Automobile Repair Shop Information System for Taweephon Body Shop Service Co., Ltd.

by

Ms. Usa Pengphon

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

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
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Project Title	Automobile Repair Shop Information System for Taweephon Body Shop Service Co., Ltd.
Name	Ms. Usa Pengphon
Project Advisor	Air Marshal Dr. Chulit Meesajjee
Academic year	July 28, 2001

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

Approval Committee:

(Air Marshal Dr. Chulit Meesajjee)
Dean and Advisor

(Prof.Dr. Srisakdi Charmonman)
Chairman

(Asst.Prof.Dr. Vichit Avatchanakorn)
Member

(Assoc.Prof. Somchai Thayarnyong)
MUA Representative

July 28, 2001

ABSTRACT

Taweephon Body Shop Service Co., Ltd. is a business focusing on car repair services. The more growth in car business there is, the more competitive the situation of car services in the business segment there are. The situation has led the company to the phase of business improvement and business differentiation.

The business has been running manually without any quality control process. This is the major problem that caused the decrease in customer satisfaction. The project examines what has been done to evaluate the existing operation procedures. Then the result leads to the concerns on the followings: enhance the efficiency and performance of the organization, minimize the operation cost and minimize the reparation time.

The knowledge on System Analysis and Design has been taken into consideration. The computerized database management system was selected as the solution for business enhancement. All related steps such as data flow diagram (DFD), process description and data dictionary have been performed accordingly. Before coming to the programming and coding step, the program was planned to cover most of the existing operation procedures. So all databases were made and linked systematically together.

During the coding process, system verification and validation had been tested by program test, link test and full system test. After the entire system works properly according to the design concept, the system has been implemented and taken into use.

The result has obviously proven that the entire business has been improved. The proposed system has completely met the design specifications and objectives.

ACKNOWLEDGEMENTS

This project is completed with the contributions of several persons. The writer would like to take this opportunity to express her earnest appreciation to Air Marshal Dr. Chulit Meesajjee, the advisor of this project, for his valuable time, his suggestions, repetitive corrections and motivations which made this project possible within the time frame.

And she is also grateful to all lecturers of the MS CIS programs for imparting their knowledge to her. Furthermore, she is greatly thankful to all the project committee members of the Graduate School for their advices.

Finally, she would like to thank all of her friends for their supports and kind assistance.

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1.1 Background of the Project

Taweephon Body Shop Service Co., Ltd. is a full service automotive collision repair facility offering a range of services. It was established in 1980. The major business is to repair and paint the damaged cars. It has an over all capacity to take up more than 100 cars per month. It has twenty staff members. To achieve the goal, and eliminate all the problems that occur from the manual system, the company intends to increase the overall efficiency of the organization by replacing the manual system with the computerized one.

The existing system, which the company uses to control all processes such as customer registration, car registration, insurance claimed registration, receipts, job order system, inventory system, accounting system, reports, and so on are run manually. The company did not have an accurate exact program or computer system to handle the information. These cause many problems for the users in the company; for example, they do not have the same standard format of documents. Now the company has more customers and insurance companies to contact with compared to the past. Before the new computerized system is used, the data is stored separately in marketing department, accounting department, Body/paint department. It will lead to data redundant problem, which wastes the operation time. Their effectiveness and efficiency are quite low.

To spend less time to serve customers and to reduce the time to manage the system, the company needs to set up a computerized system to collect all data, generate accurate and useful information. The new system will also help to increase work efficiency for the company since the computerized system allows data sharing across departments, so it will help to reduce operation time.

The automobile repair shop information system is required for solving the problems that already exist and also avoid the problem that may occur in the future. This system is designed to improve the efficiency and effectiveness of the organization.

1.2 Objectives of the Project

The objectives of the project on the Automobile Repair Shop Information System are as follows:

(1) To study the existing system and design the new computerized system for automobile repair shop services.

(2) To identify user requirement

(3) To identify information system requirement

(4) To improve the efficiency and effectiveness of the organization.

(5) Reduce data redundancy—before new computerized system is used, the data is stored separately in marketing department, accounting department, inventory department, personnel department, and body/paint department. It will lead to data redundant problem, which wastes the operation time.

(6) Reduce operation time—since the computerized system allows data sharing across departments, it will help to reduce operation time.

(7) Increase information accuracy—since all transactions will be handled automatically by the new computerized system, information accuracy is guaranteed.

1.3 Scope of the Project

The scopes of the project are as follows:

(1) To analyze, design and develop a computerized system for automobile repair shop services.

(2) To design screen layout for users such as main menu for transaction, customer information, car information, insurance company information, stock of inventory, etc.

(3) To manage data accurately.

(4) To maintain and update customer details and status of cars.

(5) To analyze cost and benefit of the proposed system.

(6) To create contract, receipt and reports such as car status report, repaired report, quotation report, performance summary report, etc.

1.4 Deliverables

The deliverables for the automobile repair shop information system are as follows:

(1) Project Introduction

  (a) Background of the project

  (b) Objectives

  (c) Scope

(2) The existing system

  (a) Background of the Organization

  (b) Existing business function

  (c) Current problems and areas for improvement

  (d) Existing computer system

(3) The Proposed System

(a) System specification

(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

The project plan is represented in terms of Gantt Chart as 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	Study the Existing Computer System
5	Develop Context Diagram
6	Develop Data Flow Diagram
7	Cost and Benefit Analysis
	II. Analysis and Design of the Proposed System
8	Report Design
9	Database Design
10	Network Design
11	Program Design
	III. Implementation of the Proposed System
12	Coding
13	Testing
14	Hardware Installation
15	Software Installation
16	Conversion

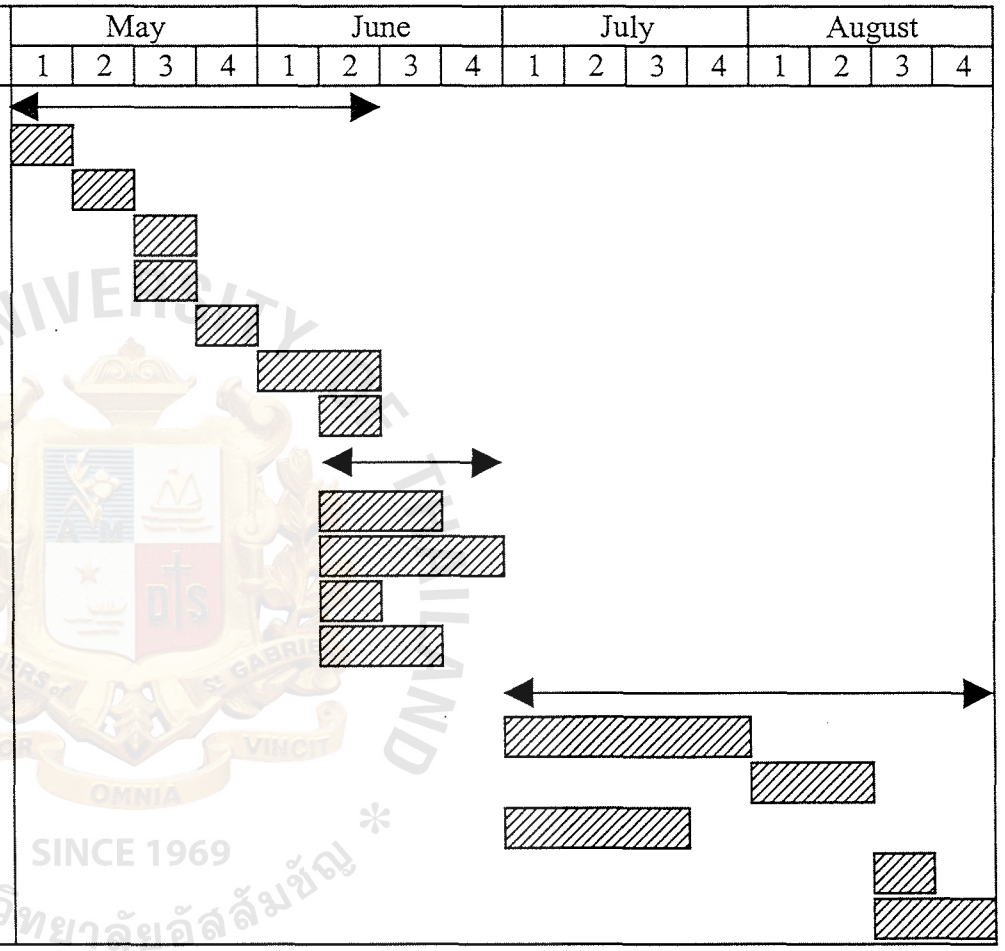

Figure 1.1. Gantt Chart for Project Implementation of Automobile Purchasing Information System.

II. EXISTING SYSTEM

2.1 Background of the Company

Taweephon Body Shop Service Co., Ltd. was established in 1982. It is located at 49 Moo 3, Petchakasem Road, Raisom District, Muang, Petchaburi 76000.

Taweephon Body Shop Service Co., Ltd. emphasizes on providing full service automotive collision repair facility. It offers all types of services on all type of cars starting from simple engine check up to complicated body or paint job. The services include the followings: working with all insurance companies, handing all accident repairs from small dings to roll-overs, paint refinishing services, hit and run repairs, glass replacement, paint polishing and detail services, front end alignments, rust repairs, indoor storage and much more.

Currently, the company is operating under all manual systems, but as the number of customers increase and co-operate with many insurance companies, it is wise for the company to consider another approach of operation. The increase of customers and insurance companies causes the file management to become more complicated when done manually. A purposing alternative is to create a computerized system for an automobile repaired shop services in order to improve the efficiency and effectiveness of the organization. Almost all the cars that customers drive to the garage have insurance and most of them are Japanese cars.

The company operates six days a week. In this company, the staffs get paid on a monthly basis while the salary for the workers is calculated by the number of days work.

Now the company wishes to use a computerized system instead of the manual system. In this business, it can be classified into two categories:

Insured car: cars that have insurance; the insurance company has to make payment instead of the customer.

Non insured car: cars that do not have insurance; the customer has to make payment on his/her own.

All customers have to drive the car into the garage except that the car is too much damaged, the garage will bring the car by using a truck. In case of accident, and the car is insured, the customer must give all documents that the insurance company has provided in order to indicate which parts of the car have to be repaired; the company will fix it immediately. And if the car does not have accident insurance, the garage will estimate the price of reparation. And if the customer agrees with the price, the company will repair it.

2.2 Problem Definition of Existing System

The existing system is a manual system but as the number of cars increases and the company deals with many insurance companies, they cause the file management to become more complicated when done manually. So, the manual system alone cannot handle all its operations. In order to compete with the competitors, the company needs to have an application to facilitate its business. There are so many problems occurring from the current system as being listed below:

(1) The updated information is not accurate and not up-to-dated in the limited time. Thus, mistakes may occur.

(2) A large volume of data cannot be handled, so the system is costly and consumes too much time. Also, some data may be lost.

(3) It takes too much time to produce any required reports.

(4) Data redundancy in many departments and waste the staffs in doing the same job.

(5) Slow respond to customer.

(6) Difficult and takes a long time to find information.

(7) Lack of efficient procedure to control and manage the automobile repaired shop information system.

(8) Cannot share the information or files among departments.

(9) It is very difficult to control the manual system.

(10) No management report.

2.3 Existing Business Function

The existing business function of the organization of Taweephon Body Shop Service Co., Ltd. can be divided into five main departments and each of their major functions is described as follows:

Marketing Department:

The main job of this department is customer services. This includes taking order and keeping customer record. Another job is to create brochures and other documents, set target and plan, to find new insurance company to be the members, advertise, and respond to customers inquires regarding the availability and status of cars.

Accounting Department:

This department does everything concerning money and numbers such as set a company's budget, control the cash flow for the company, calculate the price for customer, collect cash and cheques from customers, pay out money for daily expenses, prepare the financial report, including calculating wages.

Body/paint Department:

It is the biggest department in the company. Their job is to fix automobile body and paint the cars, verify the status of the car before launch to the customers, and evaluate the price of the cars in reparation.

Personnel Department:

The department is responsible for application form for new staff and workers, register new customers, plan the schedule for workers and recruitment for the new employees.

Inventory Department:

This job is to serve the body and paint department by providing them with the replacement part they requested. They also control inventory level and restock them whenever it is necessary. This may include a driver who picks up replacement parts as necessary.

III. PROPOSED SYSTEM

3.1 User Requirement

Currently, all data management is done manually. It is time consuming in order to deal with paper work, such as data recording, data searching, data loss or even unreadable handwriting.

The main function, which needs systematic database management, is Quotation Database. For example, administration team can check customer's car on repaired history, whether it was registered in quotation before or not, how long it was checked last time. Moreover, customer's information will help us to contact customer easier, by recording address and phone number. We can follow up about the service notification by phone or even send the promotion champagne to customer via mail. All repaired information will be registered in the database. This can be checked for later invoicing or before delivering finished car to customer. The result will lead us to faster service with quality enhancement. This will gain customer satisfaction.

Invoice and receipt management will be produced in a systematic way, the following information like payment recording, summary of income on each day/week can be tracked and controlled.

For inventory control, stock control is needed. They need parts tracking for both in and out. So reports regarding amount of remaining parts, new parts ordering and new delivered parts lists are needed for incoming parts management. For outgoing one, they need to know the price list, amount of needed parts.

The user requirements for the proposed system are defined as follows:

(1) Computerized system should allow data sharing across departments.

(2) All transactions will be handled automatically by the new computerized system, so information accuracy is guaranteed.

(3) The screen should be designed in user-friendly format to ensure the reliability of the system and produce accurate data.

(4) All documents should be printed out by the computer.

(5) The staffs take less time to obtain the required information such as car status, car information, insurance information.

(6) The proposed system can automatically calculate the total amount of products.

(7) The proposed system can show the historical and current quantities of each repaired that have been delivered to the customer.

(8) The computerized system will be designed in the scheme of easy to use, easy to understand, easy for future development and avoid using any complex structure.

3.2 The Proposed System Requirements

After the study of the existing system, we can get the requirements from the end users and the management. The end-users focus on the ease of use, and the management concentrates on the accuracy, time consumption, and reliability of the information. The proposed system is intended to control major activities of Automobile Repair Shop system. The system will focus on:

3.2.1 Computerized Database System

With the computerized database system, all data can be recorded in the computer. Quotation database, Customer database, Car database, Labor database, Inventory database, Accounting database, and Report database will be recorded accordingly. The relationship among all data will be set systematically. Moreover, the computerized database system will reduce errors and duplication of garage data recording. Using searching and analysis of database can reduce workload of employees. The more accurate the car information is, the more enhancement of repair analysis result. This will gain more customers' satisfaction level.

Program will be designed in the scheme of easy to use, easy to understand, easy for future development and avoid using any complex structure. It will cover all needed functions of previous work in the existing system.

3.2.2 Inventory Control

Inventory database is another most important part, which needs to be developed. Inventory management will help employees on: Purchase order, Delivery order, and Manage in/out spare parts from store. Since it will be linked with Quotation database and Accounting database, all payment related to spare parts will be recorded accordingly. Further enquiries can be done according to employees' need, which will reduce their workload.

3.2.3 Reports

The followings are the description if each proposed report output designed for the Taweephon Body Shop Service Co., Ltd.

Delivery slip:

It is evident to indicate that the customer delivers the car to the company. It shows the details of the car, an additional information including insurance policy and car accessories such as radio-tape, alloy wheels, etc.

Quotation:

It is the document slip that indicates the cost of repairing the vehicle in order to display the items and expenses that might occur during the repair. This will be given to the insurance company in case the car has an insurance policy and to the customer in case the car does not have insurance.

Worker report:

It is evident to show who are responsible for this job repairable such as photographer, painter, knocker, etc. The time used for that job in order to calculate the wages and performance of the workers during the month.

Appointment report:

It shows the detail of the customer and customer due date in order to prepare cars for the customer. And in case the job cannot finish on time, the company will inform the customer to avoid the anger of the customer.

Customer receipt:

After the customer pay reparation charge, the company will issue a receipt and give it to the customer in order to use as an evidence of payments and it also can be the guarantee slip in order to claim for the garage.

Customer information report:

It shows the details of customers. By using this report, the management can know the number of customers in hand and also their address. The company can contact the

customers just in case it is necessary and the report can be filled in customer's record. The data contained in the report can be used for different purposes such as planning marketing strategies to expand the business.

Insured car report:

This insured car report will be prepared monthly by revenue from the Insurance company in order to submit to management in order to summarize the total amount of money. For the customers who have insurance policy, they do not have to pay the cost of the repairable. The insurance company has to pay these expenses instead and for these expenses the insurance company will be paid at the next 45 days after they receive the quotation from the garage.

Non insured car report:

Non insured car report will be prepared monthly by revenue from the customer in cash or cheque in order to submit to management in order to summarize the total amount of money.

Performance summary report:

Performance summary report shows all reparation car by insurance company and car repaired individually that will be prepared for the management to indicate that how many cars belong to which insurance company that the customer repaired the car during the month the number of completion during the month. It indicates the number of the cars that come to the company during the month in order to report to the management that in which month there is more revenue to prepare for the marketing division.

