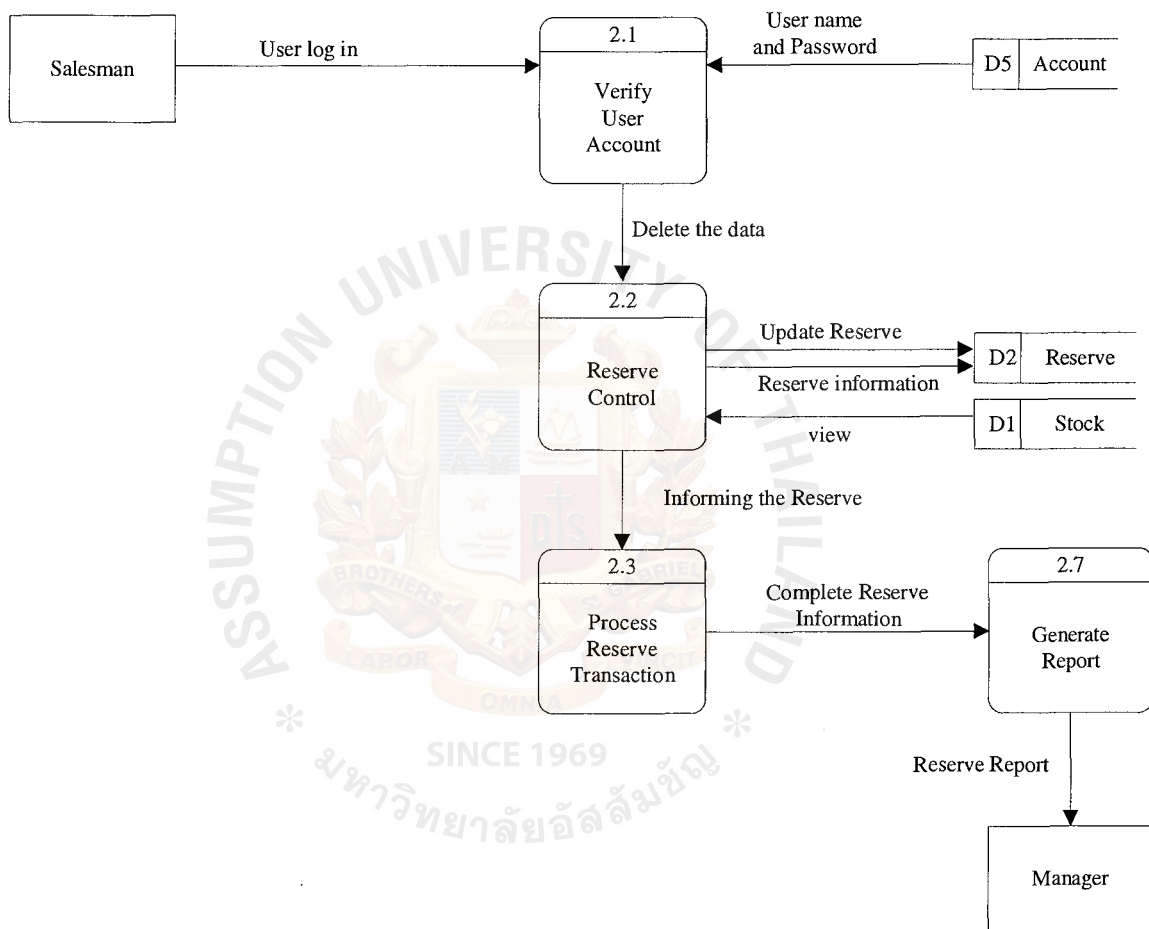
Figure A.10.   Level 1 Data Flow Diagram of Generate Reserve Report.
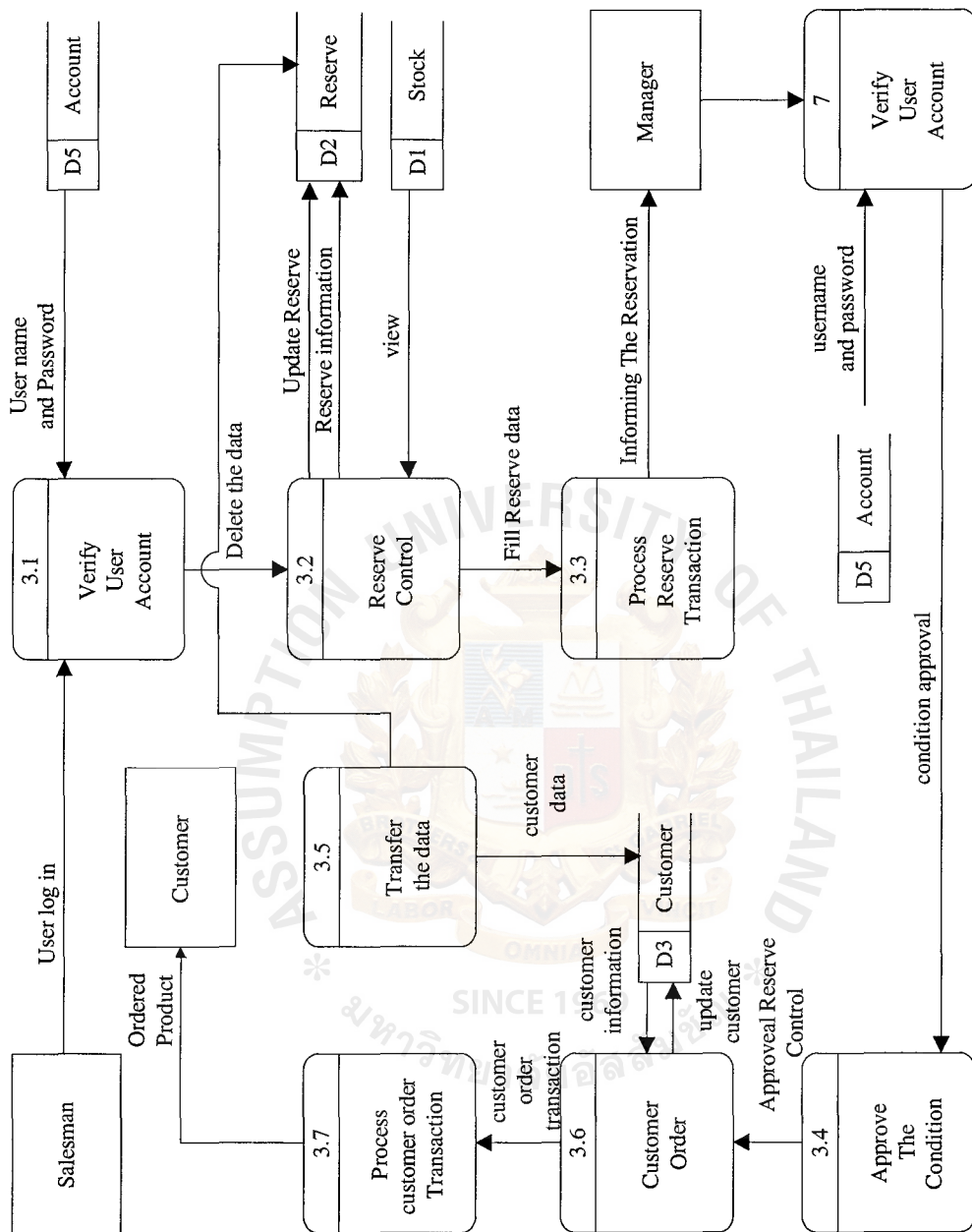
Figure A.11.    Level 1 Data Flow Diagram of Customer Order.