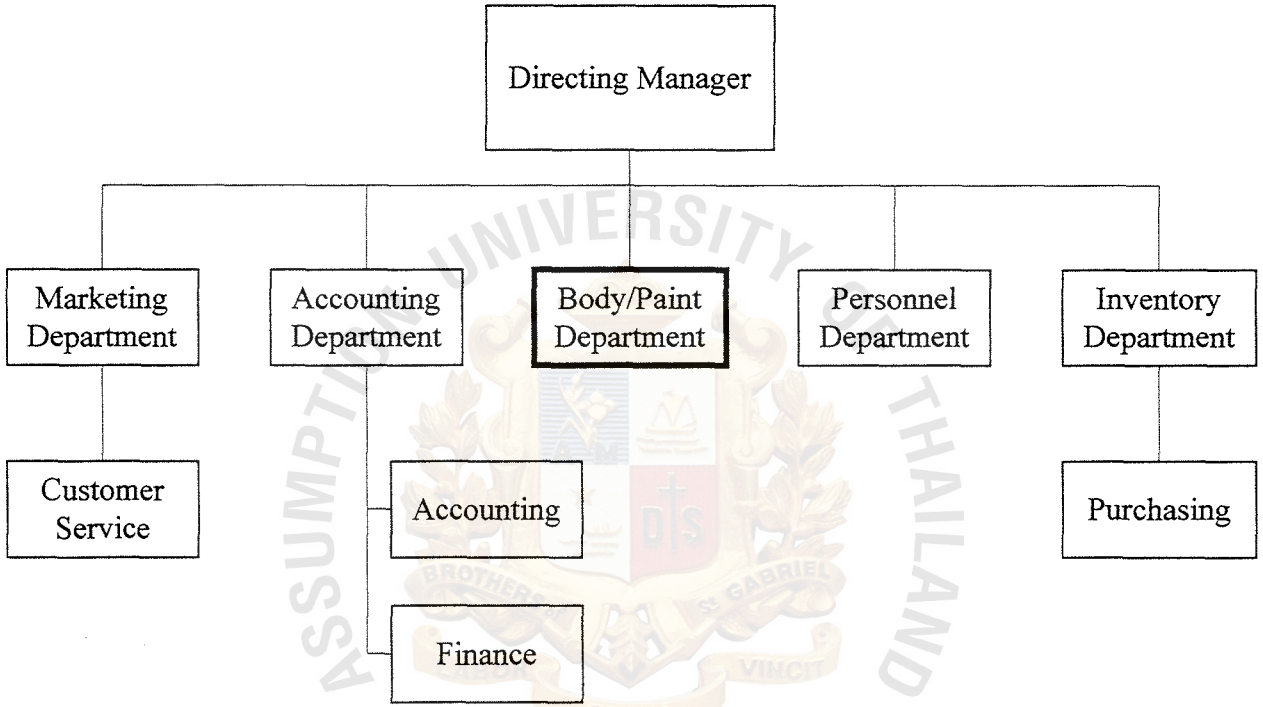

Figure 3.1. Organization Chart of Taweephon Body Shop Service Co., Ltd.

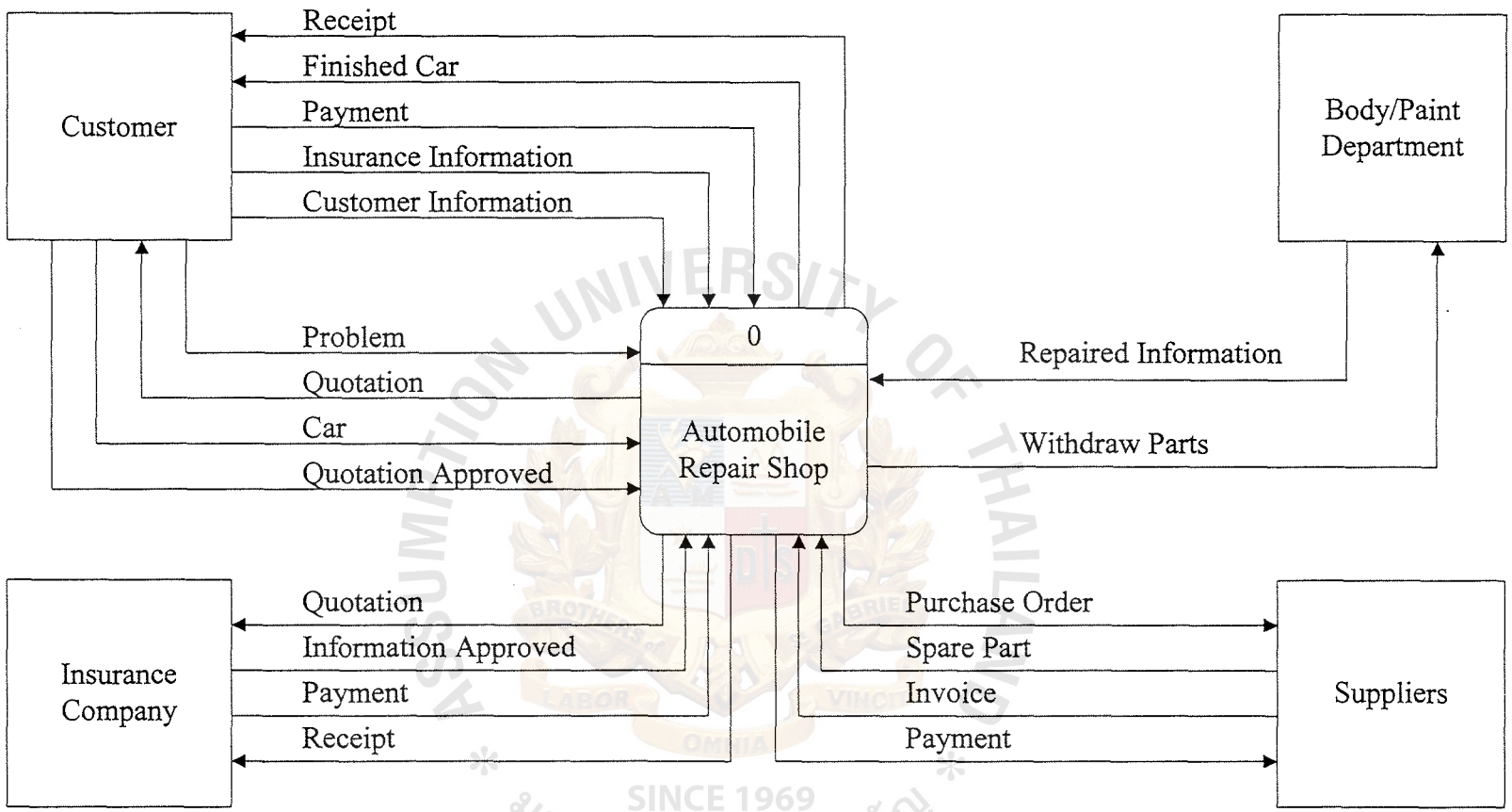

Figure 3.2. Context Diagram of Automobile Repair Shop Informaiton System.

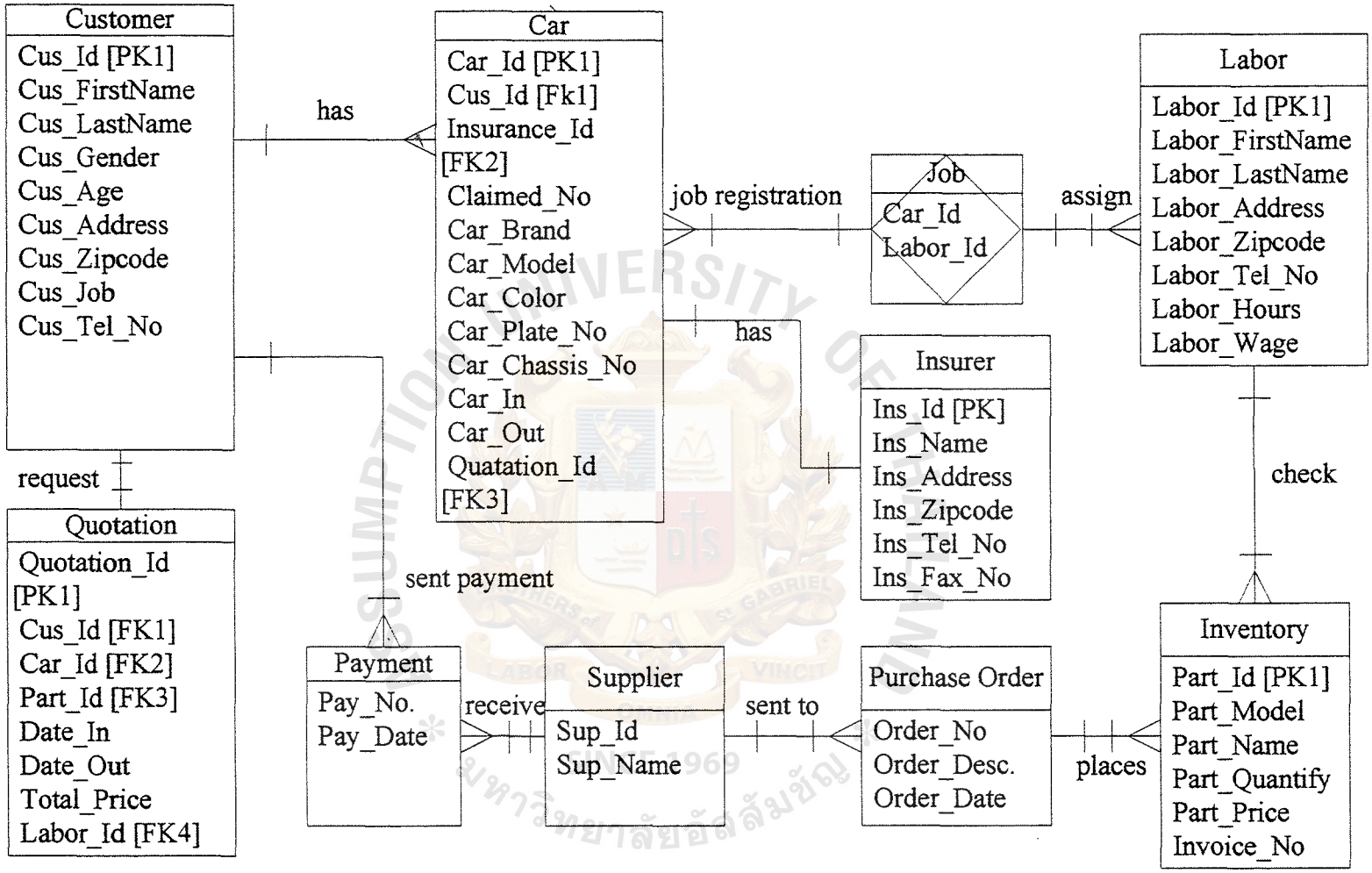

Figure 3.3. Entity Relationship Diagram of Autombile Repair Shop Information System.

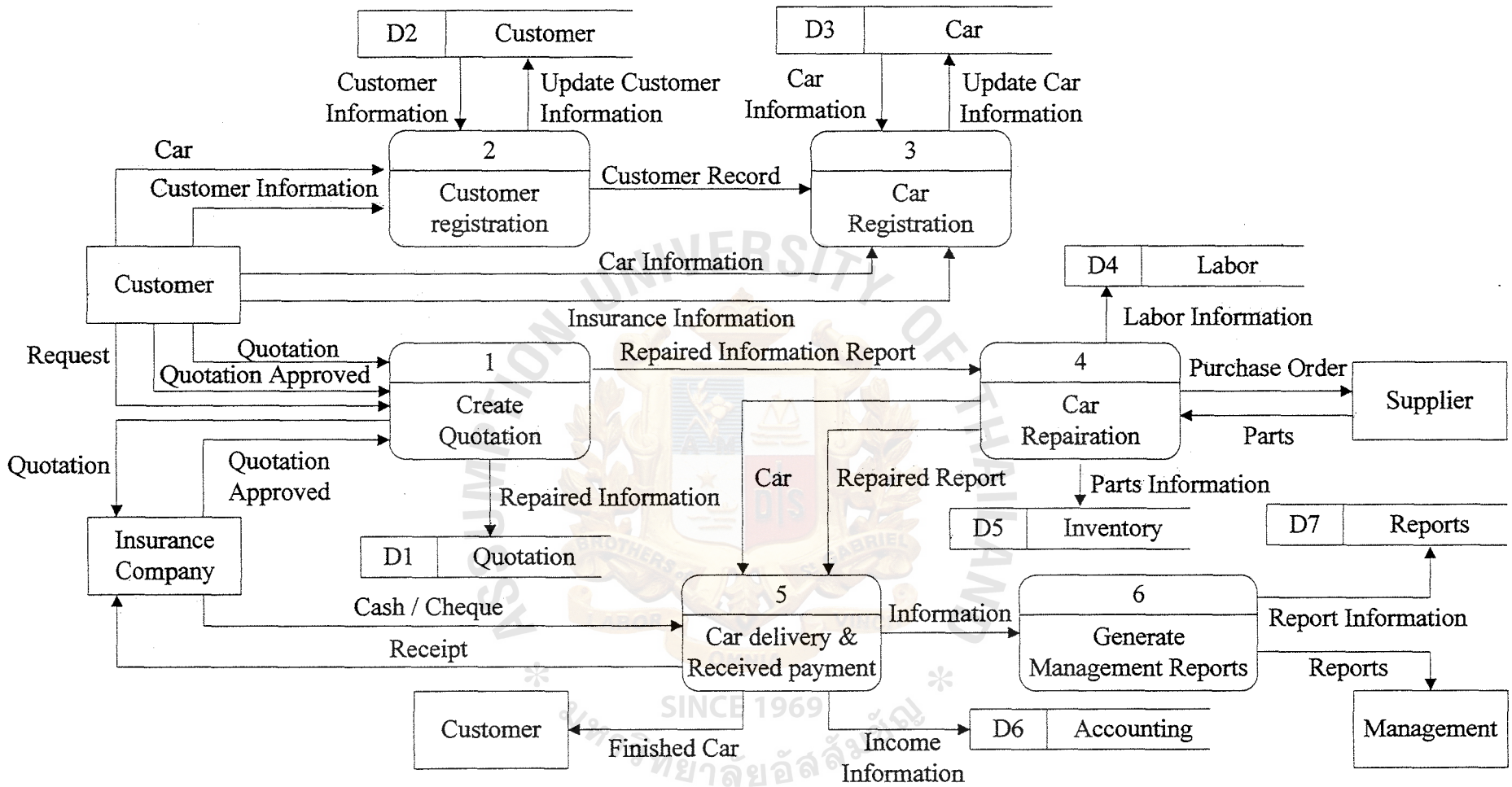

Figure 3.3. Data Flow Diagram Level 0 of the Proposed System.

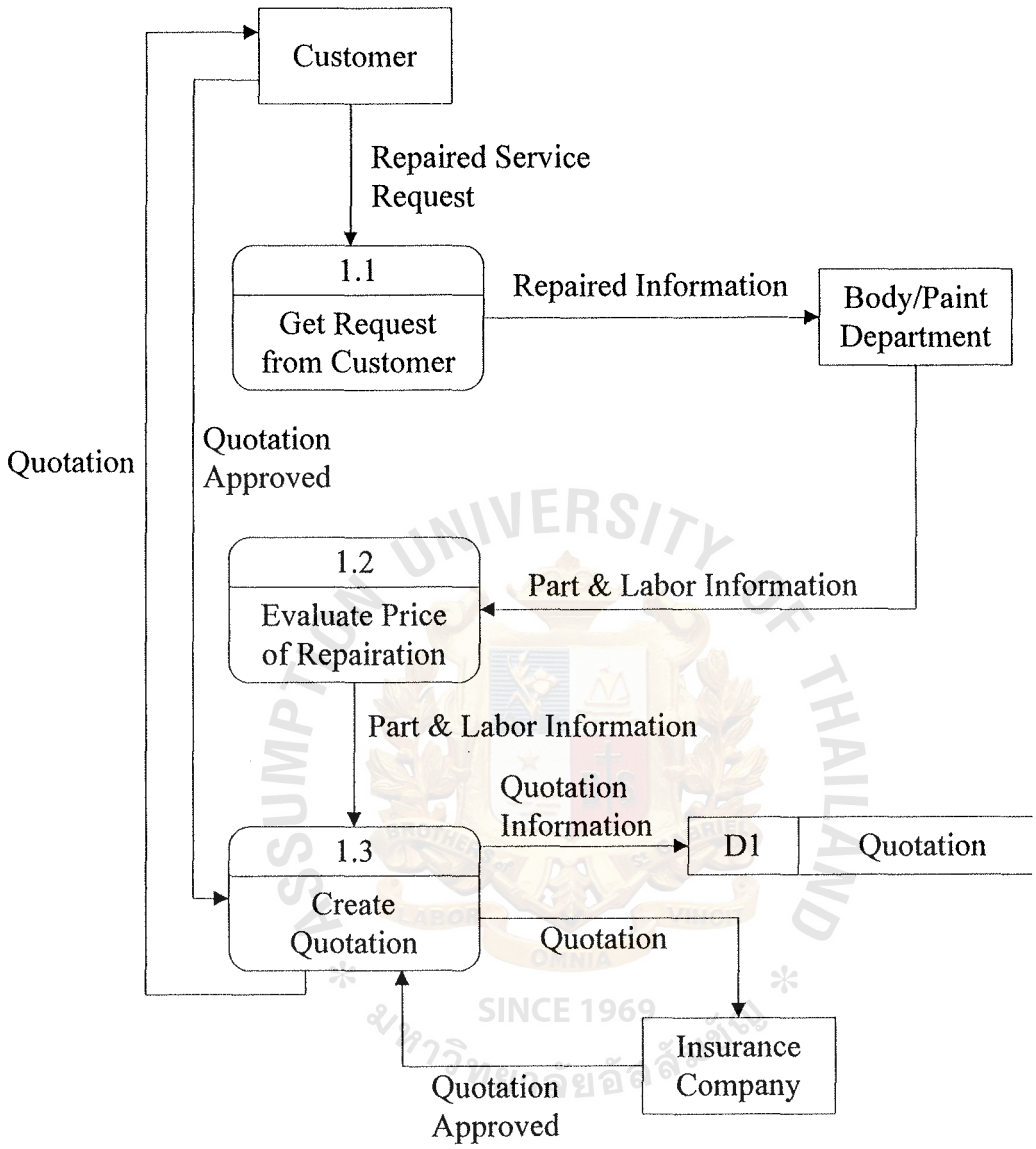

Figure 3.5. Data Flow Diagram Level 1 Process 1 Create Quotation.

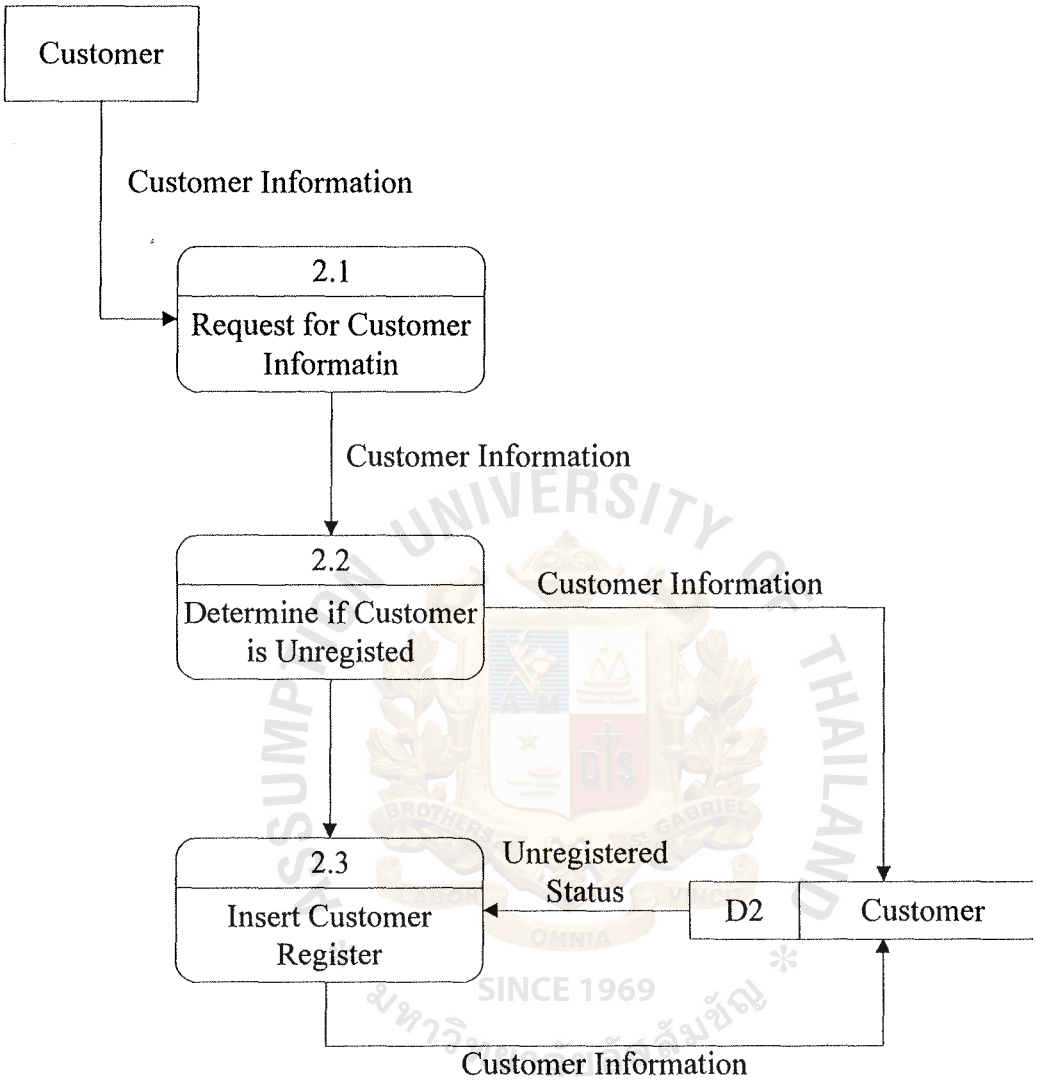

Figure 3.6. Data Flow Diagram Level 1 Process 2 Customer Registration.

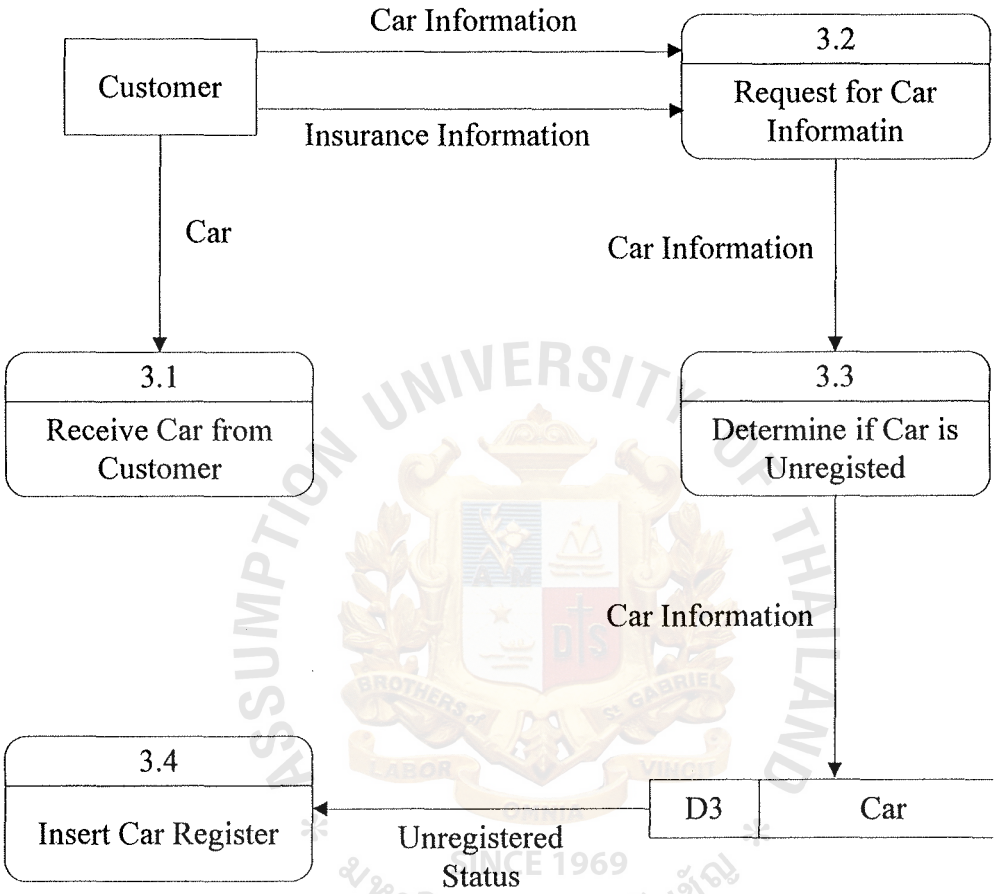

Figure 3.7. Data Flow Diagram Level 1 Process 3 Car Registration.

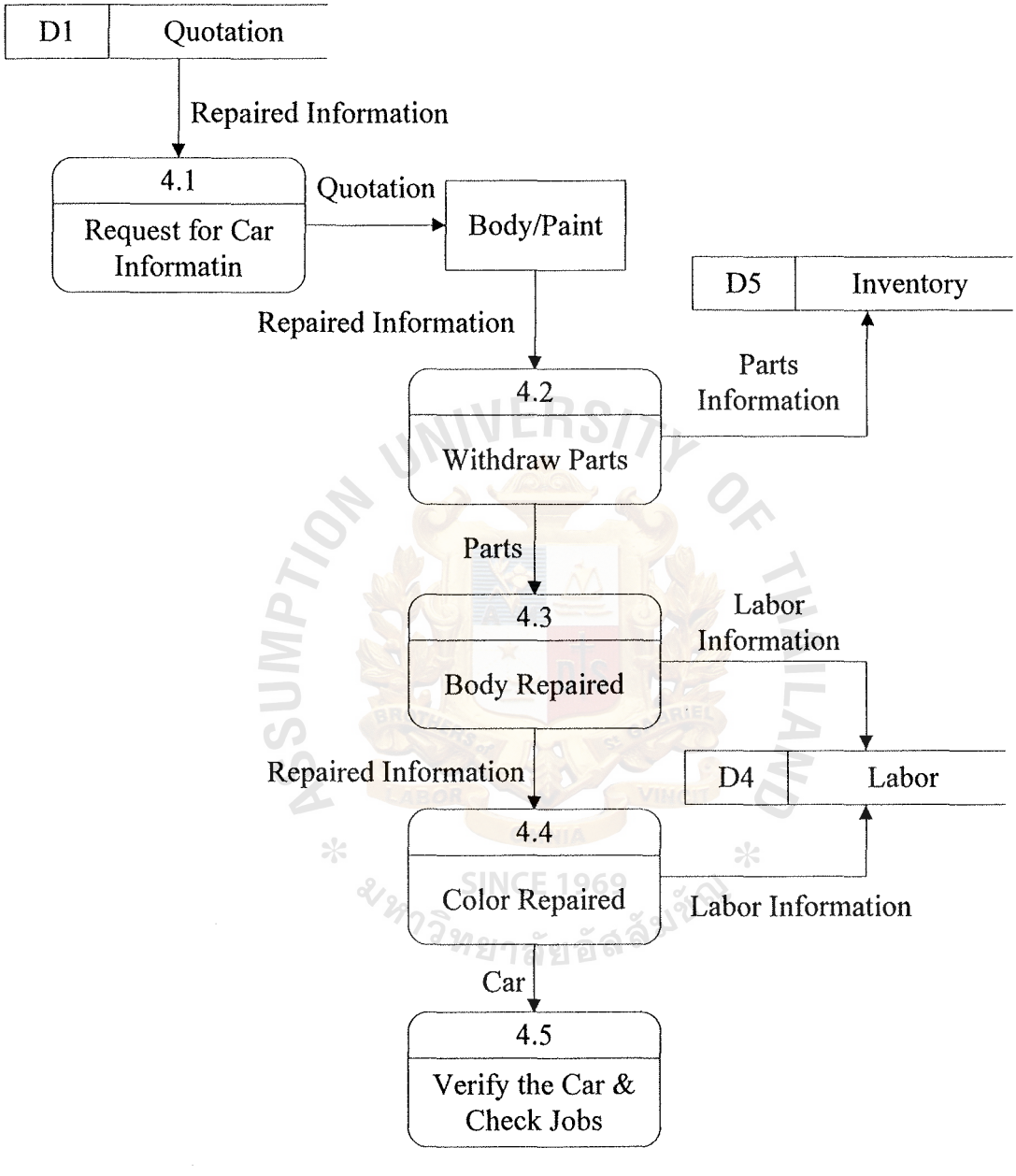

Figure 3.8. Data Flow Diagram Level 1 Process 4 Car Registration.

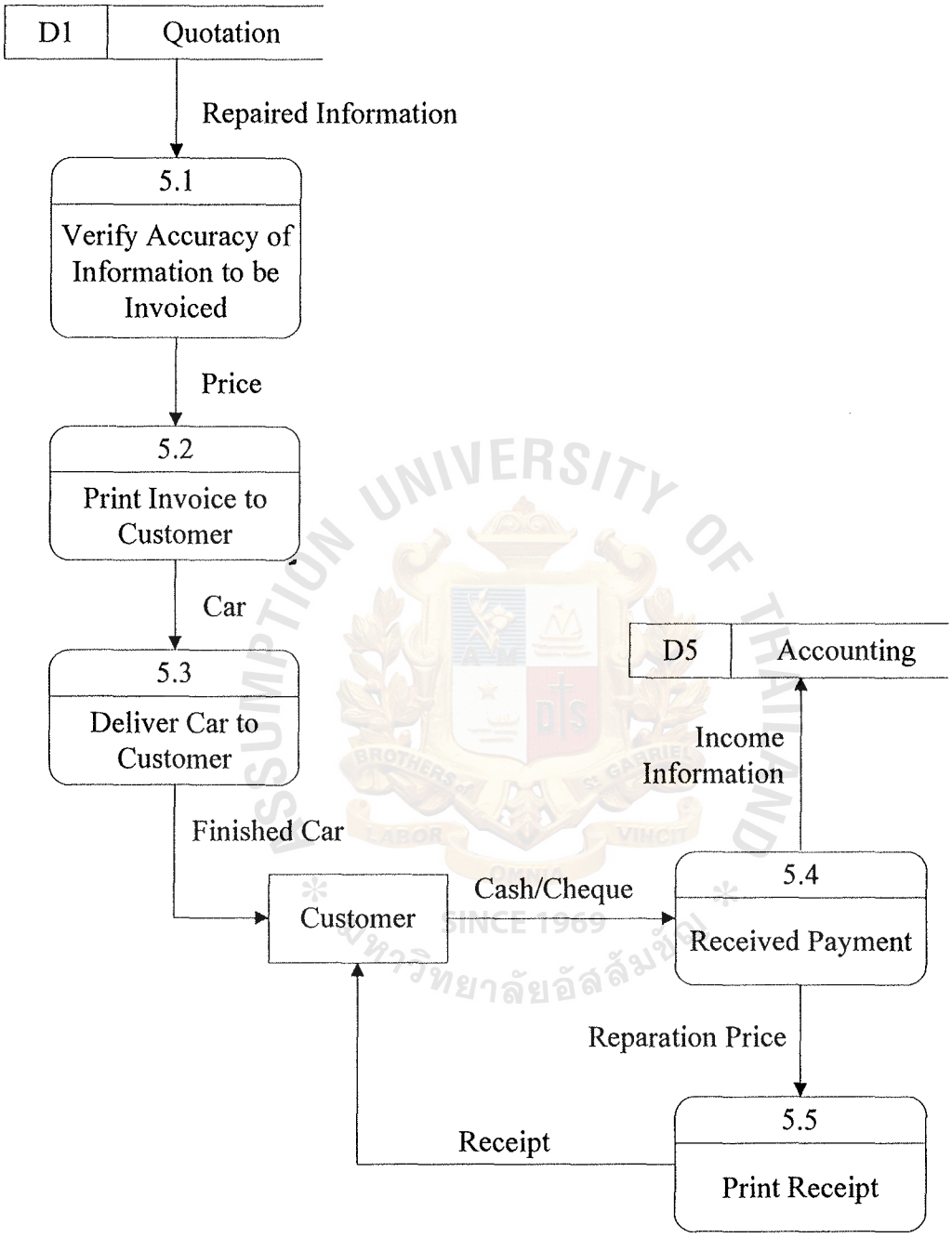

Figure 3.9. Data Flow Diagram Level 1 Process 5 Car Delivery & Received Payment.

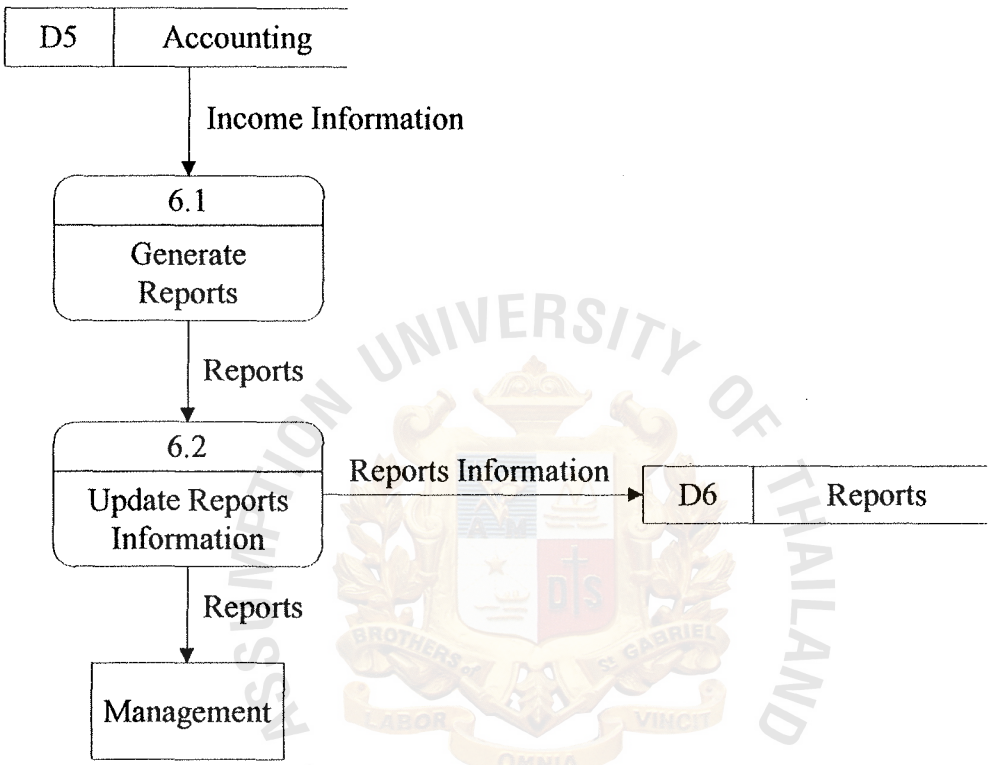

Figure 3.10. Data Flow Diagram Level 1 Process 6 Generate Management Report.