44
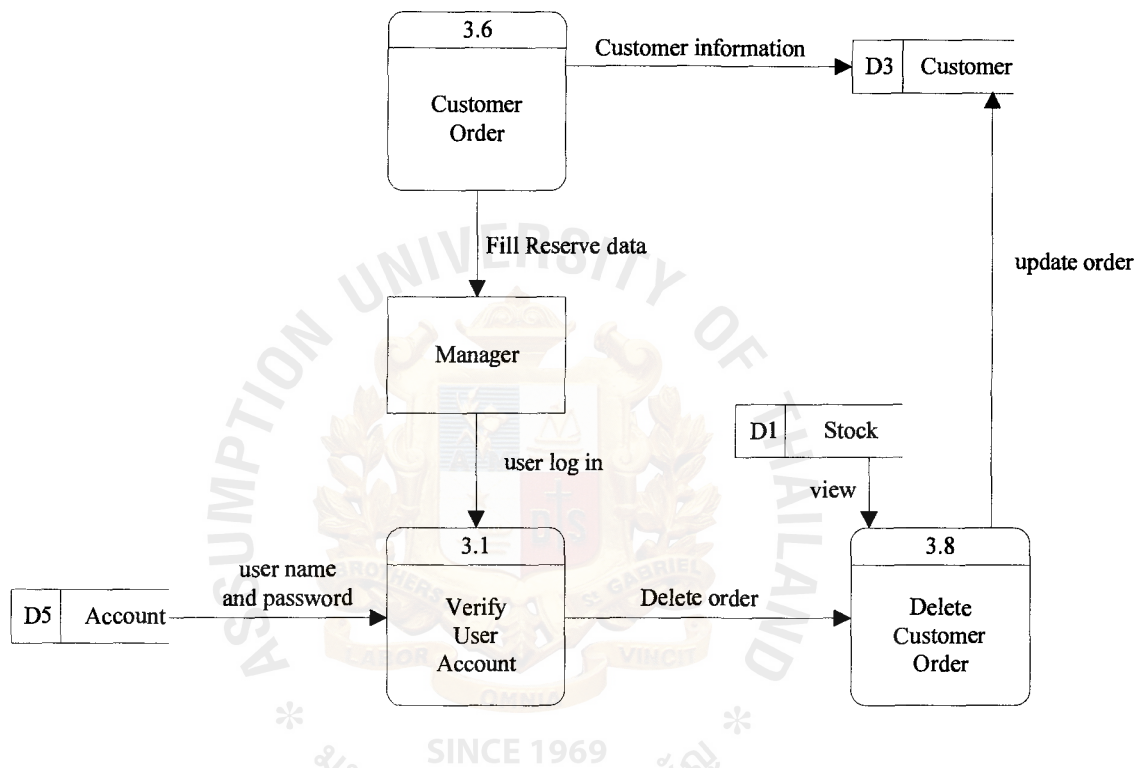
Figure A.12. Level 1 Data Flow Diagram of Delete Customer Order.
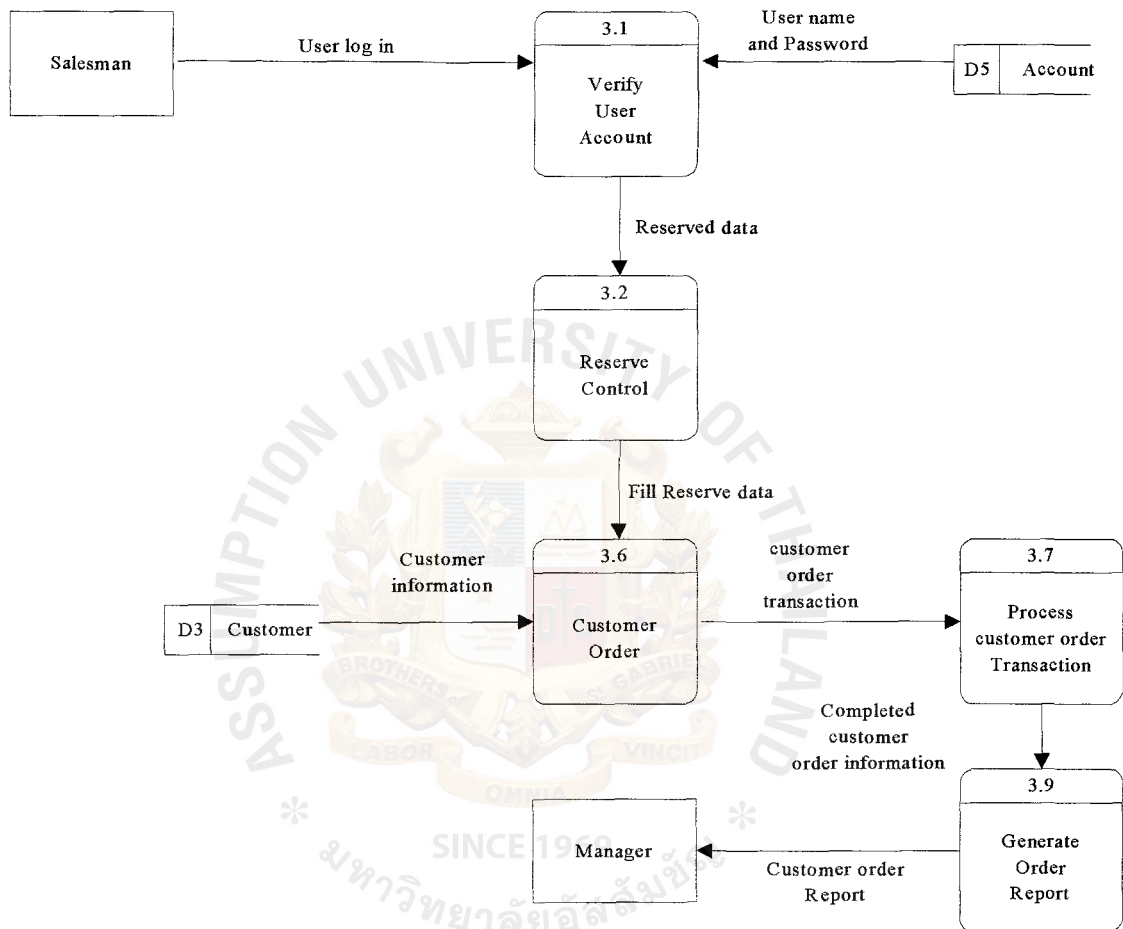
Figure A.13.   Level 1 Data Flow Diagram of Generate Customer Order Report.
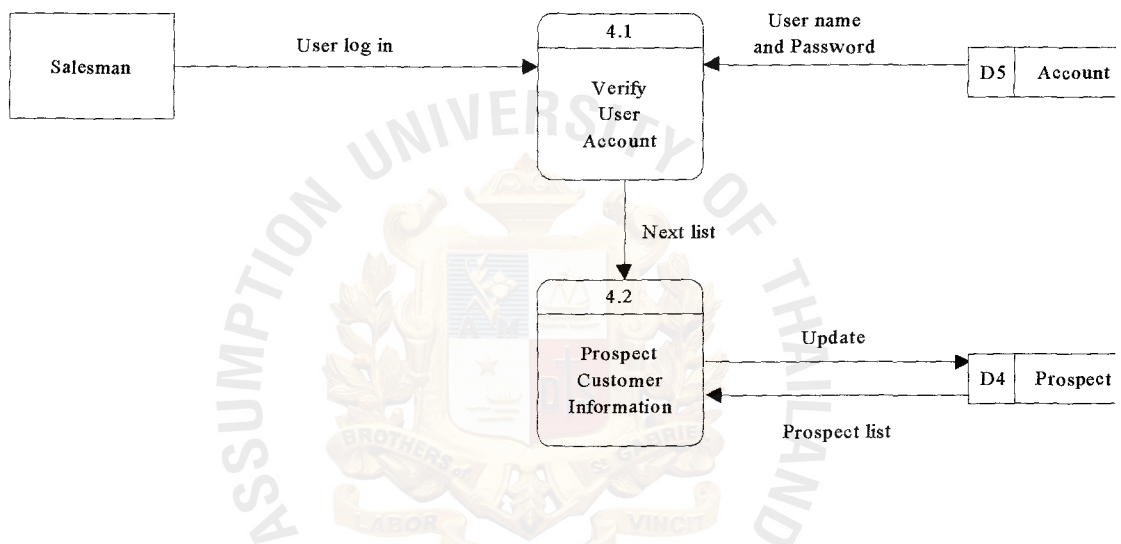
Figure A.14.   Level 1 Data Flow Diagram of Input the Prospect Customer.
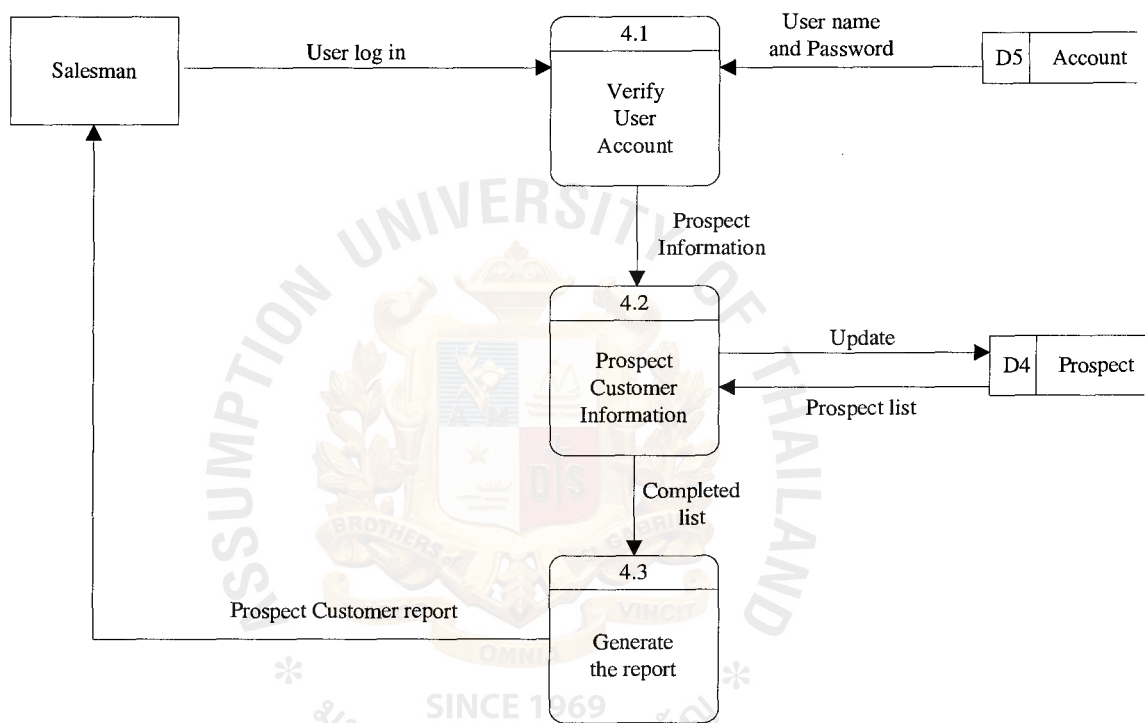
Figure A.15. Level 1 Data Flow Diagram of Generate Prospect Customer report.

# APPENDIX   B

PROCESS SPECIFICATION

# PROCESS SPECIFICATION

Table B.1.  Process Specification of Verify the User Account.

| Items | Description |
|---|---|
| Process Name: | Verify the user account |
| Data In: | User's name and password |
| Data Out: | Valid user information<br>Invalid message |
| Process: | (1) User fills the user's name and password<br>(2) Compare (1) with account database<br>(3) If it is valid<br>     Then go to used car menu<br>     Else invalid message appears on screen |
| Attachment: | (1) Account Data Store |

Table B.2.  Process Specification of Process Data on the Web.

| Items | Description |
|---|---|
| Process Name: | Process data on the web |
| Data In: | Get the new stock data |
| Data Out: | Used car's information is presented on the browser |
| Process: | (1) Input new stock data for used car Data Store |
| Attachment: | (1) Used car Data Store |

Table B.3.  Process Specification of Process Photo on the Web.

| Items | Description |
|---|---|
| Process Name: | Process photo on the web |
| Data In: | Get photo that matches with each used car |
| Data Out: | Used car photo is presented on the browser |
| Process: | (1) Input photo from photo Data Store |
| Attachment: | (1) Photo Data Store |

Table B.4. Process Specification of Process Reserve Status.

| Items | Description |
|---|---|
| Process Name: | Process reserve status |
| Data In: | Get reserved car info |
| Data Out: | "Reserve" is appeared on page of reserved car on the browser |
| Process: | (1) Manager appears the reserved<br>(2) When used car is reserved, "Re serve" work is appeared on the page of reserved car automatically<br>(3) If over the appointment's day to order, "Reserved" is deleted automatically |
| Attachment: | (1) Reserve Data Store |

Table B.5. Process Specification of Delete Sold Out Used Car.

| Items | Description |
|---|---|
| Process Name: | Delete sold out used car |
| Data In: | Get customer order info |
| Data Out: | Sold out car's page is deleted |
| Process: | (1) when finishing customer order transaction, sold out car's page is deleted automatically |
| Attachment: | (1) Customer Data Store |

Table B.6. Process Specification of Reserve Control.

| Items | Description |
|---|---|
| Process Name: | Reserve control |
| Data In: | Input the reserve's information |
| Data Out: | Information occurs on the screen |
| Process: | (1) Input the customer's information, wanted reserve car's information and payment condition<br>(2) Show information on the screen<br>(3) Customer can check the correctness on the screen |
| Attachment: | (1) Reserve Data Store<br>(2) Used car Data Store |

Table B.7. Process Specification of Process Reserve Transaction.

| Items | Description |
|---|---|
| Process Name: | Process reserve transaction |
| Data In: | Get the reserve information |
| Data Out: | Reserve info into Data Store |
| Process: | (1) Execute the reserve information on the screen to customer Data Store<br>(2) These info are used to generate the report |
| Attachment: | (1) Reserve Data Store |

Table B.8. Process Specification of Approve the Condition.

| Items | Description |
|---|---|
| Process Name: | Approve the condition |
| Data In: | Get the reserve information |
| Data Out: | Reserve slip screen |
| Process: | (1) After the manager verifies the user name and password, go to click Approve button |
| Attachment: | (1) Reserve Data Store |

Table B.9. Process Specification of Transfer Data.

| Items | Description |
|---|---|
| Process Name: | Transfer data |
| Data In: | Reserve information |
| Data Out: | Customer order information occurs on the screen |
| Process: | (1) Reserve data is automatically transferred to Customer Data Store |
| Attachment: | (1) Reserve Data Store<br>(2) Customer Data Store |