3.3 System Design

It is the evaluation of alternative solutions and the specification of a detailed computer-based solution. The objective of the system design is to replace an existing system, which is done by manual into a computer in order to improve control, performance, and services to compete with the competitor. It deals with translating users' business requirements and constraints into technical solutions. They design the computer files, databases, inputs, outputs, screens, networks, and programs that will meet the systems users' requirements. They also integrate the technical solution back into the day-to-day business environment.

The design will have to be broken down into sub-systems and these sub-systems may be allocated to different processors. Distributing systems over multiple processors also makes it possible for different sub-systems to be active simultaneously or concurrently. This concurrency needs to be designed into the system explicitly rather than left to chance.

Context Diagram

The proposed system uses context diagram to focus on data flowing in and out of the system and the processing of the data. It helps in analyzing the system for accuracy and completeness. It defines the scope and boundary for the system and project. Because the scope of any project is always subject to change, the context diagram is also subject to constant change. It shows the links, which indicate the relationship between system and subsystem.

Data Flow Diagram

The data flow diagram is used to present the system in step by step. The data flow diagram is a modeling tool that allows the user to picture a system as a network of functional processes. It is able to conceptualize how data are managed through the organization. It is represented graphically how data can flow to or from within the system, processing functions, and the storage of this data indicates from where information is received and to where it is sent.

Database Design

The proposed system selected Relational database design to design the database that it helps up to map the tables to be fifth normal form.

Normalization

Normalization Theory is used for the relational data base schema and can apply for any database application. It is the way data attributes are grouped to form stable, flexible and adaptive entities.

Definition of first NF to fifth NF

1NF = A relation R is in first normal form (1NF) if and only if all underlying domains contain atomic values only. (No repeating group)

2NF = A relation R is in second normal form (2NF) if and only if it is in 1NF and every nonkey attribute is fully dependent on the primary key.

3NF = A relation R is in third normal form (3NF) if and only if it is in 2NF and every nonkey attribute is nontransitively dependent on the primary key.

BCNF = A relation R is in Boyce/Codd normal form (BCNF) if and only if every determinant is a candidate key.

4NF = A relation R is in fourth normal form (4NF) if:

(a) The relation is in BCNF and

(b) It contains, if and only one MVD fact about an entity.

5NF = A relation is said to be in fifth normal form (5NF) if:

(a) The relation is in 4NF and

(b) If it contains and MVD fact then it also cannot be decomposed into smaller relation without information loss.

Table 3.1. File Description of Customer Record.

Sequence	Field Name	Type	Size	Format
1	Cus_Id	Character	7	xxxxxxx
2	Cus_FirstName	Character	13	x xxxxxxxxx
3	Cus_LastName	Character	25	xxxxxxxxxx
4	Cus_Gender	Character	5	xxx
5	Customer_Age	Integer	3	xx
6	Cus_Address	Character	60	xxx..xxx
7	Cus_Zipcode	Character	5	xxxxx
8	Cus_Job	Character	15	xxxxxxxxxx
9	Cus_Tel_No	Character	9	xxxxxxx
10	Cus_Fax_No	Character	9	xxxxxxx
11	Cus_Mobile_No	Character	9	xxxxxxx
12	Car_Id	Character	7	xxxxxxx

Table 3.2. File Description of Car Record.

Sequence	Field Name	Type	Size	Format
1	Cus_Id	Character	7	xxxxxxx
2	Car_Id	Character	7	xxxxxxx
3	Insurance_Id	Character	7	xxxxxxx
4	Claimed_No	Character	10	xxx..xxx
5	Car_Brand	Character	15	xx..xxx
6	Car_Model	Character	15	xx..xxx
7	Car_Color	Character	10	xx..xxx
8	Car_Year	Character	7	xxxx
9	Car_Plate_No	Character	10	xxxxxxxx
10	Car_Chassis_No	Character	15	xxx...xxx
11	Car_Engine_No	Character	18	xxx...xxx
12	Car_DateIn	Date	8	dd/mm/yy
13	Car_DateOut	Date	8	dd/mm/yy
14	Quotation_Id	Character	7	xxxxxxx

Table 3.3. File Description of Insurance Record.

Sequence	Field Name	Type	Size	Format
1	Ins_Id	Character	7	xxxxxxx
2	Ins_Name	Character	30	xxx..xxx
3	Ins_Address	Character	60	xxx..xxx
4	Ins_Zipcode	Character	5	xxxxx
5	Ins_Tel_No	Character	9	xxxxxxx
6	Ins_Fax_No	Character	9	xxxxxxx

Table 3.4. File Description of Quotation Record.

Sequence	Field Name	Type	Size	Format
1	Quotation_Id	Character	7	xxxxxxx
2	Cus_Id	Character	7	xxxxxxx
3	Car_Id	Character	7	xxxxxxx
4	Part_Id	Character	7	xxxxxxx
5	Date_In	Date	8	dd/mm/yy
6	Date_Out	Date	8	dd/mm/yy
7	Total_Price	Integer	10	9999.99
8	Labor_Id	Character	7	xxxxxx

Table 3.5. File Description of Labor Record.

Sequence	Field Name	Type	Size	Format
1	Labor_Id	Character	7	xxxxxxx
2	Labor_FirstName	Character	13	xxx.xxx
3	Labor_LastName	Character	25	xxx.xxx
4	Labor_Address	Character	60	xxx.xxx
5	Labor_Zipcode	Character	5	xxxxx
6	Labor_Tel_No	Character	9	xxxxxxx
7	Labor_hours	Integer	5	999
8	Labor_Wage	Integer	6	99999

Table 3.6. File Description of Parts and Inventory Record.

Sequence	Field Name	Type	Size	Format
1	Part_Id	Character	7	xxxxxxx
2	Part_Model	Character	15	xxx..xxx
3	Part_Name	Character	15	xxx..xxx
4	Part_Quantity	Integer	4	99
5	Part_Price	Integer	7	9999.99
6	Invoice_No	Character	4	999

Table 3.7. File Description of Income Record.

Sequence	Field Name	Type	Size	Format
1	Passwd_Id	Character	10	xxxxx
2	Passwd_Name	Character	12	xxxxx

Data Dictionary

Data Dictionary helps in defining the meaning and components of terminator, data stored, data elements and data flows. It is a document that supports data flow diagrams. It contains all the terms and its definitions for data flows and data stores that relate to a specific system

Structure Chart

It proposed a very small set of programming constructs for developing code. Structured programming recognized that in order to attack the details of a problem, it is very important to have a firm grasp of the overall problem first. It is a top down system that is used for developing a production design. It represents diagrams in hierarchical manner and shows the control structure imposed on the system's processes. It displays the subordination or the hierarchical levels of rank between processes. The diagram consists of modules and the connecting arrows indicate that the data pass through up and down. The objective is to show which module is the boss to subordinate structure of the system.

Process Specification

Process specification is created for primitive processes on a data flow diagram as well as for some higher-level process that explode to a child diagram. It explains the decision-making logic and formulas that will transform process input data output. Each derived element must have process logic to show how it is produced from the base

elements or other previously created derived elements that are input to the primitive process.

Module Specification

This method is used for specifying each module in structure chart in order to specify code. How to specify is the problem. The module should not specify in too many details or to little. In designing the module, the statements used for the module specification should simply state the relationships between inputs and outputs in order to tell that when call input what should be the results when module returns.

Input Design

The screen design is based on the following guideline; Screen must be kept simple, consistent, and also facilitates movement between screens. It is used for presenting the proposed system in physical format. The screens present how to input the information and also the outcomes of the input.

Output Design

The outputs are provided in both screen and printed reports. Outputs present information to system users. Outputs, the most visible component of a working information system, are the justification for the system. Some outputs are also generated to fulfill management information system requirements. These outputs can be classified as on of the following three types of reports:

Detailed reports present information with little or no filtering or restrictions.

Summary reports categorize information for managers who do not want to wade through details.

Exception reports filter data before they are presented to the manager as information. Such reports usually report exceptions to some condition or standard.

3.4 Hardware and Software Specification

Hardware Configuration and Specification

All PCs are connected together by LAN and Windows NT version 2000 operating system. The prevailing computing model is currently client/server wherein a network of clients, single-user computers, are connected to and interoperate with servers, multiple-user computers that share their services. The personnel computer will be used to run this system. The entire computer will be connected together as a computer network in order to share all the resources. There will be a computer acts as file server. All the data transactions will be kept there, so that all the users will be able to get the updated data from one place. The hardware configuration is shown in Figure 3.11.

The hardware specifications for the proposed Automobile Repair Shop Information System are shown in Table 3.8. The computer network will be Ethernet type by using HUB with UTP (Unshield Twisted Pair). The Ethernet card will be installed all the computers in this LAN. There will be 2 printers which consist of one dot matrix printer and one laser printer.

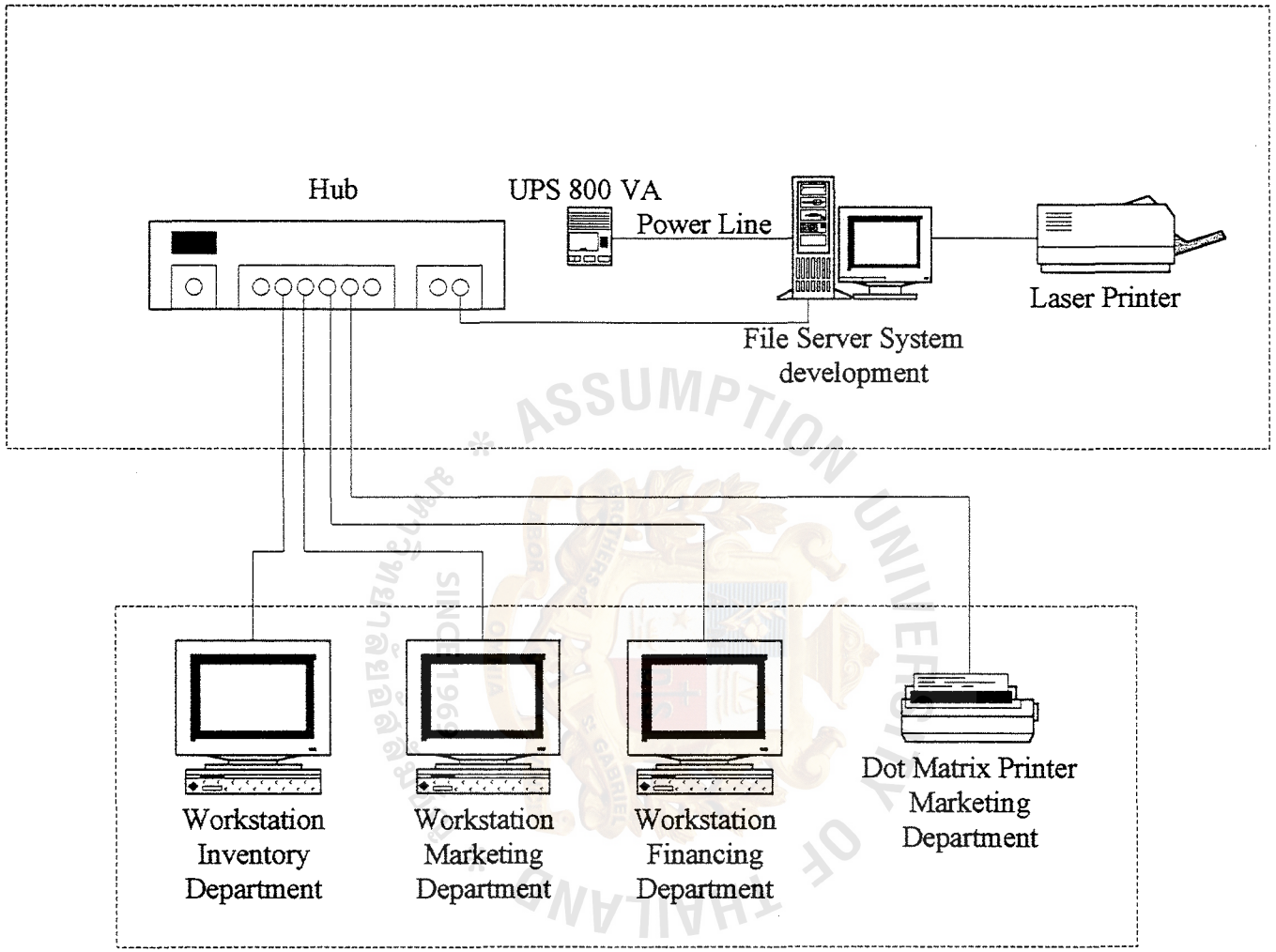

Figure 3.13. Local Area Network Design of Taweephon Body Shop Service Co., Ltd.

Table 3.8. The Hardware Specification for the Server.

Hardware	Specification
CPU	Intel Pentium III 733 MHz.
Cache	512 KB
Memory	256 MB
Hard Disk	IBM 20 GB ATA 100
CD-Rom Drive	ASUS 52X
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10-Base T
Display Adapter	SVGA card 16 MB
UPS	800 VA
Display	15" monitor

Table 3.9. The Hardware Specification for Each Client Machine.

Hardware	Specification
CPU	Intel Pentium II 500 MHz.
Cache	256 KB
Memory	128 MB
Hard Disk	10 GB
CD-Rom Drive	52X
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10-Base T
Display Adapter	SVGA card 16 MB
Display	15" monitor
Printer	Dot Matrix, Laser Printer

Table 3.10. The Software Specification for the Server.

Software	Specification
Operating System	Microsoft Windows NT Server 2000
Web Server	Microsoft Internet Information System 2.0
Application Server	Microsoft Active Server Pages
Database Server	Microsoft Access 2000

Table 3.11. The Software Specification for Each Client Machine.

Software	Specification
Operating System	Microsoft Windows ME
Web Browser	Microsoft Internet Explorer 5.0
Application Software	Microsoft Office 2000

3.5 System Security and Control

Input Control

(1) User and password authorization

Only authorized users can login the system with their own password. Before entering into the system, the authorized users and other users need to enter both login name (assigned by the system) and password.

(2) Validation of Data

All input date are validated with a master file in this system.

Process Control

The authorized users can access into the system and can make any changes such as day to day operation. For the inventory, some persons have the authorization in editing the information. This system can be login by other department, but they can

access to see the information only, they have no authorization to edit any information in the system.

The authorized users are required to change their password every month.

Produce only required number of output reports.

Other Control

The computer hardware office must be locked every closing time and the key must be kept by an authorized person.

Back up and Recovery

Use tape back up mechanism.

Back up copies should be created every time the database is updated or modified.

Daily back up for use database and development program.

A copy of system program must be kept in secondary storage to ensure system operation in case of program failure.

Data file must be stored on secondary storage medium to prevent loss of data.

To prevent loss of data during a power failure, a UPS is recommended.

3.6 Cost and Benefits Analysis

3.6.1 Cost Analysis

Cost of Existing System

Manual System in the first year	Baht
(1) Employee Salary	
Manager (1 @ 10,000)	120,000
Supervisor (1 @ 8,000)	96,000
Staff (13 @ 5,000)	780,000
Total Employee Salary Cost	996,000
(2) Operating Cost (1 @ 7,000)	84,000

	Baht
(3) Utility Cost (1 @ 5000)	60,000
Total Existing Manual System	1,140,000

<u>Estimate Cost of proposed system</u>

Computerized System in the first year

Tangible Cost

Development Cost

(1) Investment Cost

<u>Hardware Specification</u>	Baht
(a) File Server 1 Set	85,000
Medium Tower Case	
Intel Mainboard	
CPU Pentium III 733 MHz.	
Harddisk IBM 20 GB ATA 100	
Cache Memory 512 KB	
SD RAM 256 MB Bus 133 MHz. ECC	
Disk Drive 1.44 MB	
Network Adapter Ethernet 10-Base T	
Display Adapter SVGA card 16 MB	
UPS 800 VA	
(b) Workstation 3 set 3 sets * 32,000 Baht	105,000
CPU Intel Pentium II 500 MHz.	
RAM 128 MB	
Harddisk 10 GB	
Mini tower Case	

	Disk Drive 1.44 MB	
	CD ROM 52 x	
	Display Adapter SVGA card 16 MB	
	Monitor 15"	
	Keyboard 104 keys support Windows 98	Baht
(3)	Printer 2 sets	60,000
	Dot-metrix Printer Epson 1 set	25,000
	Laser printer HP Laser Jet 2100 1 set	35,000
	Total Hardware Cost	250,000

Software Specification

(a)	Operating System 4 sets * 15,000	60,000
(b)	System Development Software	35,000
	Microsoft Office 2000 professional	25,000
	Total Software Cost	120,000
	Total Investment Cost	370,000
(2)	Implementation Cost	Baht
	System Analyst (1 @ 170 hours/each 300/hr)	51,000
	Programmer (1 @ 200 hours/each 350/hr)	70,000
	Training Cost	35,000
	Total Implementation Cost	156,000
	Total Development Cost	526,000

Annual Operating Cost in the first year

(1)	Employee Salary	
	Manager (1 @ 12,000)	144,000
	Supervisor (1 @ 9,500)	114,000

	Baht
Staff (8 @ 6,000)	576,000
Total Employee Salary Cost	690,000
(2) Operating Cost (1 @ 7,000)	84,000
(3) Utility Cost (1 @ 5,000)	60,000
(4) Maintenance Cost (1 @ 4,000)	48,000
(5) Office Equipment	35,000
Total Annual Operating Cost	905,000
Total Computerized Cost	1,587,000

Intangible Cost

(1) Cost of operation transform.

(2) Cost of disruption daily operation.

(3) Cost of backup data in case of system failure.

3.6.2 Benefit Analysis

The benefit of proposed system over the existing system can be classified into two categories as follows:

Tangible Benefit in the first year	Baht
(1) Employee Salary	306,000
(2) Operating Cost	0
(3) Utility Cost	0
Total Cost of Saving	306,000

Intangible Benefit

(1) Improve efficiency and effective of utilizing resources

(2) Improve efficiency and effective of the operation of inventory system

(3) Improve data accuracy, consistency, and integrity

(4) Decrease working process and time consuming

(5) Decrease human error

(6) Provide reports for management team in making decision

(7) Improve image of the company

(8) Reduce redundant of work

(9) Reduce hard copy

3.6.3 Costs and Benefit Comparison

The principle objective of the comparison is to evaluate the break-even point of the cost and benefit of the current system and the proposed system. The break-even point represents the time when the benefit is equal to the investment cost.

The hardware and software cost will be amortized into 5 years; therefore, the cost will be equal through year 1-5. The implement cost, in the first year, is numerous amounts due to installation of both the hardware and software. All cost except office equipment will be increased 5% every year.

The benefit, approximately 280,000 Baht, stemmed from the reduction due to less waste and less effort when applying the new system.

Table 3.12. Cost Comparison between the Existing System and Proposed System, Baht.

Cost Items	Years				
	1	2	3	4	5
Existing System:					
Staff (increase 5% per year)	996,000	1,045,800	1,098,090	1,152,995	1,210,645
Operating Cost (increase 5% per year)	84,000	88,200	92,610	97,241	102,103
Utility Cost (increase 5% per year)	60,000	63,000	66,150	69,458	72,930
Total Cost	1,140,000	1,197,000	1,256,850	1,319,693	1,385,677
Cumulative Cost	1,140,000	2,337,000	3,593,850	4,913,543	6,299,220
Proposed System:					
Development Cost:					
Hardware Cost with UPS,800 VA	50,000	50,000	50,000	50,000	50,000
Software Cost	24,000	24,000	24,000	24,000	24,000
Implement Cost	156,000	0	0	0	0
Operating Cost:					
Office Equipment Cost	35,000	35,000	35,000	35,000	35,000
Staff (increase 5% per year)	690,000	724,500	796,950	876,645	964,310
Operating Cost (increase 5% per year)	84,000	88,200	92,610	97,241	102,103
Utility Cost (increase 5% per year)	60,000	63,000	66,150	69,458	72,930
Maintenance Cost (increase 5% per year)	48,000	50,400	52,920	55,566	58,344
Total Cost	1,147,000	1,035,100	1,117,630	1,207,910	1,306,687
Cumulative Cost	1,147,000	2,182,100	3,299,730	4,507,640	5,814,327

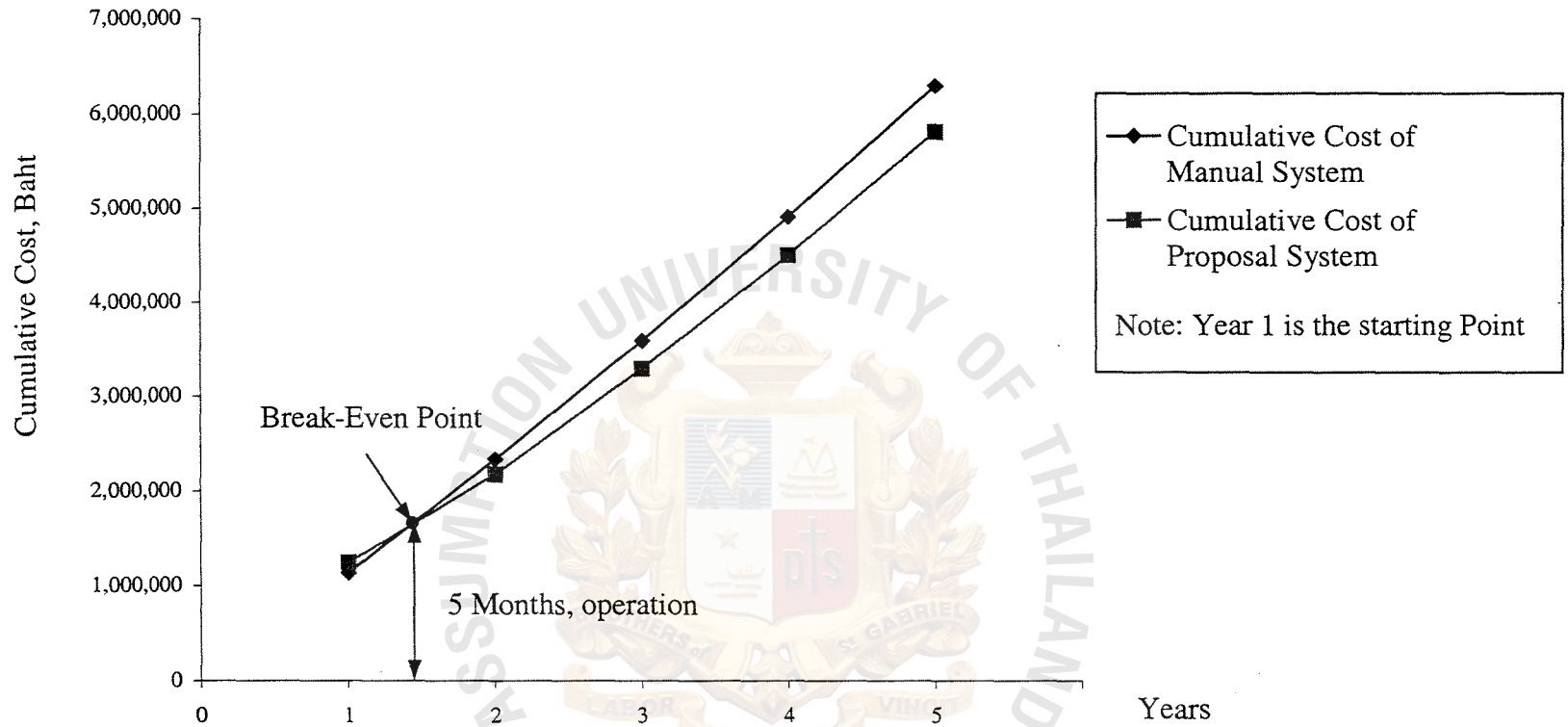

Figure 3.12. Cost Comparison between Manual & Proposed System.

Table 3.13. Payback Analysis, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-526,000	-	-	-	-	-
Operation & maintenance cost		-48,000	-50,400	-52,920	-55,566	-58,344
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs (adjust to present value)	-526,000	-42,864	-40,169	-37,679	-35,339	-33,081
Cumulative time-adjust costs over lifetime	-526,000	-568,864	-609,033	-646,712	-682,051	-715,133
Benefits derived from operation of new system	0	306,000	351,900	404,685	465,387	535,196
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs (adjust to present value)	0	273,258	280,464	288,136	295,986	303,456
Cumulative time-adjusted benefits over lifetime	0	273,258	553,722	841,858	1,137,844	1,441,300
Cumulative lifetime time-adjusted cost + benefit	-526,000	-295,606	-55,311	195,146	455,792	726,167

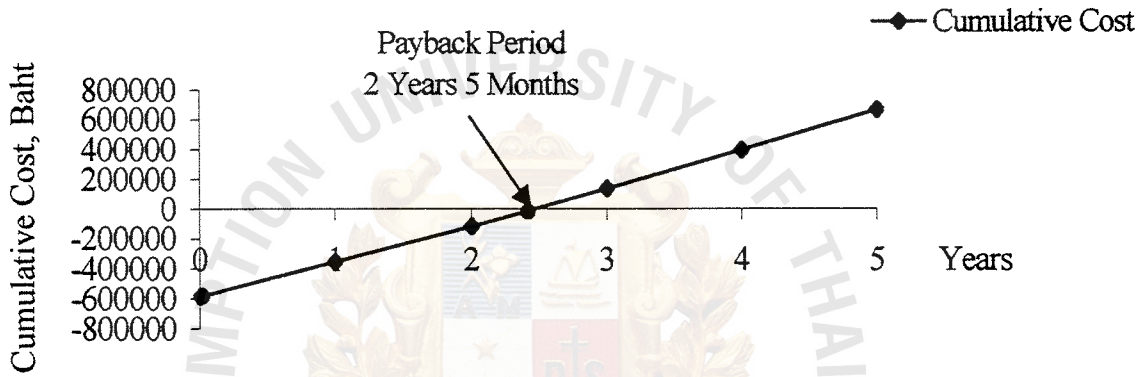

Figure 3.13. Payback Analysis.

Net Present Value

Net Present Value is a cash discount approach based on present value of cash. The net present value formula is shown as follows:

$$NPV = R/(1+L)^1+\ldots+R/(1+K)^n-I$$

When NPV = Net Present Value

I = Investment

R = Annual saving realized by investment

K = Interest Rate

N = Number of years saving available

The investment costs or development costs of this system are 526,000 Baht in Year1. The maintenance cost is approximately 48,000 Baht per year. The benefit derived form this proposed system in the first year is 306,000 Baht. It will increase 20% each year. So the net present value of the proposed system can be calculated as in Table 3.13. and the payback period of the proposed system is shown in Figure 3.13.

If NPV is more than zero, the project should be accepted. If NPV is less than zero, the project should be rejected. After the net present value calculation, it is positively valued at 306,000 Baht and therefore, the proposed system should be accepted

IV. SYSTEM IMPLEMENTATION

The implementation begins after management has accepted the new system. It consists of the installment of the new system and the removal of the current system. It involves hardware (machine), software (computer program, procedure forms) and peopleware (personnel). Implementation plan includes all steps to convert from the existing system to the new system.

4.1 Program Coding

Coding is the important point at which application programs are written in order to perform whatever business functions are being computerized. The best way to write a program is to work directly form the design documentation and compose the program interactively at a workstation or PC. Programs are much easier to write when broken down into several small and more manageable modules.

When writing a program, the following documentation should be on hand:

(1) The data dictionary

(2) The coding scheme for code data elements

(3) The file layouts and data base schemas

(4) Screen layouts

(5) Data entry specifications

(6) The program design documentation

4.2 Testing

System testing is an expensive but critical process that can take as much as 50 percent of the budget for program development. The common view of testing held by user is that it is performed to prove there is no error in the program.

Testing is the process of executing program with the explicit intention of finding errors. The test should be designed to determine whether specific goals and objective could be met. The primary concern is the compatibility of individual module that has been designed with different specification for data length type and data element name.

It verifies adequate file sizes. The accuracy of computer processing time estimated must be verified and throughput times must be recorded and analyzed. The important purpose of a system test is to test the system run as a whole.

The elements to include in a comprehensive system test are the followings:

(1) System objectives

(2) Output reports

(3) Input forms and procedures

(4) Errors and correction procedures

(5) Throughput times

(6) Computer time

(7) Adequacy of system documentation

The parallel test may be the best way to simulate actual operation of the system. In parallel testing, the proposed system operates along with the existing system and cross-checks for system accuracy.

The testing may require more than one test for computer application. After the test is complete, the proposed system is modified, and the modified system is then retested.

4.3 System Debugging

Debugging refers to the process that a program may be with errors and testing is the process to guarantee that the program is free of errors. No matter how well a system is designed and regardless of how well it has been tested, there inevitably will be errors uncovered after the system goes into operation. Adequate staffing is required for proper

system maintenance. The technical staff of system analysts and programmer will need to be devoted to maintenance activities once several systems are in operation. System analyst should review all systems and program documentation before accepting responsibility for the system, thus helping to ensure that maintenance can be carried out independently of initial design team.

4.4 Hardware Setup and Installation

(1) Design where to install computer system in the garage

(2) Installation hardware part such as computer server, PCs

(3) Installation line to link for this LANs network

(4) Setup hardware configuration

4.5 Software Implementation

(1) Install operating system

(2) Setup hardware configuration

(3) Implementation new computerized system

4.6 Conversion

Conversion is the process of changing from the old system to the new one. There are four conversion methods of handling the system conversion. They are parallel systems, direct cut over, pilot approach, and phase in method. This project selects the parallel system method. This method converts the old system to the new system carefully, since the automobile repaired shop system did not have a computer system before. The committee and all the staff would like the new computer system to fully replace the old one so that the staff will not have to rely on the old manual system. The existing system is manual operation. The company should convert the system step by step, because if the system is damaged, all work will stop immediately. It is difficult to solve the damaged system. Moreover, the staffs have never operated a computer system.

So it would be a step by step conversion of the system. We must give staff time to be familiar with computer and there will be training for staff eventually.

4.7 Training

Prepare people for the new system. Some people do not know how to use the new system. We should have training courses to make the users understand how the new system works (step by step) and how to create reports. Overview flow of this program, so they can analyze and solve the problem that will happen in the future.

Inexperienced end-users have never used a computer before. They have never run the application program. The company has to train them so that they may understand the way to use the computer. It is necessary for the end users to know how to turn on a workstation, how to insert diskette into workstation, and how to save the information in the computer or diskette and how to load a program into the system. They must also be sure when it is safe to take a certain action without risk of losing data. They must know how to correct a simple problem about the data.

The main problem of user training involves the use of the system itself. The training in entry of data details into the system or in the keeping data includes the method to enter data and the data should be redundant. Users must be shown how to add data, make changes or edit it, formulate inquiries to retrieve specific information, and delete records of data. These functions are the most basic features of the system, and the person conducting the training session must be sure everyone understands them and can perform efficiently. To evaluate the effectiveness of the training, it is recommended to provide some testing of the users in key tasks and understanding of the functions.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The study of this project is to analyze, design and implement the information system for Taweephon Body Shop Service Co., Ltd. During the analysis of the existing system, some problems are found. A large amount of transactions occur each day. The process of daily transactions seems to be busy and difficult in the manual operation.

The manual system will fail to implement the information when the company expands in the future. The volume of information will be increased. The company will want the information to be managed efficiently. All of this, the manual system will not be able to support these features. If the company still uses the manual system, the result will be a greater cost and defectives and, at last, lead to failure. So that the computerized system is design to solve these problem including other which will be occurred in the future.

In the computerized system, the normalization is applied in design it. The normalization will help to design the database with no or very little redundancy. It also provides several benefits such as it saves time expenses, it provides information about automobile repair shop, it increases the efficiency and effectiveness in the organization and it also accurate information for the management.

By using such data flow diagrams, the new system can be designed and information flow can be described. The input from screen design and output reports are shown in this computer information system. The security and control system includes data accuracy control, backup control for authorized person and source document control for interrelated sections.

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

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

Process	Existing System	Proposed System
Application Process	1.5 hrs	1 hr.
Inquiry Process	15 mins.	5 mins
Payment Process	10 mins	3 mins
Modification Process	20 mins	10 mins
Printing Process	5 mins	5 mins
Cheque Prepare Process	15 mins.	5 mins
Total	2 hrs. 35 mins	1 hr. 28 mins

From Table 5.1, the degree of achievement of the existing system and proposed system are 2 hours 35 minutes and 1 hour 28 minutes. The proposed system saves time for doing processes than existing system 1 hour 7 minutes. Using manual system takes much time in keeping the document, so it is difficult to retrieve the document. A large amount of customers, cars, and transactions occur each day. The process of daily transactions seems to be busy and difficult in manual operation. The stocks are out of items. Some of them are missing or misplaced, some are obsolete and their quantities do not match the requirement. The company's cash flow is tight as there is too much investment in the inventory. The computerized system is then developed to support the work of this business.