Table B.10. Process Specification of Customer Order.

| Items | Description |
|---|---|
| Process Name: | Customer order |
| Data In: | Reserve information after approval |
| Data Out: | Customer order information |
| Process: | (1) Get customer information on a screen<br>(2) Input addition information per ordering |
| Attachment: | (1) Customer Data Store<br>(2) Used car Data Store |

Table B.11. Process Specification of Process Customer Order Transaction.

| Items | Description |
|---|---|
| Process Name: | Process customer order transaction |
| Data In: | Get customer order information |
| Data Out: | Customer order info into Data Store |
| Process: | (1) Execute the customer order information on the screen to customer Data Store<br>(2) These information are used to generate the report |
| Attachment: | (1) Customer Data Store |

Table B.12. Process Specification of Prospect Customer Information.

| Items | Description |
|---|---|
| Process Name: | Prospect customer information |
| Data In: | New prospect customer |
| Data Out: | Prospect customer list |
| Process: | (1) Input new prospect customers<br>(2) Execute them into database<br>(3) Generate report for follow-up |
| Attachment: | (1) Prospect Data Store |
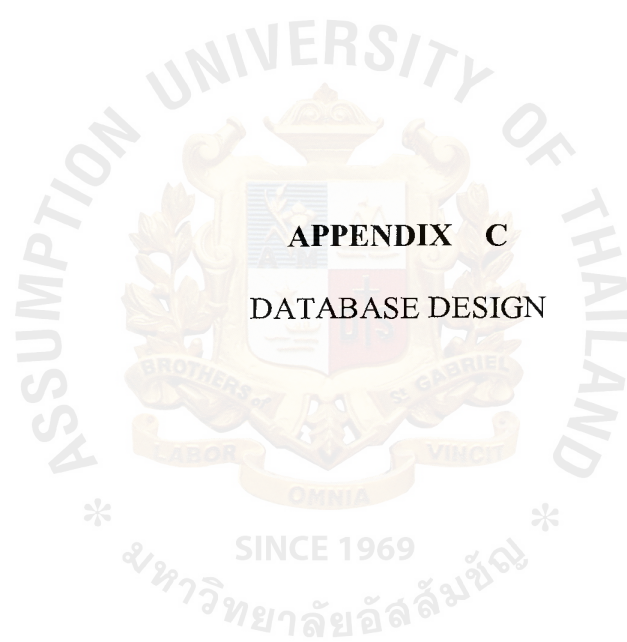
**APPENDIX   C**

DATABASE DESIGN

## Customer

| |
|---|
| Cus_id [pk] |
| Name prefix |
| Lastname |
| Contact address |
| Tel_no |
| Mobile |
| FAX |
| Nearest place |
| Tumbon |
| Occupation |
| Office Address |
| Office Tel |
| Car License |
| Engine_no. |
| Color |
| Series |
| Year |

## Manager

| |
|---|
| Mgr_id [pk] |
| Mgr_name |
| Mgr_lastname |
| Mgr_address |
| Mgr_telephone |
| Department |
| Work history |
| Mgr_mobile |

## Salesman

| |
|---|
| Sales_id [pk] |
| Sales_name |
| Sales_surname |
| Sales_address |
| Sales_telephone |
| Sales_work history |
| Sales_mobile |

## Prospect

| |
|---|
| Prospect_id [pk] |
| Prospect_name |
| Prospect_lastname |
| Prospect_Telephone |
| Prospect_mobile |
| Prospect_address |
| Interested car |
| Date of Contract |

## Stock Department

| |
|---|
| Stock Staff_id [pk] |
| name |
| surname |
| Used car information· |

## Reserve Control

| |
|---|
| Reserve_no.[pk] |
| Sales_id [pk] |
| Cust_id [pk] |
| date of delivery car |
| time of delivery car |
| date of reserve |
| No. of reserve card |
| Approval person |
| Reserve_Car_brand |
| Reserve_Car_series |
| Reserve_Car_engine |
| Reserve_Car_color |
| Reserve_Car_year |
| Reserve_Car_key |
| Cash |
| Hire purchase |
| Interested rate |
| Down payment |
| No._of_month |
| Installation_amount |
| Deposit_amount/ |
| Price |
| Net_balance |
| Turn price |
| Date_of_deppsit |
| No._of Inv/receipt |

## Customer Order

| |
|---|
| Order_no.[pk] |
| Sales_id [pk] |
| Cust_id [pk] |
| Guarantee_name |
| Cusf_idcard |
| Guarantee_idcard |
| Guarantee_addredd |
| Guarantee_office |
| Guarantee_tel |
| Guarantee_mobile |
| Guarantee_Fax |
| Guarantee_Place |
| Guarantee_officercard |
| No_of_order_receipt |
| No_of_cheque |
| No_cashier_cheque |
| Cashier_name |
| Date_of_payment |
| wife_name |
| wife_office |
| wife_Telephone |
| address_from_idcard |
| other_accessory |

generates

reserve/order

make a transaction

make a transaction

transfer

make the list

inform

Figure C.1. Entity Relationship Diagram of Used Car Information System.

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Table C.1.   Structure of Customer.

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|---|---|---|---|---|---|---|---|---|
| 1 | Customer Id | int(10) | Y | Y | | Customer Order and Resreve Control | | Primary Key |
| 2 | Prefix | int(10) | | | | | | Attribute |
| 3 | Name | varchar(15) | Y | | | | | Attribute |
| 4 | Last name | varchar(25) | Y | | | | | Attribute |
| 5 | Contact address | varchar(50) | | | | | | Attribute |
| 6 | Phone | int(15) | | | Y | | | Attribute |
| 7 | Mobile | int(15) | | | Y | | | Attribute |
| 8 | Fax | int(15) | | | Y | | | Attribute |
| 9 | Nearest place | varchar(15) | | | | | | Attribute |
| 10 | Tumbon | varchar(15) | Y | | | | | Attribute |
| 11 | Occupation | varchar(15) | | | | | | Attribute |
| 12 | Office address | varchar(50) | | | | | | Attribute |
| 13 | Office telephone | int(10) | | | | | | Attribute |
| 14 | Car license | varchar(10) | Y | Y | Y | | | Attribute |
| 15 | Engine No. | varchar(10) | Y | Y | Y | | | Attribute |
| 16 | Frame No. | varchar(10) | Y | Y | Y | | | Attribute |

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Table C.1.  Structure of Customer (Continued).

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|-----|-----------|-----------|-------|--------|----------|---------------------|-------|----------|
| 17 | Series | varchar(15) | | | | | | Attribute |
| 18 | Color | varchar(10) | | | | | | Attribute |
| 19 | Year | int(10) | | | | | | Attribute |

Table C.2.  Structure of Salesperson Table.

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|-----|-----------|-----------|-------|--------|----------|---------------------|-------|----------|
| 1 | Salesperson Id | int(10) | Y | Y | | Customer Order and Reserve Control | | Primary Key |
| 2 | Prefix | varchar(10) | | | | | | Attribute |
| 3 | Salesperson name | varchar(15) | | | | | | Attribute |
| 4 | Salesperson last name | varchar(25) | | | | | | Attribute |
| 5 | Salesperson address | varchar(50) | | | | | | Attribute |
| 6 | Salesperson phone | int(10) | | | | | | Attribute |
| 7 | Salesperson mobile | int(10) | | | Y | | | Attribute |
| 8 | Work history | varchar(50) | | | | | | Attribute |

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Table C.3.   Structure of Prospect.

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|---|---|---|---|---|---|---|---|---|
| 1 | Prospect Id | int(10) | Y | Y | | | | Primary Key |
| 2 | Prefix | varchar(10) | | | | | | Attribute |
| 3 | Prospect name | varchar(15) | | | | | | Attribute |
| 4 | Prospect last name | varchar(25) | | | | | | Attribute |
| 5 | Prospect address | varchar(50) | | | | | | Attribute |
| 6 | Prospect phone | int(10) | | | | | | Attribute |
| 7 | Prospect mobile | int(10) | | | Y | | | Attribute |
| 8 | Interested car | varchar(15) | | | | | | Attribute |
| 9 | Date of contact | int(15) | Y | | | | | Attribute |

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Table C.4. Structure of Manager.

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|-----|-----------|-----------|-------|--------|----------|---------------------|-------|----------|
| 1 | Manager Id | int(10) | Y | Y | | | | Primary Key |
| 2 | Prefix | varchar(10) | | | | | | Attribute |
| 3 | Manager name | varchar(15) | | | | | | Attribute |
| 4 | Manager last name | varchar(25) | | | | | | Attribute |
| 5 | Manager address | varchar(50) | | | | | | Attribute |
| 6 | Manager phone | int(10) | | | | | | Attribute |
| 7 | Manager mobile | int(10) | | | Y | | | Attribute |
| 8 | Manager work history | varchar(50) | | | | | | Attribute |
| 9 | Department | int(10) | Y | | | | | Attribute |

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Table C.5.    Structure of Stock Department.

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|---|---|---|---|---|---|---|---|---|
| 1 | Stock ID | int(10) | Y | Y | | | | Primary Key |
| 2 | Stock name | varchar(15) | | | | | | Attribute |
| 3 | Stock last name | varchar(25) | | | | | | Attribute |
| 4 | Used car information | varchar(50) | | | | | | Attribute |

Table C.6.    Structure of Reserve Control.

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|---|---|---|---|---|---|---|---|---|
| 1 | No.of reserve card | int(10) | Y | Y | | Customer Order | | Primary Key |
| 2 | Salesperson Id | int(10) | Y | Y | | Salesperson | | Foreign Key |
| 3 | Customer Id | int(10) | Y | Y | | Customer | | Foreign Key |
| 4 | Date of delivery car | int(10) | | | | | | Attribute |
| 5 | Time of delivery car | int(10) | | | Y | | | Attribute |
| 6 | Date of reserve | int(10) | | | | | | Attribute |

Table C.6.   Structure of Reserve Control (Continued).

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|-----|------------|-----------|-------|--------|----------|---------------------|-------|----------|
| 7 | Approval person | int(10) | | | | | | Attribute |
| 8 | Reserve car brand | varchar(15) | | | | | | Attribute |
| 9 | Reserve car series | varchar(15) | | | | | | Attribute |
| 10 | Reserve car engine no. | varchar(15) | | Y | | | | Attribute |
| 11 | Reserve car frame no. | varchar(15) | | Y | | | | Attribute |
| 12 | Reserve car color | varchar(15) | | | | | | Attribute |
| 13 | Reserve car year | int(10) | | | | | | Attribute |
| 14 | Reserve car key | int(10) | | Y | | | | Attribute |
| 15 | Cash | varchar(10) | | | Y | | | Attribute |
| 16 | Hire purchase | varchar(10) | | | Y | | | Attribute |
| 17 | Interest rate | int(10) | | | Y | | | Attribute |
| 18 | Down payment | int(10) | | | Y | | | Attribute |
| 19 | No. of month | int(10) | | | Y | | | Attribute |
| 20 | Installation amount | int(10) | | | Y | | | Attribute |
| 21 | Deposit amount | int(10) | | | | | | Attribute |
| 22 | Price | int(10) | | | | | | Attribute |

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Table C.6.   Structure of Reserve Control(Continued).