The proposed computerized will let all processes done in systematic ways. Every processes will be managed in step by step. For each process from Table 5.1, proposed system use less time than existing system. It produces reports that cover major aspects and satisfy the management and user requirement. It also provides several benefits such as it saves time expenses, can find information needed easily, history of service and repair recorded in file, can control and record payment, easy to retrieve records on request, and control inventory and track all parts.

5.2 Recommendations

The proposed system is the first step towards computerization. The computerized system can be modified for further expansion easily or to develop further according to user's requirement.

In the future organization will have branch at other sites. The modem will use to communicate the data from head office to other branches. The system will be better and help marketing department to plan and manage the market.

The information of company will be implemented in online system. The inventory department also fully supports user requirements since it can interact efficiently with other departments.

The company used the barcode in order to link and transfer the issued spare part code into the inventory control for spare parts by a program interface. The inventory staff not key in each issued spare part code on the screen during the issue process. This barcode solve the problem of the mistakes of keying the issued pare part code. It will not only ensure the inventory staff that the issue information is more accurate, but also reduce the work time of issuing process.

APPENDIX A

DATA DICTIONARY

DATA DICTIONARY

1. Car information	= * Details of all brand names, models and options of cars available for services*
2. Customer	= { Customer }
3. Customer information	= Customer name + Customer address + Phone number + Fax number
4. Customer name	= { Legal character }
5. Customer address	= Address number + Street + City + Zip Code
6. Fax number	= { Legal character }
7. Phone number	= { Legal character }
8. Address number	= { Legal character }
9. Street	= { Legal character }
10.Zip Code	= { Legal character }
11.Car record	= * Details record about the car *
12.Customer record	= * Details record about the car *
13.Delivery slip	= * The document which show the customer information and date appointment *
14.Income information	= * Details of income during the month *
15.Insurance	= { Insurance }

16.Insurance information = Insurance company name + address + Zip Code + Phone number + Fax number

17.Invoices = { Invoice }

18.Invoice parts = * Information contains in invoice * customer name + car plate no. + part no. + part price + unit

19.Parts information = * Detail about part and price of each job *

20.Labor information = Labor name + labor no. + address zip code + telephon no. + mobile no. + wages

21.Quotation = * A document issued as an offer to the customer and insurance company in order to the decision to repaired the car *

22.Receipt = * A document issued as an evidence of payment made by customer *

23.Repaired = { Repaired }

24.Repaired information = * Customer Id+ Car Id + Part Id + Date In + Date out *

25.Repaired report = * Report that records the number of time of the car *

26.Update customer information = * Current information about customer after process of insert delete or change *

27.Update car information = * Current information about car after process of insert delete or change *

28.Withdraw parts = * A document which shows the details about parts of the car that must be changed *

APPENDIX B

PROCESS SPECIFICATION

PROCESS SPECIFICATION

Process : 1.1

Process Name : Get request from customer

Description : Receive customer order

Input : 1. Repair service request

Output : Repaired information

Process : 1. Get request from customer

2. Get repaired information

Attached : -

File : -

Process : 1.2

Process Name : Evaluate price

Description : To evaluate the reparation price.

Input : 1. Repaired Information

2. Labor and part information

Output : Evaluate price

Process : 1. Get repaired information

2. Get part information and labor information

3. Calculate part price and labor price

Attached : -

File : Quotation file

Process : 1.3

Process Name : Create quotation

Description : Print evaluate price to customer

Input : 1. Part and labor information

2. Repaired Information

Output : Quotation

Process : 1. Get part and labor information

2. Get repaired information

Attached : -

File : Quotation

Process : 2.1

Process Name : Request for customer information

Description : To request form personal information

Input : Customer information

Output : Customer information record

Process : 1. Request for information

2. Send customer information form to customer.

Attached : -

File : -

Process : 2.2

Process Name : Determine if customer is unregistered

Description : To determine whether the customer information is already registered or not.

Input : Customer name

Output : Customer's register status

Process : 1. Looking for customer's name

2. Key in the customer name and retrieve data from customer record.

Attached : -

File : Customer file

Process : 2.3

Process Name : Insert customer registration

Description : Enter nregistered customer and customer information to customer file

Input : Customer information

Output : Customer ID

Process : 1. Open new customer register form.

2. Enter customer's information and save to database.

Attached : -

File : Customer file

Process : 3.1

Process Name : Receive car from customer

Description : To get damaged car from customer

Input : damaged car

Output : damaged car

Process : 1. Get damaged car from

2. Send damaged car to Body/Paint department

Attached : -

File : -

Process : 3.2

Process Name : Request for car information

Description : To request for car information from customer

Input : Customer information

Output : Customer record

Process : 1. Request for information

2. Send car information form to customer

Attached : -

File : Car file

Process : 3.3

Process Name : Determine if car is unregistered

Description : To determine whether the car information is already registered or not.

Input : Car's plate number

Output : Car's register status

Process : 1. Looking for car's plate number.

2. Key in the plate number and retrieve data from car file

Attached : -

File : Car file

Process : 3.4

Process Name : Insert car registration

Description : Enter unregistered plate number and car information to car file.

Input : 1. Car information

2. Unregistered plate number.

Output : Car ID

Process : 1. Open new car register form.

2. Enter car information and save to database.

Attached : -

File : Car file

Process : 4.1

Process Name : Get repaired information

Description : To receive repaired information from quotation database

Input : Request

Output : Repaired information

Process : 1.Get repaired information from quotation database

2. Send to labor

Attached : -

File : Quotation file

Process : 4.2

Process Name : Withdraw parts

Description : To get spare parts from inventory

Input : Withdraw slip

Output : Parts

Process : 1. Send withdraw slip to Inventory department

2. Receive spare parts from Inventory department

Attached : -

File : Inventory file

Process : 4.3

Process Name : Body repaired

Description : To repair car's body.

Input : Damaged car

Output : Body finished car

Process : Replace the new spare part

Attached : -

File : Labor file

Process : 4.4

Process Name : Color repaired

Description : To repair car's color.

Input : Color damaged car

Output : finished car

Process : 1.repaired damaged car.

2.paint

Attached : -

File : Labor file

Process : 4.5

Process Name : Verify the car and check job

Description : To verify the finished car.

Input : 1. Finished car

2. Quotation

Output : Car status

Process : 1. Get quotation

2. Get finished car

3. Check outside of car.

4. Check the fixed point.

Attached : -

File : Quotation file

Process : 5.1

Process Name : Verify accuracy of information to be invoiced

Description : To check invoiced information.

Input : Quotation

Output : Accuracy data to be invoiced

Process : 1. Get quotation

2. Check the data

Attached : -

File : -

Process : 5.2

Process Name : Print invoice to customer

Description : To create invoice to customer.

Input : Invoiced information

Output : Invoice

Process : 1. Receive invoiced information

2. Print invoice

Attached : -

File : Invoice file

Process : 5.3

Process Name : Deliver car to customer

Description : To send car to customer.

Input : Finished car

Output : Delivery slip

Process : Send car to customer

Attached : -

File : -

Process : 5.4

Process Name : Receive payment

Description : To collect and record the payment.

Input : Payment

Output : Receive Bill

Process : 1. Retrieve the invoice and payment file.

2. Collect the money from customer.

3. Record amount and type of payment.

Attached : -

File : Accounting file

Process : 5.5

Process Name : Print receipt

Description :

Input : money

Output : Receipt

Process : Print receipt and take to customer.

Attached : -

File : Receipt file

Process : 6.1

Process Name : Generate reports

Description : To print the reports

Input : Report information

Output : Reports

Process : 1. Open report menu

2. Select type of report

3. Print reports

Attached : -

File : Report file

Process : 6.2

Process Name : Update reports information

Description : To update the report information to database.

Input : 1. Reports information

2. Report ID

Output : Report ID

Process : 1. Open existing report data in report file

2. Check report information with the existing report data in database.

3. Update any changed report's information

Attached : -

File : Report file

APPENDIX C

MODULE SPECIFICATION

MODULE SPECIFICATION

MODULE : CREATE QUOTATION

PURPOSE : To create quotation

To calculate the price

USES : Car Id

RETURN : Labor price, Part price

FUNCTION DETAILS :

1. Add repaired record
2. Evaluate the price
3. Calculate price
4. Print quotation
5. Print report

MODULE : CUSTOMER REGISTRATION

PURPOSE : To find the existing customer record

To create new customer record

USES : Customer Id

RETURN : Customer Id, Customer name, Car plate no.

FUNCTION DETAILS :

1. Search customer record
2. Add customer record
3. Update customer record

MODULE : CAR REGISTRATION

PURPOSE : To find the existing car record

To create new car record

USES : Car Id

RETURN : Car Id, Car name

FUNCTION DETAILS :

1. Search car record
2. Add car record
3. Update car record

MODULE : CAR REPAIRATION

PURPOSE : To observe date finish

USES : Car Id, Date in, Labor Id, Part Id

RETURN : Repaired record

FUNCTION DETAILS :

1. Get date finish
2. Update repaired record
3. Write repaired record

MODULE : CAR DELIVERY AND RECEIVE PAYMENT

PURPOSE : To delivery the car

To get money

USES : Car Id

RETURN : Car condition

FUNCTION DETAILS :

1. Search file car
2. Search file repaired
3. Comparison finish date and appointment date
4. Print delivery report
5. Add income record
6. Print receipts

MODULE : CREATE MANAGEMENT REPORTS

PURPOSE : To create reports for management

USES : Report Id

RETURN : Report record

FUNCTION DETAILS :

1. Add report record
2. Update report record
3. Print report

APPENDIX D

STURCTURE CHART

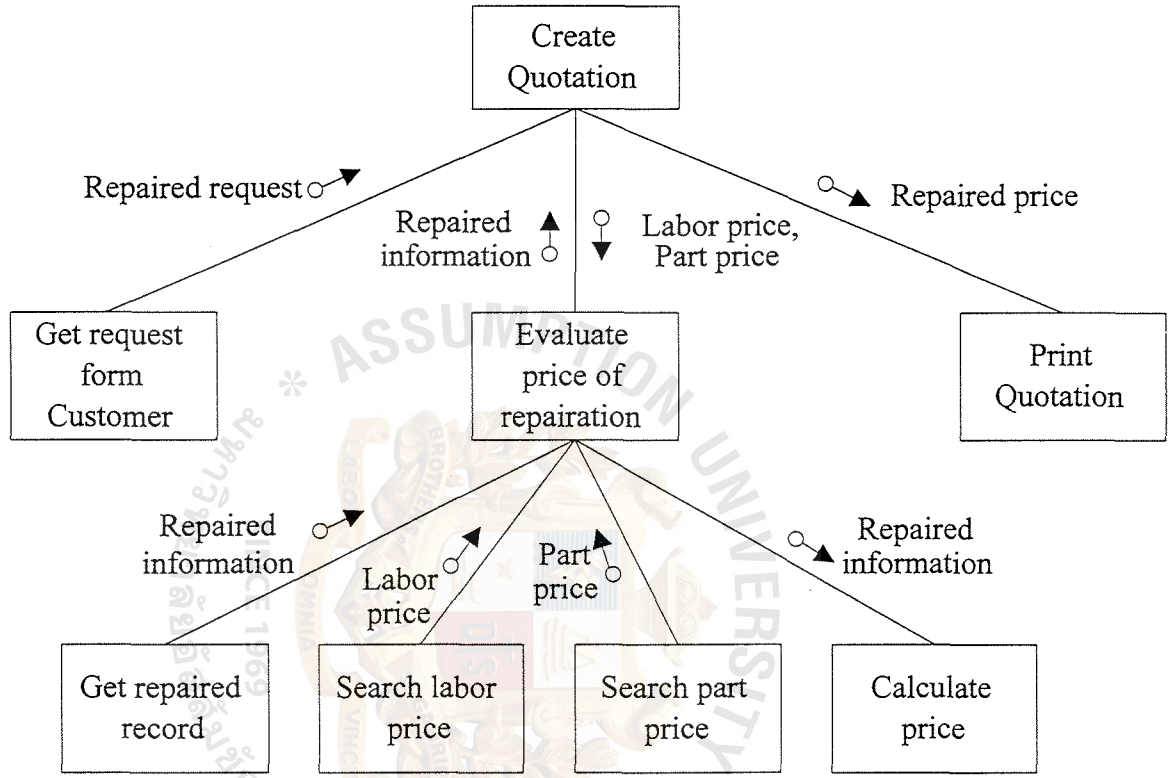

Figure D.1. Structure Chart of Create Quotation.

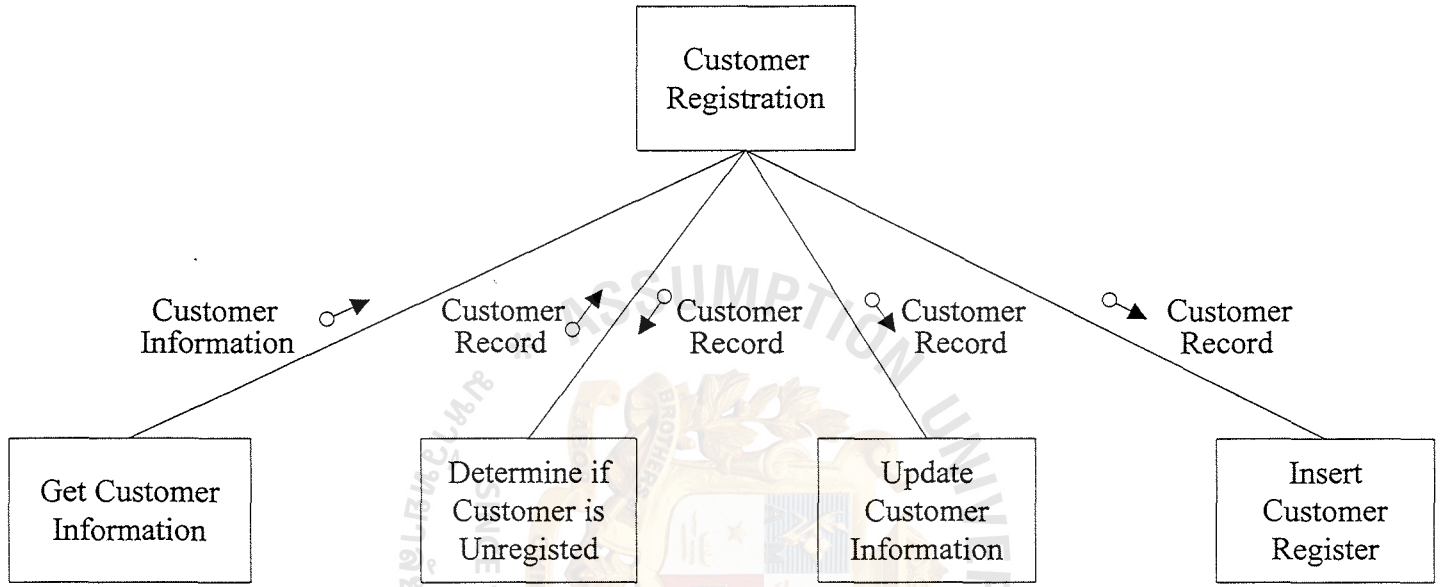

Figure D.2. Structure Chart of Customer Registration.

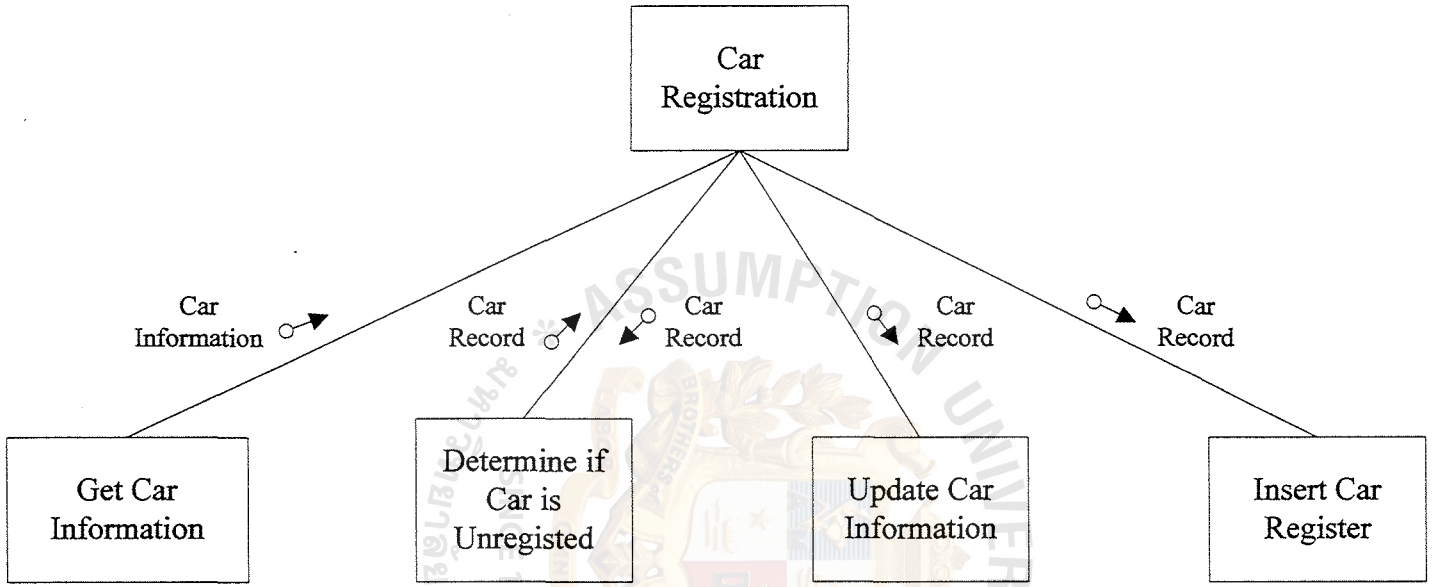

Figure D.3. Structure Chart of Car Registration.