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|---|---|---|---|---|---|---|---|---|
| 23 | Turned price | int(10) | | | Y | | | Attribute |
| 24 | Date of deposit | int(10) | | | | | | Attribute |
| 25 | No. of reserve receipt | int(10) | | | | | | Attribute |

Table C.7.   Structure of Customer Order.

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|---|---|---|---|---|---|---|---|---|
| 1 | Order No. | int(10) | Y | Y | | | | Primary Key |
| 2 | Salesperson Id | int(10) | Y | Y | | Salesperson | | Foreign Key |
| 3 | Customer Id | int(10) | Y | Y | | Customer | | Foreign Key |
| 4 | Customer Id.card | int(15) | Y | Y | | | | Atttribute |
| 5 | Guarantor Id card | int(15) | | Y | | | | Atttribute |
| 6 | Guarantor address | varchar(50) | | | | | | Atttribute |
| 7 | Guarantor office address | varchar(50) | | | | | | Atttribute |
| 8 | Guarantor occupation | varchar(15) | | | | | | Atttribute |

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Table C.7.　Structure of Customer Order(Continued).

| No. | Field Name | Field Type | Index | Unique | Nullable | Foreign Key to Table | Check | Key Type |
|-----|-----------|------------|-------|--------|----------|----------------------|-------|----------|
| 9 | Guarantor phone | int(10) | | | | | | Attribute |
| 10 | Guarantor mobile | int(10) | | | Y | | | Attribute |
| 11 | Guarantor fax | int(10) | | | Y | | | Attribute |
| 12 | Guarantor nearest place | varchar(15) | | | | | | Attribute |
| 13 | Guarantor offiicial card | int(15) | | | Y | | | Attribute |
| 14 | No.of order receipt | int(15) | | | | | | Attribute |
| 15 | Date of payment | int(15) | | | | | | Attribute |
| 16 | Wife's name | varchar(15) | | | Y | | | Attribute |
| 17 | Wife's office | varchar(50) | | | Y | | | Attribute |
| 18 | Wife's office phone | int(10) | | | Y | | | Attribute |
| 19 | Address from Id card | varchar(50) | | | | | | Attribute |
| 20 | Other accessaries | varchar(50) | | | Y | | | Attribute |

# APPENDIX   D

## DATA DICTIONARY

# DATA DICTIONARY

Table D.1.  Data Dictionary of Used Car Information System.

| Data | Meaning |
|---|---|
| Approval reserve information | Approval reserve is informed to salesperson |
| Completed customer order information | Wanted information to generate the report |
| Completed list | Wanted list to generate the report |
| Completed reserve information | Reserve information that are wanted to generate the report |
| Condition approval | Manager approves the condition |
| Create the stock | Stock data is sent by stock department |
| Customer data | Data is stored in customer database |
| Customer information | Get customer information |
| Customer order information | Get customer order information |
| Customer order report | Report to manager |
| Delete reserve information | Reserve information is deleted |
| Delete the data | Sold out used car |
| Delete the order | Delete customer order information |
| Filled reserve data | Process reserve transaction |
| Informing the reserve | Manager is informed about the reserve |
| Invalid message | Invalid message appears when user fills in the wrong username or password |
| New list | New list of prospect customer |
| Ordered product | Customer order transaction to customer |
| Prospect customer report | Report to salesperson |
| Prospect list | Prospect information from the database |
| Reserve the data | Data is input in reserve screen |
| Reserve information | Transfer reserve information database to customer database |

Table D.1. Data Dictionary of Used Car Information System (Continued).

| Data | Meaning |
|---|---|
| Reserve information | Get reserve information |
| Reserve report | Report to manager |
| Reserve slip | Slip is issued |
| Sending reserve slip | Reserve slip is sent to customer |
| Update customer | Update customer information |
| Update reserve | Update reserve data to reserve database |
| Update reserve status | Update reserve status |
| Upload photo | Upload the used car photo to the web |
| Used car's data | User processes the used car's data |
| User login | User's name and password that user fills in |
| Username and password | User has to fill user's name and password. If they are incorrect, user cannot access to the system |
| View | Check the stock |

# APPENDIX   E

## STRUCTURE DESIGN
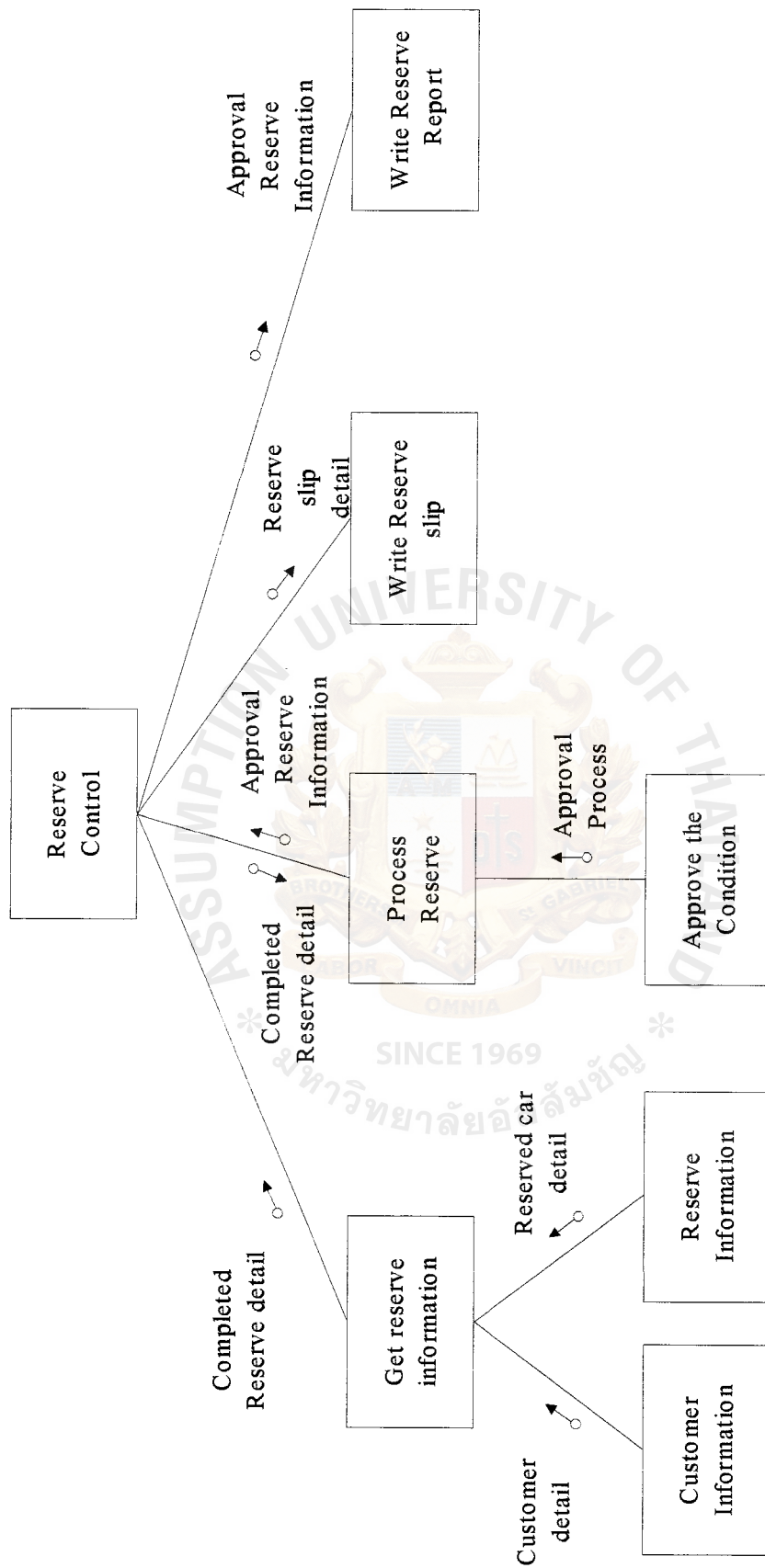
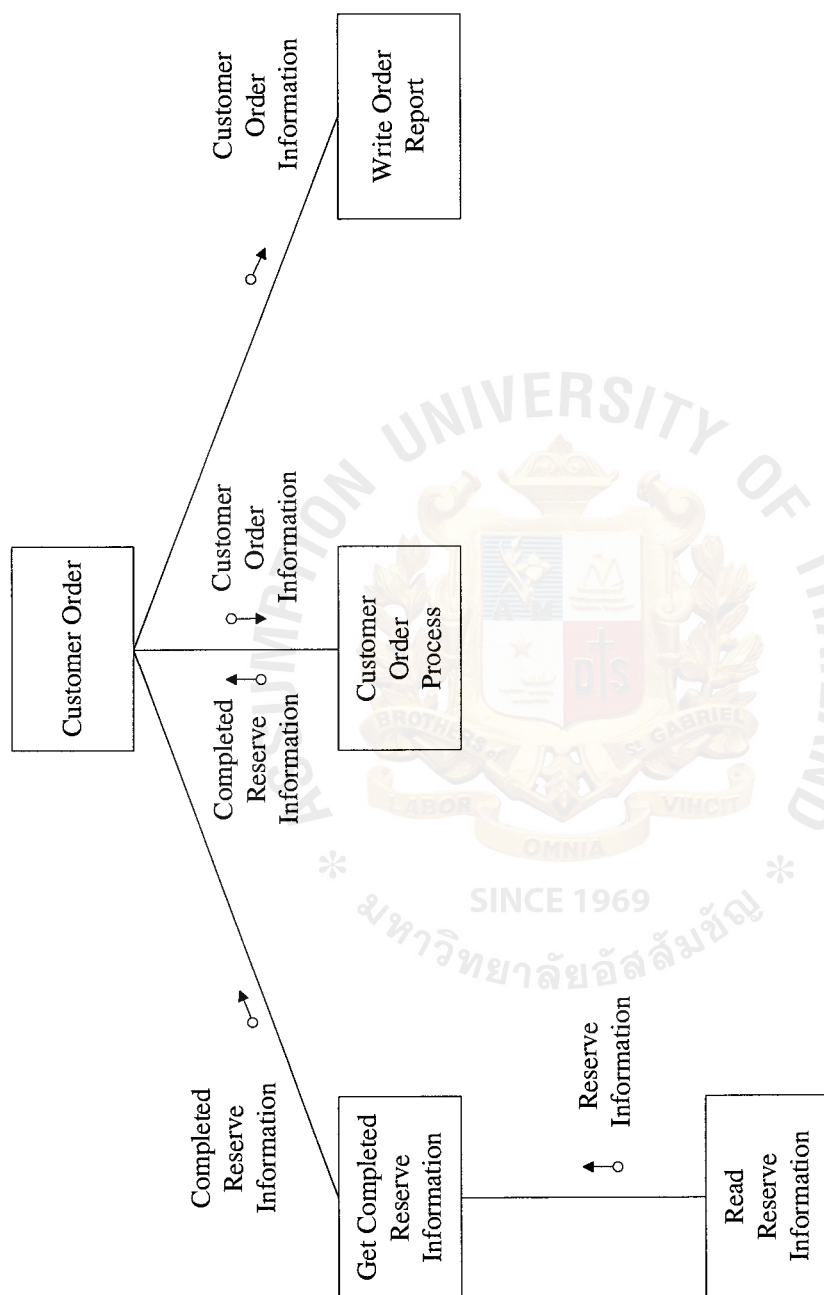Figure E.1. Structure Design of Reserve Control Process.
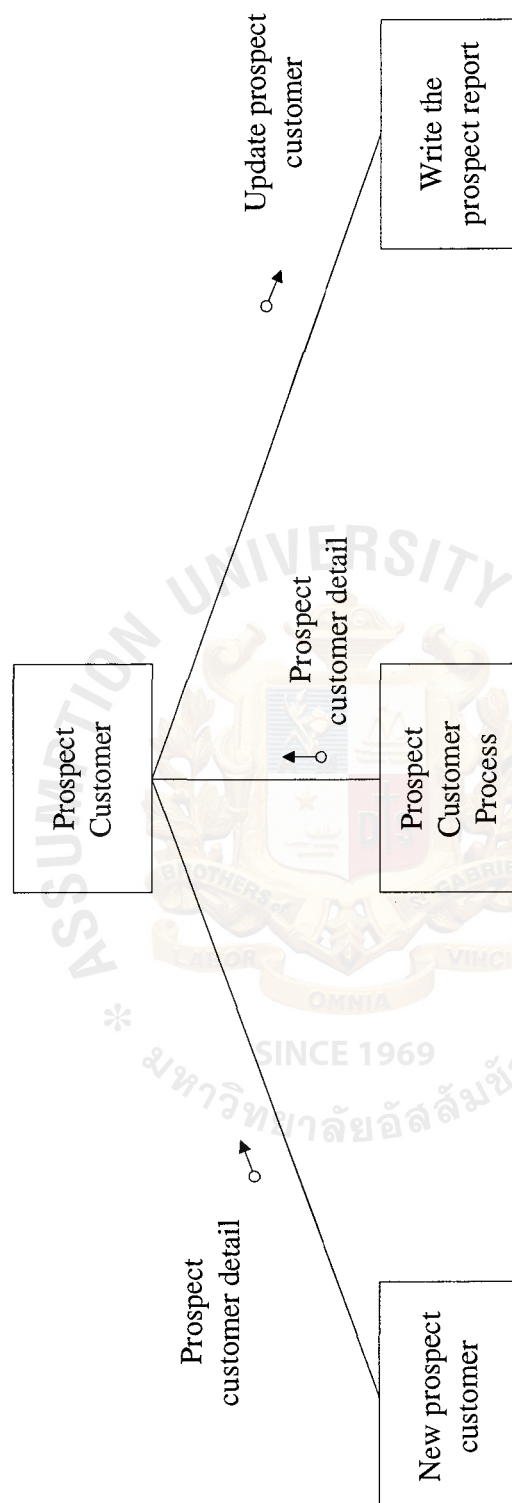
Figure E.2. Structure Design of Customer Order Process.