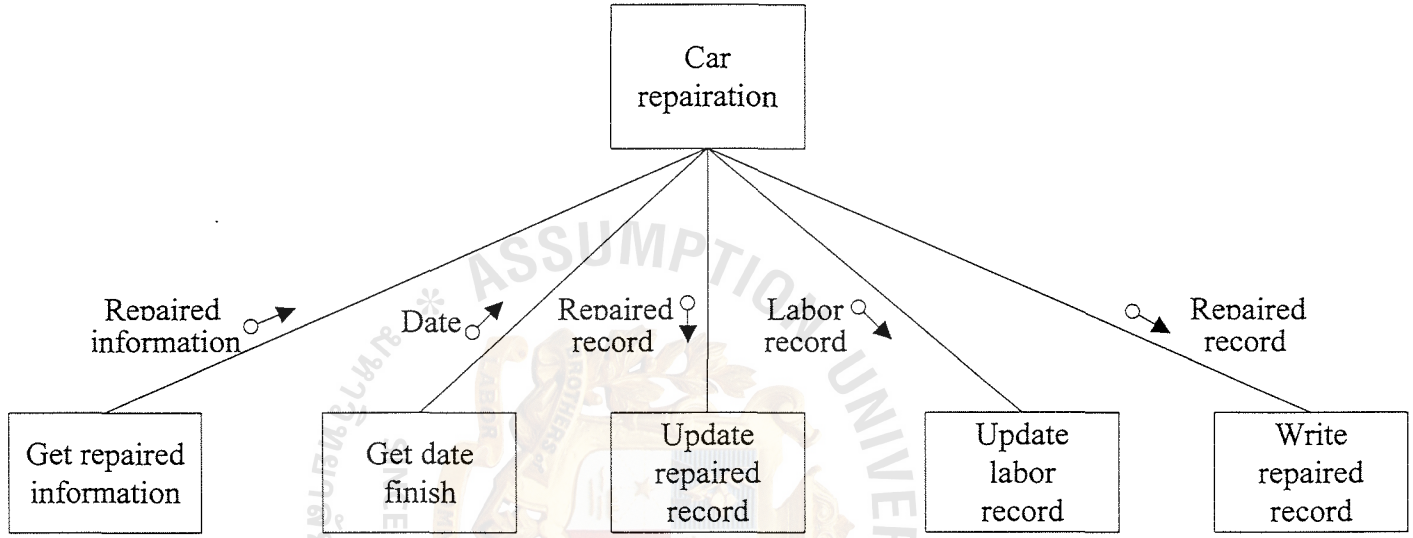

Figure D.4. Structure Chart of Car Repairation.

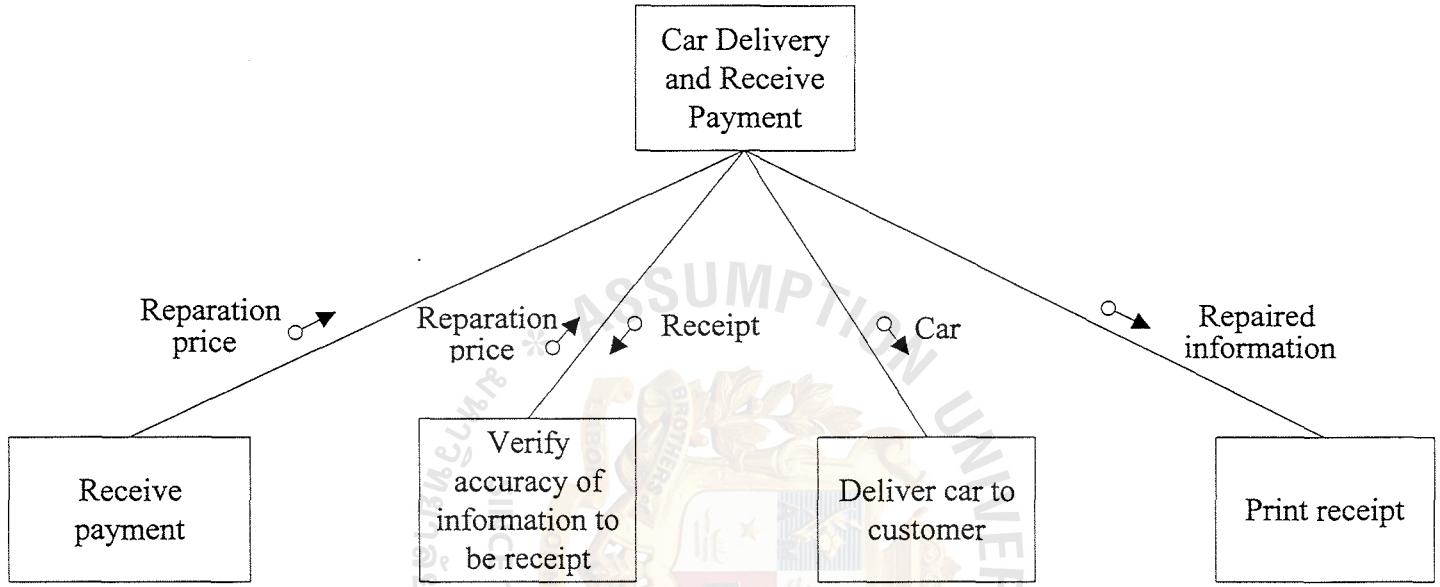

Figure D.5. Structure Chart of Car delivery and Receive payment.

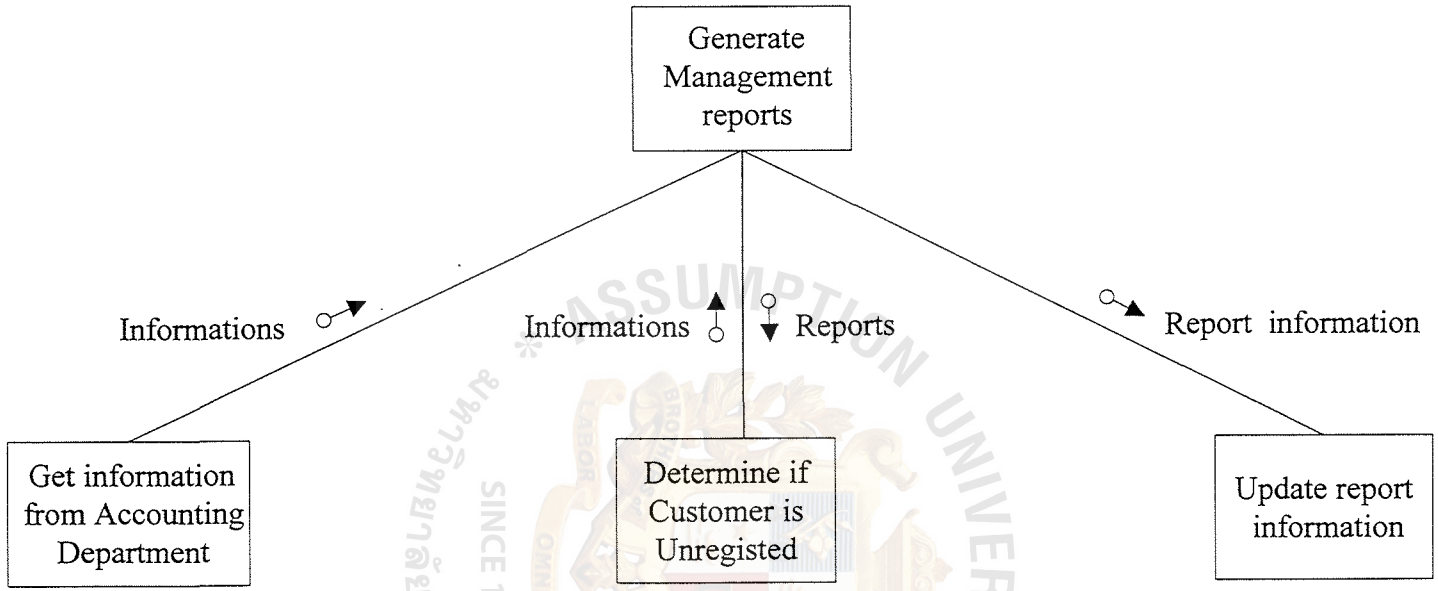

Figure D.6. Structure Chart of Generate Management Reports.

APPENDIX E

SCREEN LAYOUT

SCREEN LAYOUT

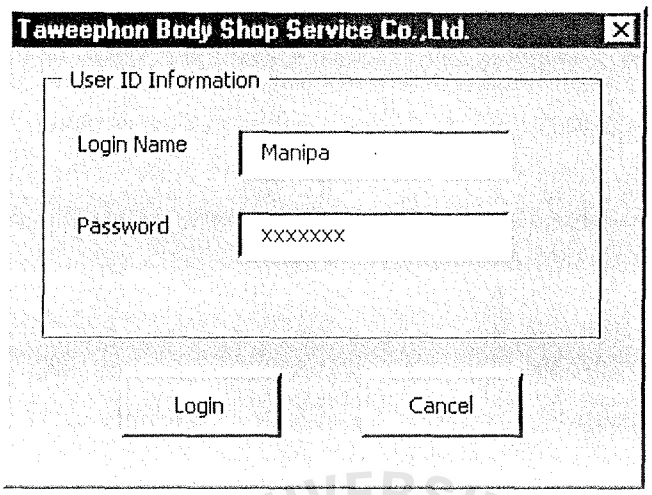

Figure E.1. User ID Information.

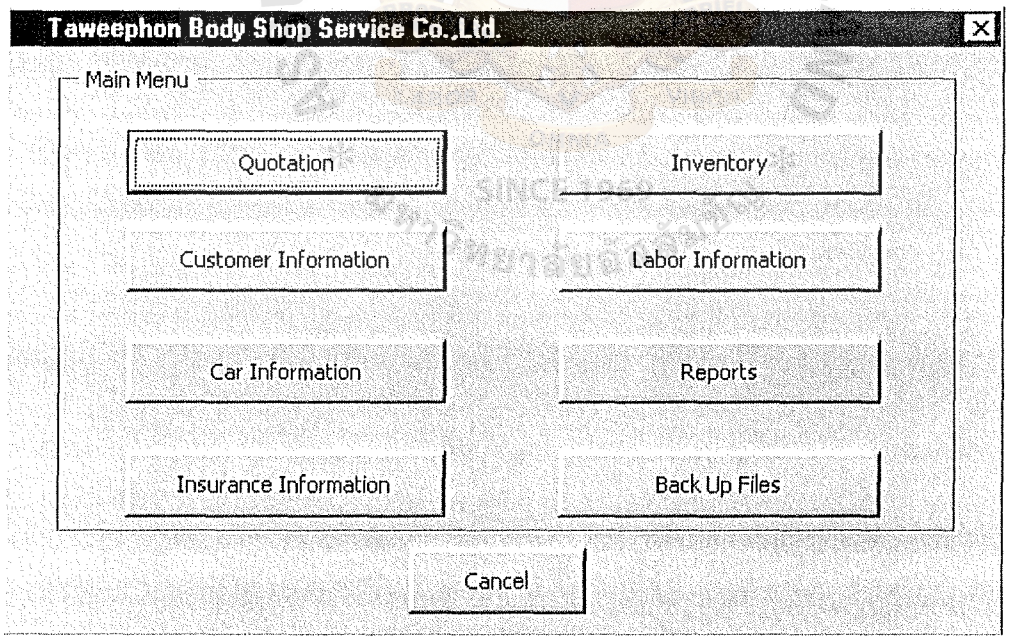

Figure E.2. Main Menu.

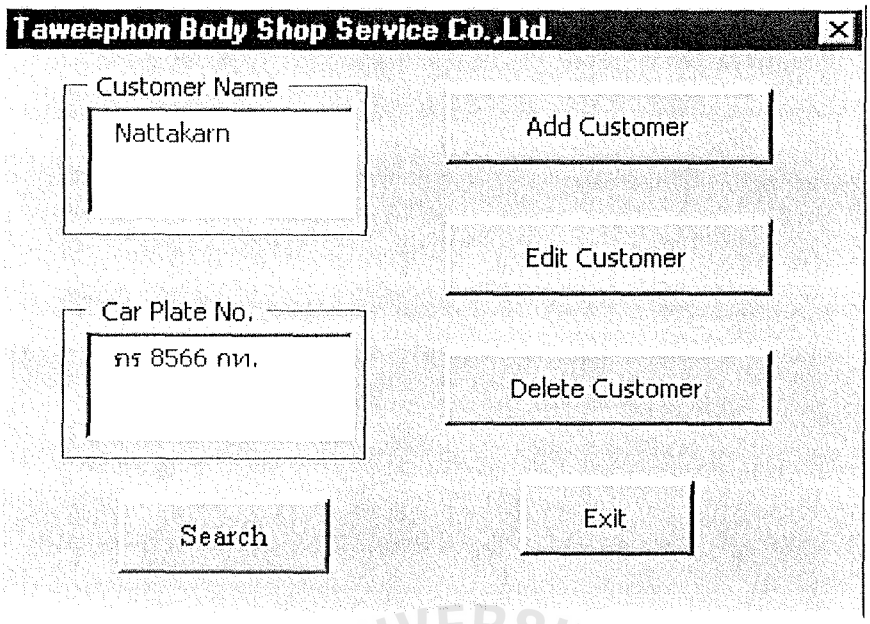

Figure E.3. Customer Main Menu.

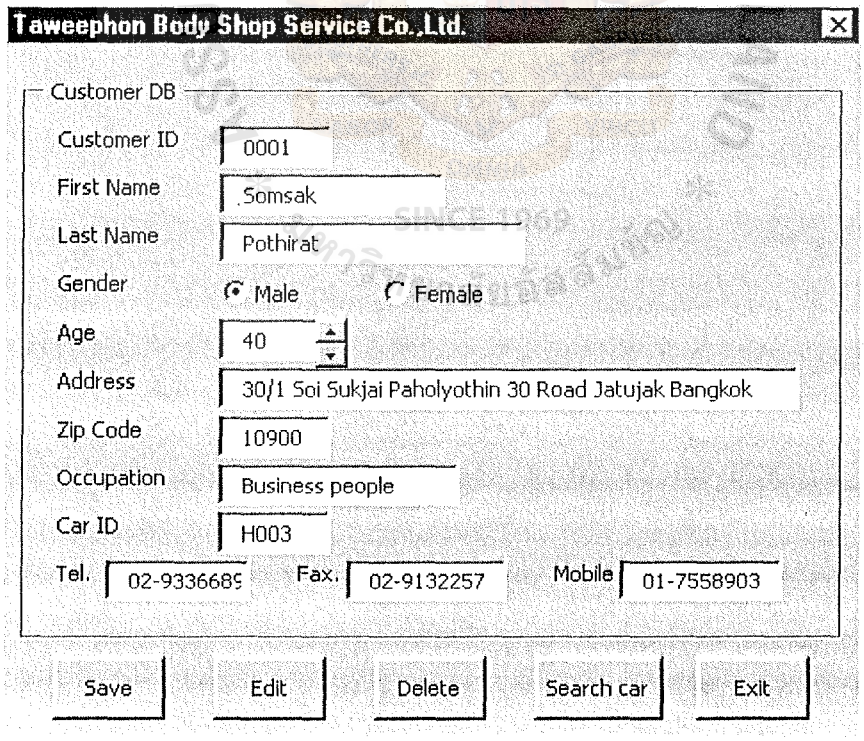

Figure E.4. Customer Information.