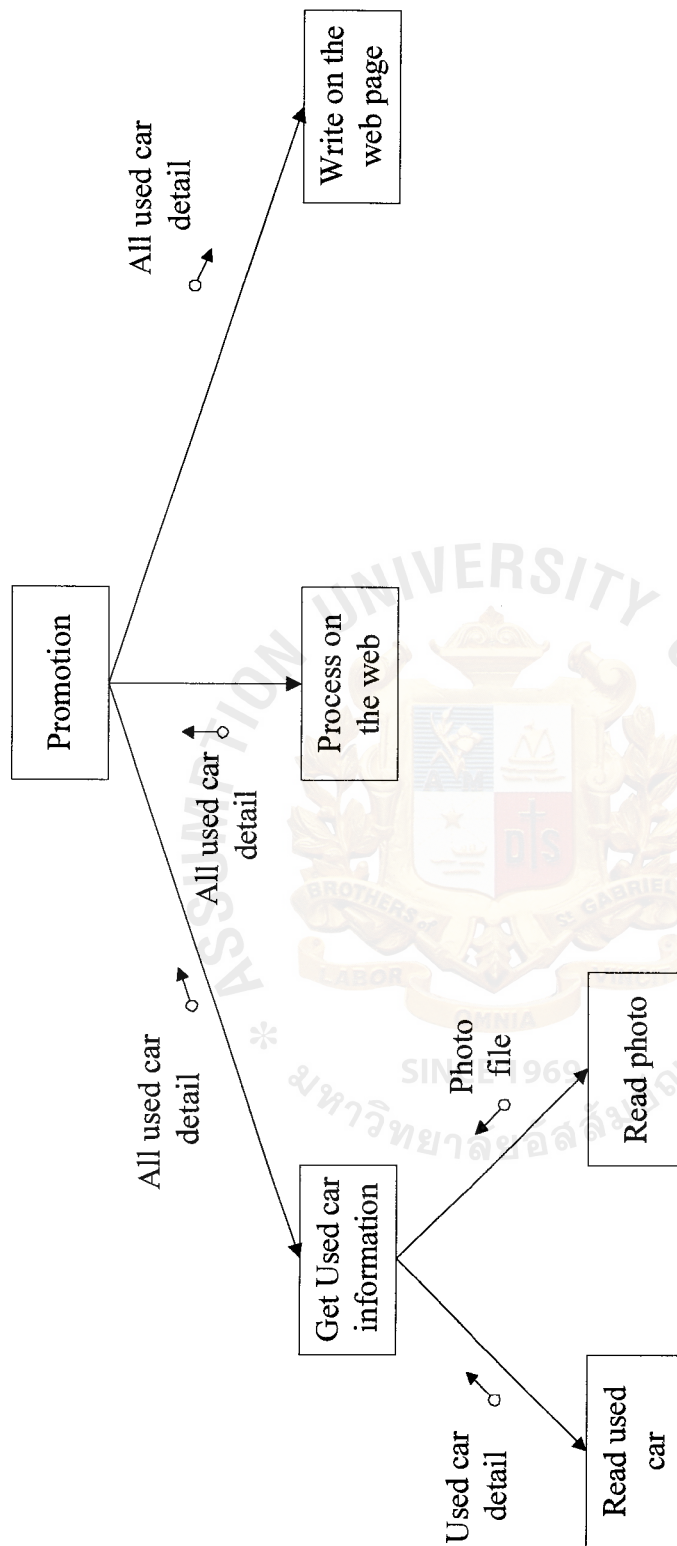Figure E.3.    Structure Design of Prospect Customer.

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Figure E.4.   Structure Design of Promotion Process.

**APPENDIX   F**

REPORT DESIGN

| No. | Cus.id | Prefix | Cus.name | Contact Address | Phone | Mobile | Fax | Nearest Place | Occupation |
|-----|--------|--------|----------|-----------------|-------|--------|-----|---------------|------------|
| 1 | 440001 | นาย | อุดม แสงไม | 68/1 ต.ตากกแดด อ.เมือง จ.ชุมพร86000 | 511689 | 2859784 | - | รพ.ชุมพร | ข้าราชการ |
| 2 | 440002 | นาย | กิตติ รุ่งเรืองเดช | 85/98 ม.2 ต.ทานแพ อ.สวี จ.ชุมพร86000 | 501478 | - | - | การไฟฟ้า | ข้าราชการ |
| 3 | 440003 | นาง | สมใจ โสสะอาด | 31/69 ถ.ท่าตะเภา อ.เมือง จ.ชุมพร86000 | 502346 | - | 502346 | บ้านนอนเตีย | ค้าขาย |
| 4 | 440004 | นาย | โชพาล โตสัตย์ซื่อ | 4 ม.1 ต.ถ่มผม อ.หลังสวนจ.ชุมพร86000 | 511235 | - | - | ต.ถ่าชิวจ | ข้าราชการ |
| 5 | 440005 | นาง | แดง แช่ตั้ง | 72 ม.4 ต.บ้านหอก อ.มาบอ่ามเปค จ.ชุมพร86000 | | 6487954 | 511963 | แยกไฟดาว | เกษตรกร |
| 6 | 440006 | นาย | ใจ มั่นคง | 66 ม1 ต.คลองวาน อ.มาบอ่ามเปค จ.ชุมพร 86000 | 501456 | - | | คลองวาน | เกษตรกร |
| 7 | 440007 | นาง | สุขใจ รักถิ่นไทย | 12/1 ม.1 ต.ถ่มผม อ.หลังสวน จ.ชุมพร86000 | 511879 | - | - | ต.ศ่าชิวจ | ข้าราชการ |
| 8 | 440008 | นาย | อภิชาติ ชูยั่น | 3/7 ถ.ท่าชาว ต.ตากกแดด อ.เมือง จ.ชุมพร86000 | 514236 | 5468792 | - | การตา | เกษตรกร |
| 9 | 440009 | นาย | ดำ ปานแย้ง | 5 ม.2 ต.บ้านมิง อ.ท่าแซะ จ.ชุมพร 86000 | 502001 | - | 501258 | โรงนายด้า | เกษตรกร |

SCH COMPANY 123/4 Chumporn-Wangpai Rd., T. Takdad, A. Muang Chumporn 86000

Figure. F.1. Customer Information That Reserves on June1, 2001.

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SCH COMPANY 123/4 Chumporn-Wangpai Rd., T. Takdad, A. Muang Chumporn 86000

| No. | Date | Sales.id | Cus.id | Cus.name | Brand | Engine.No | Frame.No | Color | Year | Price |
|-----|------|----------|--------|----------|-------|-----------|----------|-------|------|-------|
| 1 | 1/5/44 | S42002 | 440001 | ดุสิต แซ่ลิ้ม | Toyota | MR05J36 | EFI4512 | Red | 1998 | 350,000 |
| 2 | 1/5/44 | S42002 | 440002 | กิตติ รุ่งเรืองเลิศ | Toyota | MR05G36 | EFI4588 | Gold | 1998 | 280,000 |
| 3 | 3/5/44 | S42003 | 440003 | สมใจ ใสสะอาด | Toyota | AL001TR | 5L78978 | Blue | 1997 | 290,000 |
| 4 | 4/5/44 | S43010 | 440004 | ไพศาล ใจสัตย์ซื่อ | Isuzu | CU514OP | IE44470 | Blue | 1996 | 310,000 |
| 5 | 4/5/44 | S43011 | 440005 | แดง แซ่ตั้ง | Toyota | AL002TR | EFI4501 | Red | 1998 | 450,000 |
| 6 | 6/5/44 | S42002 | 440006 | ใจ มั่นคง | Mazda | WW001ER | EA11111 | Red | 1999 | 565,000 |
| 7 | 7/5/44 | S43015 | 440007 | สุขใจ รักถิ่นไทย | Isuzu | CU514OO | IE44369 | Green | 1995 | 546,000 |
| 8 | 7/5/44 | S42001 | 440008 | อำนาจ ขยัน | Isuzu | CU514OO | IE44445 | Green | 1994 | 325,000 |
| 9 | 8/5/44 | S43012 | 440009 | คำ ขันแข็ง | Mazda | WR001ER | EA11187 | Blue | 1997 | 215,000 |

Figure F.2.　Customer Information with Reserved Used Car Served by Each Salesperson.

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SCH COMPANY 123/4 Chumporn-Wangpai Rd., T. Takdad, A. Muang Chumporn 86000

| No. | Date | Cus.id | Cus.name | Brand | Engine.No. | price | Payment | D/P | Month | % | Installation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1/5/44 | 440001 | ยุพ แก้วิน | Toyota | MR05J36 | 350,000 | H | 100,000 | 36 | 4.50 | 7,260.00 |
| 2 | 1/5/44 | 440002 | กิตติ รุ่นเรืองเดช | Toyota | MR05G36 | 280,000 | C | - | - | - | - |
| 3 | 3/5/44 | 440003 | สมใจ ใครจาต | Toyota | AL001TR | 290,000 | C | - | - | - | - |
| 4 | 4/5/44 | 440004 | ไพศาล โชติชูชัย | Isuzu | CU514OP | 310,000 | H | 70,000 | 48 | 5.00 | 5,250.00 |
| 5 | 4/5/44 | 440005 | แอน แก้วิง | Toyota | AL002TR | 450,000 | H | 150,000 | 48 | 3.90 | 6,500.00 |
| 6 | 6/5/44 | 440006 | ใจ มั่นคง | Mazda | WW001ER | 565,000 | H | 200,000 | 12 | 4.25 | 31,280.00 |
| 7 | 7/5/44 | 440007 | ยุปใจ รักดินไทย | Isuzu | CU514OO | 546,000 | C | - | - | - | - |
| 8 | 7/5/44 | 440008 | อภิญาด ชูชื่น | Isuzu | CU514OO | 325,000 | C | - | - | - | - |
| 9 | 8/5/44 | 440009 | ดำ ขันแข็ง | Mazda | WR001ER | 215,000 | H | 50,000 | 24 | 4.25 | 7,170.00 |

Figure F.3.   Payment Condition.

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SCH COMPANY 123/4 Chumporn-Wangpai Rd.,T.Takdad, A.Muang Chumporn 86000

| No. | Cus.id | Cus.name | Tumbon | Remark |
|-----|--------|----------|--------|--------|
| 1 | 440001 | ฤุดม แซ่ลิ้ม | ต.ตากแดด | - |
| 2 | 440008 | อภิชาต ขุยั่น | ต.ตากแดด | - |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Figure F.4. Customer Information That Orders The Car Sorting by Tumbon Takdad.

| | | | SCH COMPANY 123/4 Chumporn-Wangpai Rd., T. Takdad, A. Muang Chumporn 86000 | | |
|---|---|---|---|---|---|
| No. | Sales.id | Cus.id | Cus.name | Date of delivery | Time of delivery | Remark |
| 1 | S42002 | 440001 | อุดม แซ่ตั้ม | 2/6/44 | 13.00 | - |
| 2 | S42002 | 440002 | กิตติ รุ่งเรืองเลิศ | 9/6/44 | 8.00 | - |
| 3 | S42003 | 440003 | สมใจ ใสสะอาด | 15/6/44 | - | แจ้งยกเลิกทีหลัง |
| 4 | S43010 | 440004 | ไพศาล ใจดียี่ห้อ | 19/6/44 | 9.39 | - |
| 5 | S43011 | 440005 | แดง แซ่ตั๊ง | 28/6/44 | 11.59 | - |
| 6 | S42002 | 440006 | ใจ มั่นคง | 19/6/44 | 13.33 | - |
| 7 | S43015 | 440007 | สุใจ รักถิ่นไทย | 7/6/44 | 9.30 | - |
| 8 | S42001 | 440008 | อภิชาต ขยัน | 1/6/44 | 8.00 | - |
| 9 | S43012 | 440009 | ดำ ขันแข็ง | 30/6/44 | 17.00 | - |

Figure F.5.   Customer Information with Date of Car Delivery and Time of Car Delivery.

| SCH COMPANY 123/4 Chumporn-Wangpai Rd.,T.Takdad, A.Muang Chumporn 86000 | | | | | | |
|---|---|---|---|---|---|---|
| No. | Cus.id | Cus.name | Price | Turned price | Deposit | Net Balance | Remark |
| 1 | 440089 | สุเทพ มั่นคงดี. | 450,000.00 | 200,000.00 | 10,000.00 | 240,000.00 | - |
| 2 | 440100 | เจนจบ รามกิจการ | 280,000.00 | 190,000.00 | 5,000.00 | 185,000.00 | - |
| 3 | 440023 | ลำจวน สวยดี. | 450,000.00 | 250,000.00 | 10,000.00 | 190,000.00 | - |
| 4 | 440051 | ธนธร ฤกษ์มหาร | 500,000.00 | 200,000.00 | 5,000.00 | 295,000.00 | - |
| 5 | 440023 | วิภา ใฝ่ความรู้. | 500,000.00 | 120,000.00 | 5,000.00 | 375,000.00 | - |
| 6 | 440019 | นักรบ คู่บุญธรรม | 480,000.00 | 268,000.00 | 5,000.00 | 207,000.00 | - |
| 7 | 440073 | ฉาย ศรีประเสริฐ | 546,000.00 | 290,000.00 | 6,000.00 | 250,000.00 | - |
| 8 | 440056 | โสภี เก้าห้างงาม | 600,000.00 | 300,000.00 | 10,000.00 | 290,000.00 | - |
| 9 | 440033 | ประหยัด มากทวี. | 550,000.00 | 233,000.00 | 5,000.00 | 312,000.00 | - |

Figure F.6.    Net Price After Deducting Turned Price.

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| No. | Date | Cus.id | Cus.name | Brand | Engine.No | Frame No | Color | Year | Price | Approval |
|-----|------|--------|----------|-------|-----------|----------|-------|------|-------|----------|
| | | | | | | SCH COMPANY 123/4 Chumporn-Wangpai Rd., T. Takdad, A. Muang Chumporn 86000 | | | | |
| 1 | 31/5/44 | 440004 | ไพศาล โฆสิตชัยชูชัย | Isuzu | CU5140P | IE44470 | Blue | 1996 | 310,000 | M39001 |
| 2 | 31/5/44 | 440005 | แดง แอ๊ปเปิ้ล | Toyota | AL002TR | EFI4501 | Red | 1998 | 450,000 | M39001 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Figure F.7.    Delete Ordered Car.

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SCH COMPANY 123/4 Chumporn-Wangpai Rd., T. Takdad, A. Muang Chumporn 86000

| No. | Date | Cus.name | Contact Address | Phone | Mobile | Fax | Interested car | Source | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/5/44 | จำปา รักมาก | 514 ต.ตากแดด อ.เมือง จ.ชุมพร86000 | 511288 | - | - | Toyota | Q | - |
| 2 | 11/5/44 | ประเวช ดีเลิศ | 54/7 ม.2 ต.ภากแฟ อ.สวี จ.ชุมพร86000 | 511456 | - | 511457 | Ford | C | - |
| 3 | 15/5/44 | เพ็ญ รักห้องฟ้า | 1/69 ถ.ท่าตะเภา อ.เมือง จ.ชุมพร86000 | 501235 | - | 501236 | Mitsu | W | - |
| 4 | 15/5/44 | สมัคร ว่างๆ | 4/8 ม.3 ต.ถามม อ.หลังสวน จ.ชุมพร86000 | 501226 | 8978546 | - | Isuzu | W | - |
| 5 | 18/5/44 | ประพัท รื้อออม | 2 ม.4 ต.บ้านนอก อ.มาบอำนาจเกิด จ.ชุมพร86000 | 511395 | - | - | Ford | W | - |
| 6 | 18/5/44 | ตากแดด สมใจ | 1 ม.1 ต.คลองสาม อ.นาบอ่านนุด จ.ชุมพร 86000 | 502333 | - | - | Toyota | W | - |
| 7 | 20/5/44 | ศรี ราคาดี | 12/1 ม.2 ต.ถนน อ.หลังสวน จ.ชุมพร86000 | 502666 | 8879541 | 502667 | Benz | C | - |
| 8 | 20/5/44 | ถาวร มีสุขใจ | 45 ถ.ท่ายาง ต.ตากแดด อ.เมือง จ.ชุมพร86000 | 511875 | - | - | Ford | W | - |
| 9 | 20/5/44 | ถุกม เก้าฟุกทาง | 5/1 ม.2 ต.บ้านมิ่ง อ.ท่าแซะ จ.ชุมพร 86000 | 511447 | 6395478 | 511448 | Toyota | C | |

Figure F.8.  Prospect Customer.

| SCH COMPANY 123/4 Chumporn-Wangpai Rd., T. Takdad, A. Muang Chumporn 86000 | | | | | |
|------|--------|----------|--------|-------|--------|
| No. | Date | Sales.id | Brand | Color | Remark |
| 1 | 1/6/44 | S42001 | isuzu | Green | - |
| 2 | 2/6/44 | S42002 | toyota | Red | - |
| 3 | 7/6/44 | S42003 | isuzu | Green | - |
| 4 | 9/6/44 | S42002 | toyota | Gold | - |
| 5 | 15/6/44 | S42003 | toyota | Blue | - |
| | | | | | |
| | | | | | |
| | | | | | |

Figure F.9.  Brand and Color of Cars That Were Sold Out during 1/6/44-15/6/44.

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**APPENDIX   G**

WEB INTERFACE DESIGN

Figure G.1. Login Form.

Figure G.2. Reserve Control.

TURNED CAR

Brand [Toyota]                    Series [Hilux Tiger]       Color [Gray Mica ▼]

Engine No. [MR30EE]               Frame No. [2L33P]          Key.No. [R0022]

Car License [1333]                Price [150,000]            Year [1994]

PAYMENT CONDITION

○ Cash

⊙ Hire Purchase

Price [            ]                       Price [450,000]

Deposit [            ]                     Deposit [5,000]

Turned price [            ]                Turned price [150,000]

Net Balance [            ]                 Net Balance [290,000]

                    Down payment [50,000]        Interest rate [5.00] %

                    No.of month [36]             Installation amount [7,150]

Date of deposit [15/06/44]        Approval person [M99001]

Amount [5,000]                    No.of receipt [01/099]

Date of delivery [30/07/44]                        Time of delivery [9:30]

Figure G.3.   Reserve Control.

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Figure G.4. Customer Order.

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Figure G.5. Customer Order.

Figure G.6.   Customer Order.

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Figure G.7. Customer Order.

Figure G.8.    Prospect Customer.

New Page 2 - Microsoft Internet Explorer

File  Edit  View  Favorites  Tools  Help

Back  Forward  Stop  Refresh  Home  Search  Favorites  History  Mail  Print  Edit  Messenger

Address  C:\My Documents\cus_web1_test.htm  Go  Links

SCH COMPANY 123/4 Chumporn-Wongpai Road, T.Tarkdad, A. Muang Chumporn 86000

ข้อมูลสถานยนต์มือสองฯ

เลือกลูกค้า

แจ้งกดหมาย

เดนภาพขักรถ

ข้อมูลภาพ

| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 |

Done  My Computer

Figure G.9. Instruction for the customer.

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Figure G.10.    Photos and Details.

Figure G.11.  Photo and Detail (Continued).

# APPENDIX   H

COST ANALYSIS

Table H.1.  Cost of Alternative Candidate 1, Baht.

| Cost Items | Description | Amount | Unit Price | Price |
|---|---|---|---|---|
| 1. Development Cost: | 1.1  Personnel Cost:<br>    System Analysts (180 hrs./ea) | 1 | 500.00 | 90,000.00 |
| |     IT Specialist (167 hrs/ea) | 1 | 450.00 | 75,000.00 |
| |     Programmer (200 hrs./ea) | 1 | 200.00 | 40,000.00 |
| | Subtotal 1: | | | 205,000.00 |
| | 1.2  Expense:<br>    Training Cost | 7 | 10,000.00 | 70,000.00 |
| |     Installation Cost | | | 3,400.00 |
| | Subtotal 2: | | | 73,400.00 |
| | 1.3  New Hardware:<br>    Server (Pentium III class) | 1 | 100,000.00 | 100,000.00 |
| |     Work Station (Pentium | 7 | 25,000.00 | 175,000.00 |
| |     Sony Digital camera | 2 | 12,500.00 | 25,000.00 |
| |     Epson LQ2170i | 3 | 11,000.00 | 33,000.00 |
| |     Ups 800 VA | 1 | 12,000.00 | 12,000.00 |
| |     Ups 500 VA | 6 | 2,500.00 | 15,000.00 |
| | Subtotal 3: | | | 360,000.00 |
| | 1.4  New Software:<br>    Server Software<br>    (operating system, miscellaneo | 1 | 90,000.00 | 90,000.00 |
| |     DBMS Client Software | 10 | 7,000.00 | 70,000.00 |
| | Subtotal 4: | | | 160,000.00 |
| | Total Development Cost | | | 798,400.00 |
| 2.  Operating Cost: | 2.1  Personnel Cost:<br>    IT Specialist | 1 | 250,000.00 | 250,000.00 |
| |     Manager | 1 | 300,000.00 | 250,000.00 |
| |     Staff | 6 | 520,000.00 | 520,000.00 |
| | Subtotal 1: | | | 1,020,000.00 |
| | 2.2  Maintenance:<br>    Hardware Maintenance | | | 52,000.00 |
| |     Software Maintenance | | | 33,000.00 |
| | Subtotal 2: | | | 85,000.00 |
| | Total Operating Cost | | | 1,105,000.00 |
| | Total Projceted Annual Cost | | | 1,903,400.00 |

Table H.2. Payback Analysis of Alternative Candidate 1, Baht.

| Cost Items | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Development Cost | -789,400.00 | - | - | - | - | - |
| Operation and Maintenance Cost | | -1,105,000.00 | -1,110,000.00 | -1,115,000.00 | -1,120,000.00 | -1,125,000.00 |
| Discount Factors (5%) | 1 | 0.95 | 0.91 | 0.86 | 0.82 | 0.78 |
| Time-Adjust Costs (Adjusted to Present Value | -798,400.00 | -1,049,750.00 | -1,010,100.00 | -958,900.00 | -918,400.00 | -877,500.00 |
| Cumulative Time-Adjusted Costs Over Lifetime | -798,400.00 | -1,848,150.00 | -2,858,250.00 | -3,817,150.00 | -4,735,550.00 | -5,613,050.00 |

Remark: Operating and Maintenance Cost Estimated Annual Growth Rate of 5%

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Benefit Derived from Operation of New System | - | 1,244,000.00 | 1,368,400.00 | 1,505,240.00 | 1,655,764.00 | 1,821,340.40 |
| Discount Factors (5%) | 1 | 0.95 | 0.91 | 0.86 | 0.82 | 0.78 |
| Time-Adjust Benefits (Adjusted to Present Value) | - | 1,181,800.00 | 1,245,244.00 | 1,294,506.40 | 1,357,726.48 | 1,420,645.51 |
| Cumulative Time-Adjusted Benefit Over Lifetime | - | 1,181,800.00 | 2,427,044.00 | 3,721,550.40 | 5,079,276.88 | 6,499,922.39 |

Remark: Benefits Derived from Operation of New System Estimated Annual Growth Rate of 5%

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Cumulative Lifetime Time-Adjusted Cost + Benefits | -798,400.00 | -666,350.00 | -431,206.00 | -95,599.60 | 343,726.88 | 886,872.39 |

Cumulative Cost, Baht
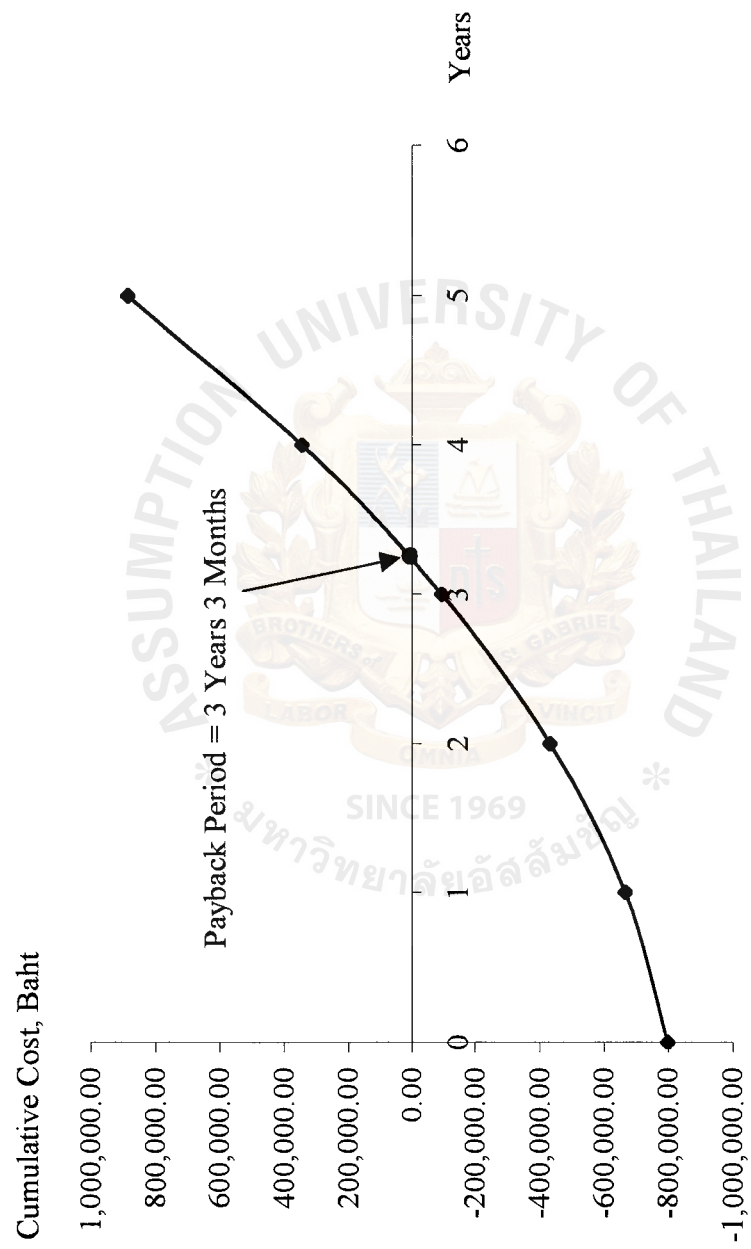
Payback Period = 3 Years 3 Months

Years

Figure H.1.  Payback Analysis of Candidate 1.

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Table H.3.    Cost of Alternative Candidate 2, Baht.

| Cost Items | Description | Amount | Unit Price | Price |
|---|---|---|---|---|
| 1. Development Cost: | 1.1  Personnel Cost: | | | |
| | System Analysts (180 hrs./ea) | 1 | 500.00 | 90,000.00 |
| | IT Specialist (167 hrs/ea) | 1 | 450.00 | 75,000.00 |
| | Programmer (200 hrs./ea) | 1 | 200.00 | 40,000.00 |
| | Subtotal 1: | | | 205,000.00 |
| | 1.2  Expense: | | | |
| | Training Cost | 10 | 15,000.00 | 150,000.00 |
| | Installation Cost | | | 2,000.00 |
| | Subtotal 2: | | | 152,000.00 |
| | 1.3  New Hardware: | | | |
| | Server (Pentium III class) | 1 | 124,500.00 | 124,500.00 |
| | Work Station (Pentium | 7 | 25,000.00 | 175,000.00 |
| | Epson LQ2170i | 3 | 11,000.00 | 33,000.00 |
| | Scanner | 1 | 5,000.00 | 5,000.00 |
| | Ups 800 VA | 1 | 12,000.00 | 12,000.00 |
| | Ups 500 VA | 6 | 2,500.00 | 15,000.00 |
| | Subtotal 3: | | | 364,500.00 |
| | 1.4  New Software: | | | |
| | Server Software | | | |
| | (operating system, miscellaneou | 1 | 50,000.00 | 50,000.00 |
| | DBMS Client Software | 9 | 55,000.00 | 495,000.00 |
| | Subtotal 4: | | | 545,000.00 |
| | Total Development Cost | | | 1,266,500.00 |
| 2.  Operating Cost: | 2.1  Personnel Cost: | | | |
| | IT Specialist | 1 | 250,000.00 | 250,000.00 |
| | Manager | 1 | 300,000.00 | 250,000.00 |
| | Staff | 6 | 520,000.00 | 520,000.00 |
| | Subtotal 1: | | | 1,020,000.00 |
| | 2.2  Maintenance: | | | |
| | Hardware Maintenance | | | 70,000.00 |
| | Software Maintenance | | | 39,000.00 |
| | Subtotal 2: | | | 109,000.00 |
| | Total Operating Cost | | | 1,129,000.00 |
| | Total Projceted Annual Cost | | | 2,395,500.00 |

Table H.4. Payback Analysis of Alternative Candidate 2, Baht.

| Cost Items | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Development Cost | -1,266,500.00 | - | - | - | - | - |
| Operation and Maintenance Cost | | -1,129,000.00 | -1,130,000.00 | -1,135,000.00 | -1,140,000.00 | -1,145,000.00 |
| Discount Factors (5%) | 1 | 0.95 | 0.91 | 0.86 | 0.82 | 0.78 |
| Time-Adjust Costs (Adjusted to Present Value) | -1,266,500.00 | -1,072,550.00 | -1,028,300.00 | -976,100.00 | -934,800.00 | -893,100.00 |
| Cumulative Time-Adjusted Costs Over Lifetime | -1,266,500.00 | -2,339,050.00 | -3,367,350.00 | -4,343,450.00 | -5,278,250.00 | -6,171,350.00 |

Remark: Operating and Maintenance Cost Estimated Annual Growth Rate of 5%

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Benefit Derived from Operation of New System | - | 1,244,000.00 | 1,368,400.00 | 1,505,240.00 | 1,655,764.00 | 1,821,340.40 |
| Discount Factors (5%) | 1 | 0.95 | 0.91 | 0.86 | 0.82 | 0.78 |
| Time-Adjust Benefits (Adjusted to Present Value) | - | 1,181,800.00 | 1,245,244.00 | 1,294,506.40 | 1,357,726.48 | 1,420,645.51 |
| Cumulative Time-Adjusted Benefit Over Lifetime | - | 1,181,800.00 | 2,427,044.00 | 3,721,550.40 | 5,079,276.88 | 6,499,922.39 |

Remark: Benefits Derived from Operation of New System Estimated Annual Growth Rate of 5%

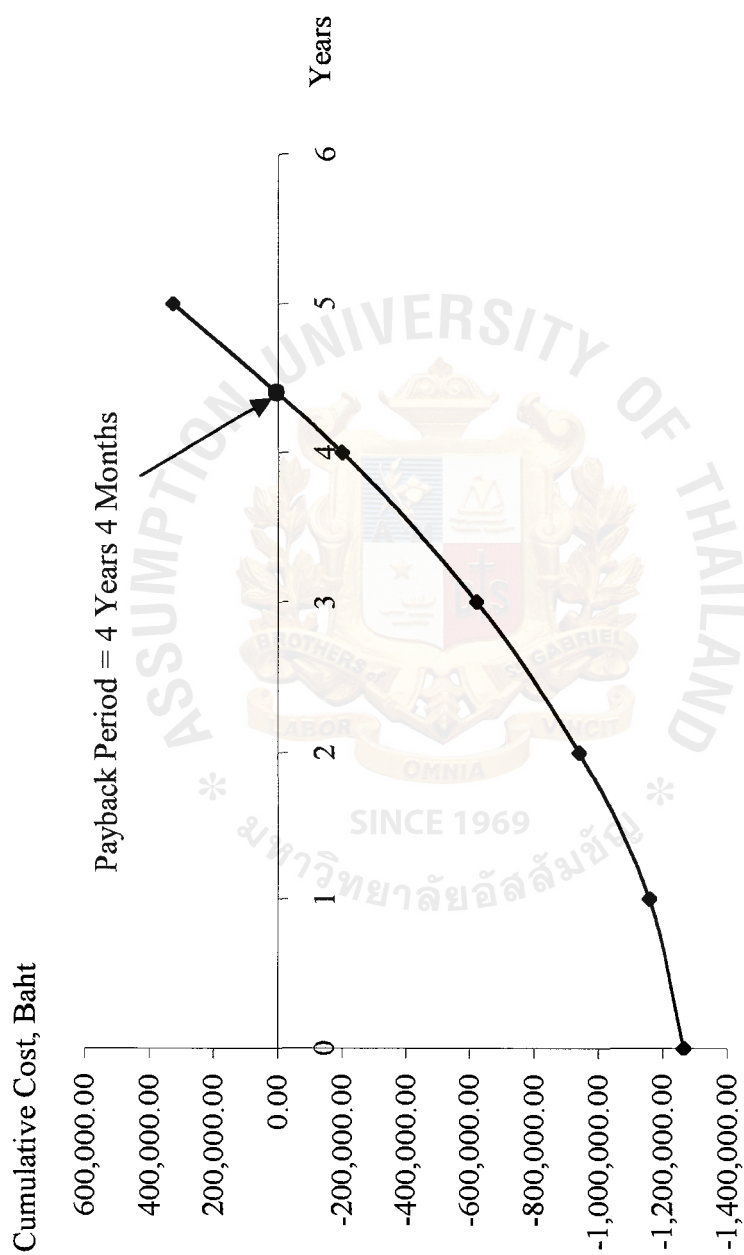| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Cumulative Lifetime Time-Adjusted Cost + Benefits | -1,266,500.00 | -1,157,250.00 | -940,306.00 | -621,899.60 | -198,973.12 | 328,572.39 |

Figure H.2.    Payback Period of Candidate 2.

Table H.5.  Cost of Alternative Candidate 3, Baht.

| Cost Items | Description | Amount | Unit Price | Price |
|---|---|---|---|---|
| 1. Development Cost: | | | | |
| | 1.1  Personnel Cost:<br>System Analysts (180 hrs./ea)<br>IT Specialist (167 hrs/ea)<br>Programmer (200 hrs./ea) | 1<br>1<br>1 | 500.00<br>450.00<br>200.00 | 90,000.00<br>75,000.00<br>40,000.00 |
| | Subtotal 1: | | | 205,000.00 |
| | 1.2  Expense:<br>Training Cost<br>Installation Cost | 10 | 8,000.00 | 80,000.00<br>10,000.00 |
| | Subtotal 2: | | | 90,000.00 |
| | 1.3  New Hardware:<br>Server (Pentium III class)<br>Work Station (Penium Celeron)<br>HP LaserJet<br>Epson LQ2170i | 1<br>7<br>1<br>3 | 140,000.00<br>25,000.00<br>40,500.00<br>10,000.00 | 140,000.00<br>175,000.00<br>40,500.00<br>30,000.00 |
| | Subtotal 3: | | | 385,500.00 |
| | 1.4  New Software:<br>Server Software<br>(operating system, miscellaneous<br>DBMS Client Software | 1<br>10 | 30,000.00<br>10,000.00 | 30,000.00<br>100,000.00 |
| | Subtotal 4: | | | 130,000.00 |
| | Total Development Cost | | | 810,500.00 |
| 2. Operating Cost: | | | | |
| | 2.1  Personnel Cost:<br>IT Specialist<br>Manager<br>Staff | 1<br>1<br>1 | 250,000.00<br>300,000.00<br>520,000.00 | 250,000.00<br>250,000.00<br>520,000.00 |
| | Subtotal 1: | | | 1,020,000.00 |
| | 2.2  Maintenance:<br>Hardware Maintenance<br>Software Maintenance | | | 40,000.00<br>46,000.00 |
| | Subtotal 2: | | | 86,000.00 |
| | Total Operating Cost | | | 1,106,000.00 |
| | Total Projceted Annual Cost | | | 1,916,500.00 |

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Table H.6. Payback Analysis of Alternative Candidate 3, Baht.

| Cost Items | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Development Cost | -810,500.00 | - | - | - | - | - |
| Operation and Maintenance Cost | | -1,106,000.00 | -1,110,000.00 | -1,115,000.00 | -1,120,000.00 | -1,125,000.00 |
| Discount Factors (5%) | 1 | 0.95 | 0.91 | 0.86 | 0.82 | 0.78 |
| Time-Adjust Costs (Adjusted to Present Value) | -810,500.00 | -1,050,700.00 | -1,010,100.00 | -958,900.00 | -918,400.00 | -877,500.00 |
| Cumulative Time-Adjusted Costs Over Lifetime | -810,500.00 | -1,861,207.00 | -2,871,300.00 | -3,830,200.00 | -4,748,600.00 | -5,626,100.00 |

Remark: Operating and Maintenance Cost Estimated Annual Growth Rate of 5%

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Benefit Derived from Operation of New System | - | 1,244,000.00 | 1,368,400.00 | 1,505,240.00 | 1,655,764.00 | 1,821,340.40 |
| Discount Factors (5%) | 1 | 0.95 | 0.91 | 0.86 | 0.82 | 0.78 |
| Time-Adjust Benefits (Adjusted to Present Value) | - | 1,181,800.00 | 1,245,244.00 | 1,294,506.40 | 1,357,726.48 | 1,420,645.51 |
| Cumulative Time-Adjusted Benefit Over Lifetime | - | 1,181,800.00 | 2,427,044.00 | 3,721,550.40 | 5,079,276.88 | 6,499,922.39 |

Remark: Benefits Derived from Operation of New System Estimated Annual Growth Rate of 5%

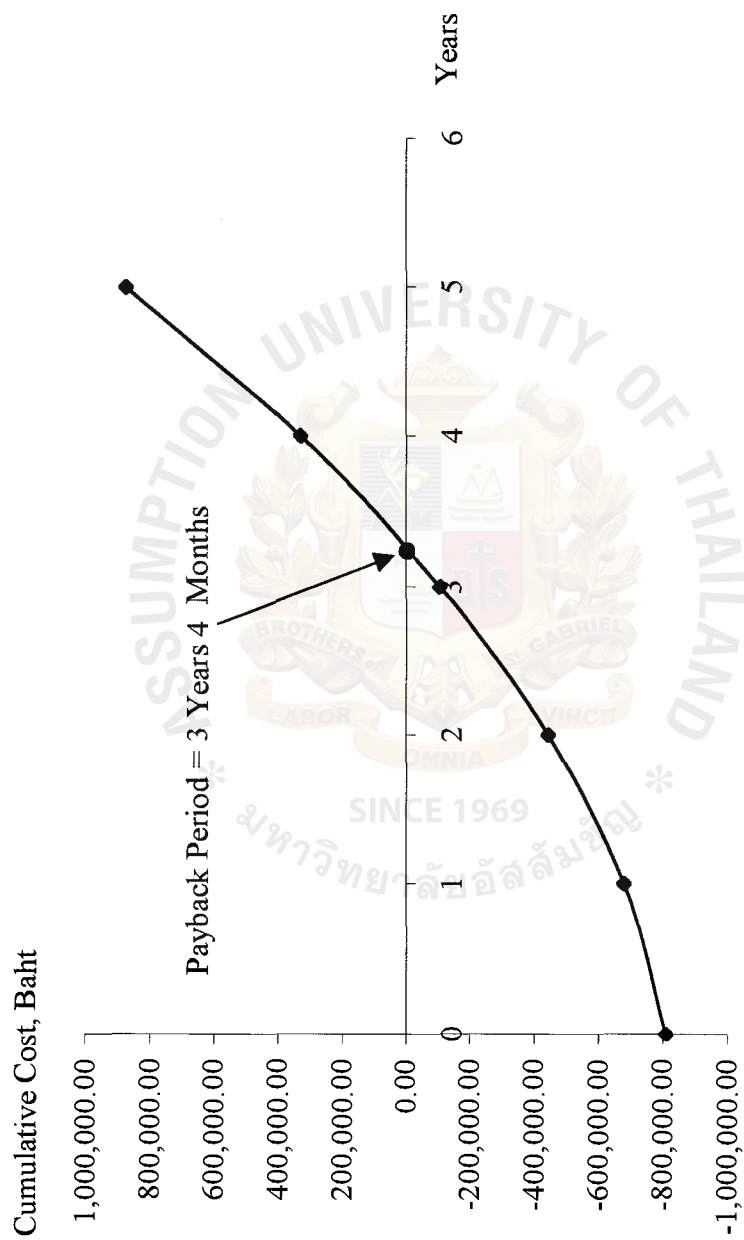| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Cumulative Lifetime Time-Adjusted Cost + Benefits | -810,500.00 | -679,400.00 | -444,256.00 | -108,649.60 | 330,676.88 | 873,822.39 |

Figure H.3.   Payback Period of Candidate 3.

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