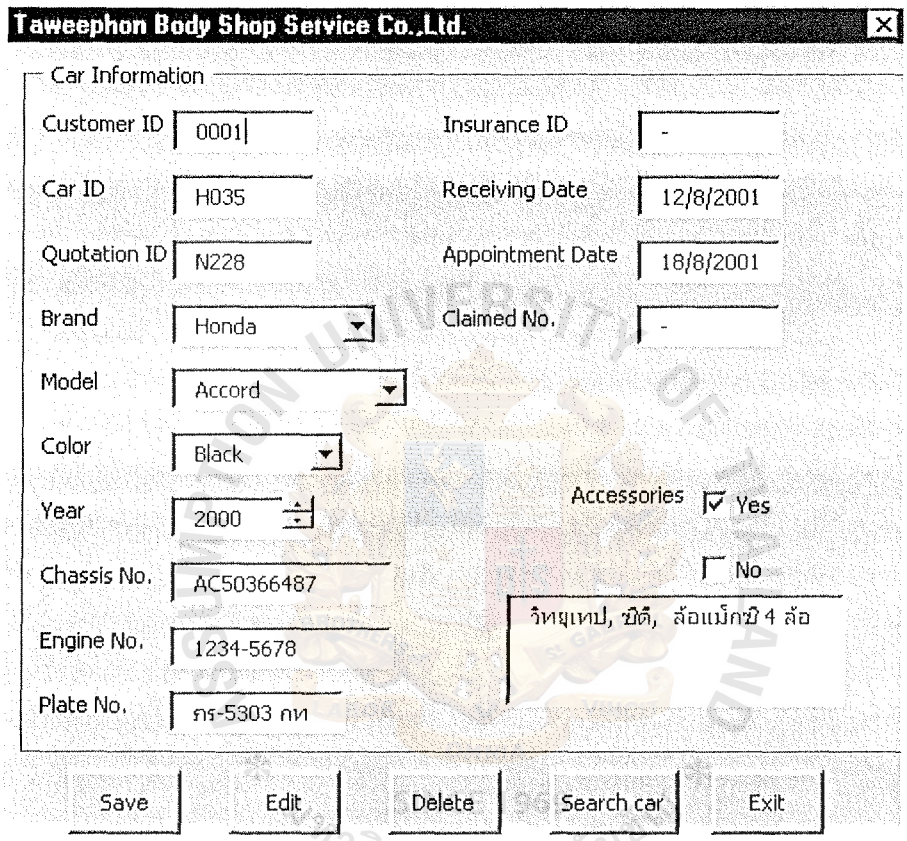

Figure E.5. Car Information.

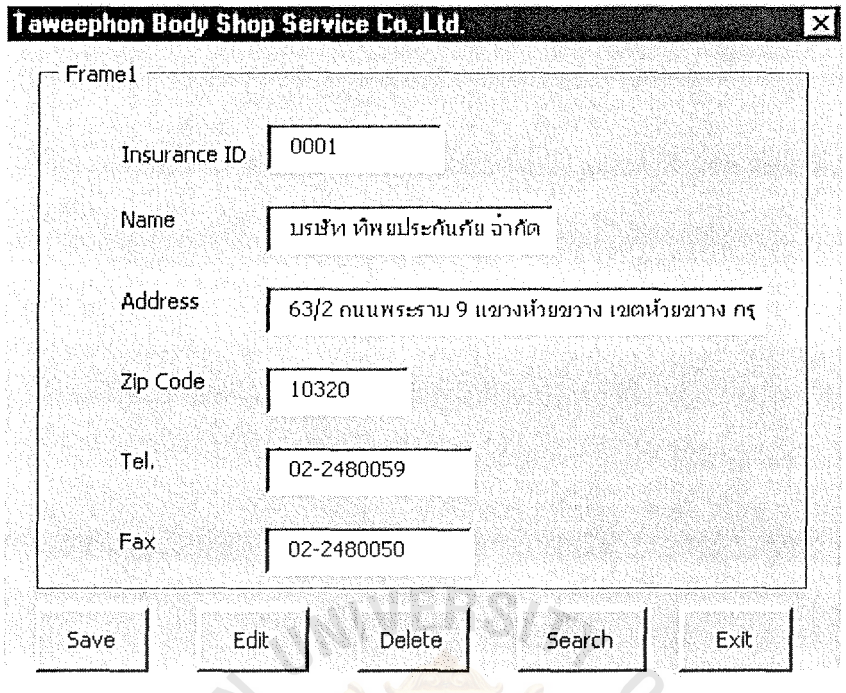

Figure E.6. Insurance Information.

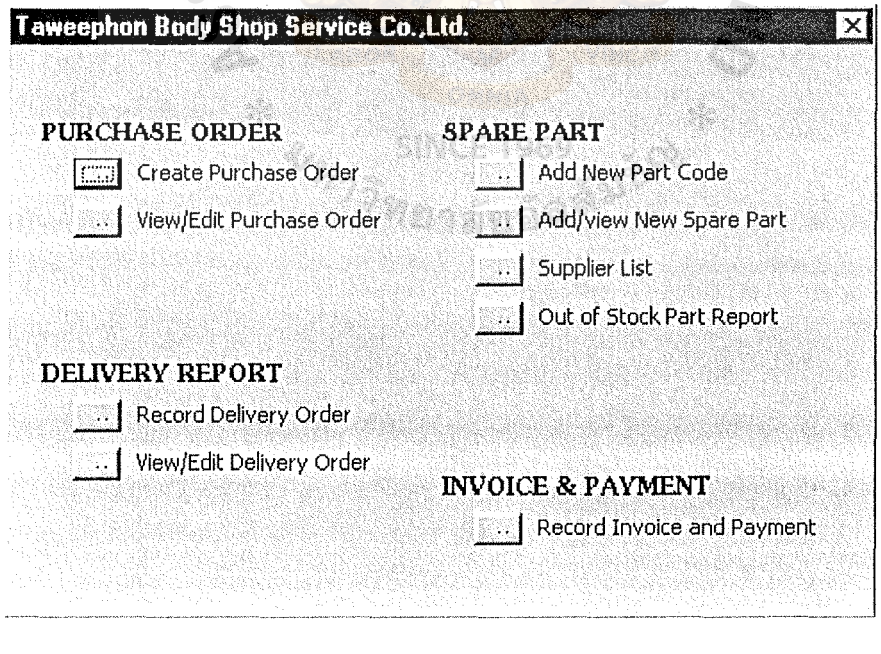

Figure E.7. Inventory Main Menu.

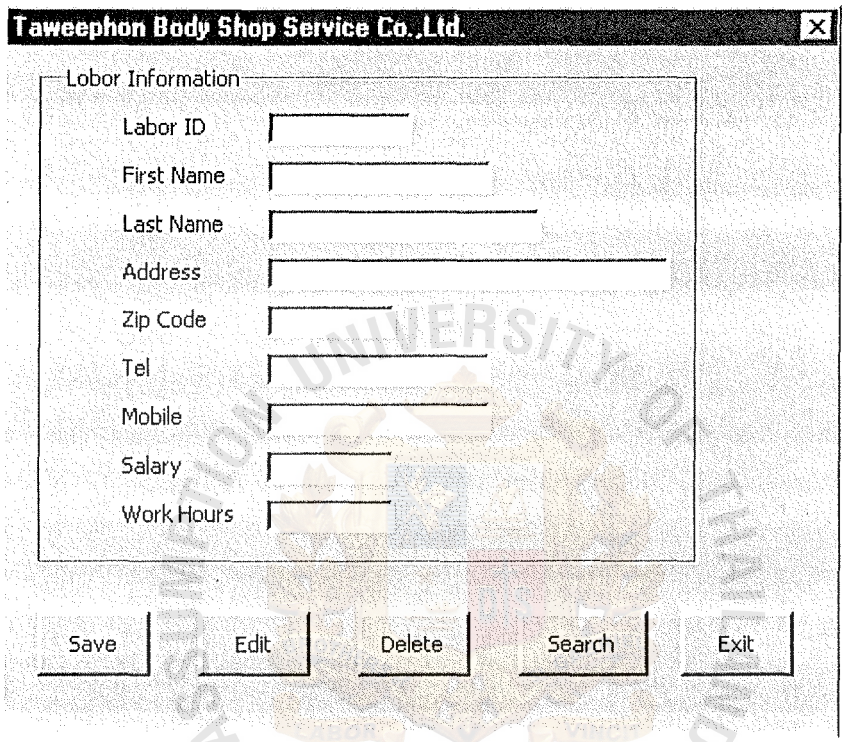

Figure E.8. Labor Information.

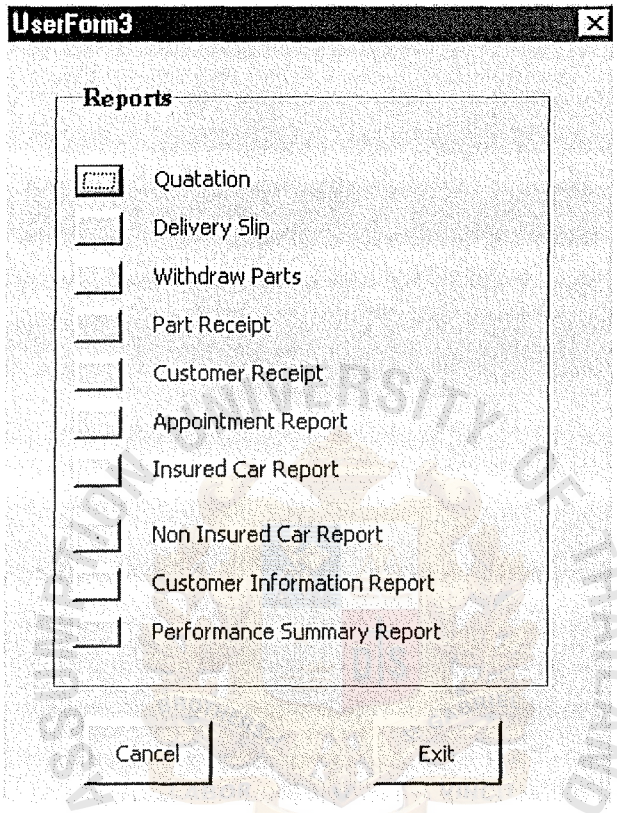

Figure E.9. Reports Main Menu.

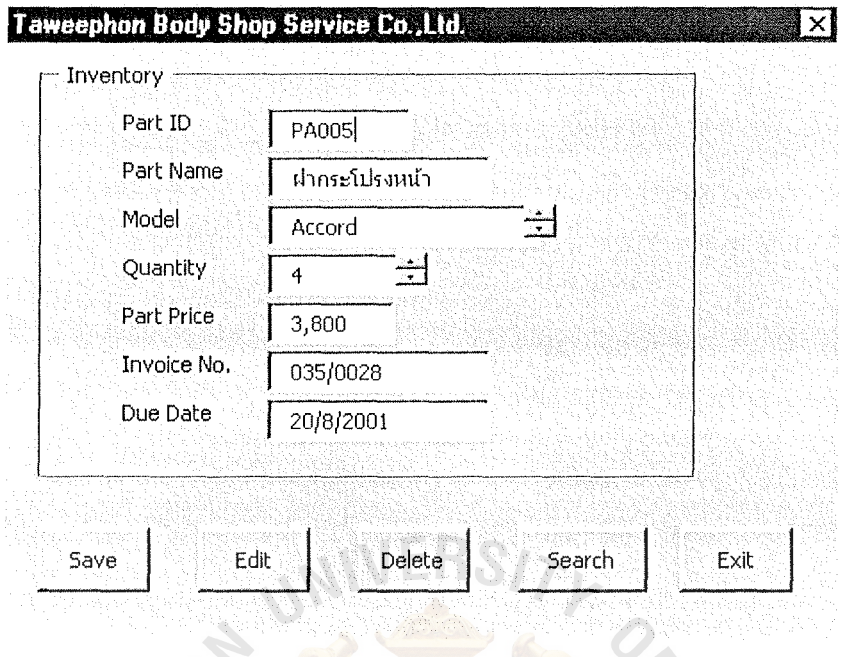

Figure E.10. Inventory Information.

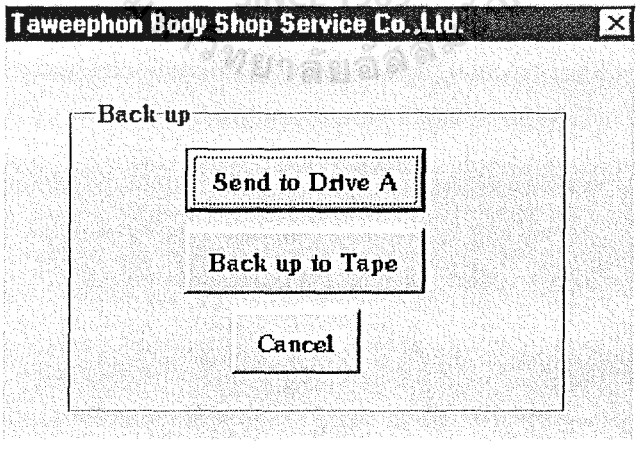

Figure E.11. Back up Menu.

APPENDIX F

REPORT LAYOUT

DELIVERY SLIP

บริษัท ทวีผลบอดี้ช็อปเซอร์วิส จำกัด
49 หมู่ที่ 3 ถนนเพชรเกษม ตำบลไร่ส้ม
อำเภอเมือง จังหวัดเพชรบุรี 76000
โทรศัพท์ 032-425831 โทรสาร 032-419833

วันที่ 30/6/44

วันนัดรับรถ 6/6/44

ชื่อ ฝึกฝน ตั้งกิตติศัพท์
ที่อยู่ 30/1 ซอยพหลโยธิน 30 ลาดยาว จตุจักร กรุงเทพ
รหัสไปรษณีย์ 10900
โทรศัพท์ 02-9303367 โทรสาร 02-9303367

ยี่ห้อรถ เปอร์โย ทะเบียน ภค 3345 กรุงเทพมหานคร
รุ่น 306 SR ปี 1996
สี เขียว เลขคัชชี

อุปกรณ์เสริม

1. วิทยุซีดี
2. แมกซ์ 15" 4 ล้อ

ผู้ส่งซ่อม .....
( )
ผู้รับรถ.....
( )

Figure F.1. Delivery Slip.

QUOTATION

บริษัท ทวีผลบอดี้เซอร์วิส จำกัด **วันที่** 30/6/44
49 หมู่ที่ 3 ถนนเพชรเกษม ตำบลไร่ส้ม
อำเภอเมือง จังหวัดเพชรบุรี 76000
โทรศัพท์ 032-425831 โทรสาร 032-419833

ชื่อ บริษัท สินมั่นคงประกันภัย จำกัด (มหาชน)
ที่อยู่ 279 ถ.ศรีนครินทร์ สวนหลวง กรุงเทพฯ 10240
ยี่ห้อรถ เปอร์โย **รุ่น** 306 SR **ปี** 1996 **สี** เขียว
ทะเบียน ภค 3345 กรุงเทพมหานคร
เลขที่อุบัติเหตุ 302-1-277/44 **กรมธรรม์** 43-1-6-055287

จำนวน	รายการ	ราคาต่อหน่วย	รวม
1 อัน	ฝากระโปรงหน้า เคาะ พ่นสี	3,000	3,000
1 ข้าง	บังโคลนหน้า LH เคาะ พ่นสี	2,500	2,500
1 บาน	ประตู LH เคาะ พ่นสี	2,500	2,500
		รวม	8,000

(แปดพันบาทถ้วน)

ผู้เสนอราคา.....
( )

Figure F.2. Quotation.

CUSTOMER RECEIPT

เล่มที่ 3 เลขที่ 16
เลขประจำตัวผู้เสียภาษีอากร 1624098859

บริษัท ทวีผลบอดี้เซอร์วิส จำกัด **วันที่** 30/6/44
49 หมู่ที่ 3 ถนนเพชรเกษม ตำบลไร่ส้ม
อำเภอเมือง จังหวัดเพชรบุรี 76000
โทรศัพท์ 032-425831 โทรสาร 032-419833

ชื่อ ฝึกฝน ตั้งกิตติศัพท์
ที่อยู่ 30/1 ซอยพหลโยธิน 30 ลาดยาว จตุจักร กรุงเทพ 10900
ยี่ห้อรถ เปอร์โย **รุ่น** 306 SR **ปี** 1996 **สี** เขียว
ทะเบียน ภค 3345 กรุงเทพมหานคร

จำนวน	รายการ	ราคาต่อหน่วย	รวม
1 อัน	ฝากระโปรงหน้า เคาะ พ่นสี	3,000	3,000
1 ข้าง	บังโคลนหน้า LH เคาะ พ่นสี	2,500	2,500
1 บาน	ประตู LH เคาะ พ่นสี	2,500	2,500
		รวม	8,000
		ภาษีมูลค่าเพิ่ม 7 %	560
		รวม	8,560

(แปดพันห้าร้อยหกสิบบาทถ้วน)

ผู้รับเงิน .....
( )

Figure F.3. Customer Receipt.

PARTS RECEIPT

เล่มที่ 2 เลขที่ 47
เลขประจำตัวผู้เสียภาษีอากร 1624098859

บริษัท ทวีผลบอดี้เซอร์วิส จำกัด **วันที่** 30/6/2544
49 หมู่ที่ 3 ถนนเพชรเกษม ตำบลไร่ส้ม
อำเภอเมือง จังหวัดเพชรบุรี 76000
โทรศัพท์ 032-425831 โทรสาร 032-419833

ชื่อ ฝึกฝน ตั้งกิตติศัพท์
ที่อยู่ 30/1 ซอยพหลโยธิน 30 ลาดยาว จตุจักร กรุงเทพ 10900
ยี่ห้อรถ เปอร์โย **รุ่น** 306 SR **ปี** 1996 **สี** เขียว
ทะเบียน ภค 3345 กรุงเทพมหานคร

จำนวน	รายการ	ราคาต่อหน่วย	รวม
1 อัน	ฝากระโปรงหน้า เคาะ พ่นสี	3,000	3,000
1 ข้าง	บังโคลนหน้า LH เคาะ พ่นสี	2,500	2,500
1 บาน	ประตู LH เคาะ พ่นสี	2,500	2,500
		รวม	8,000
		ภาษีมูลค่าเพิ่ม 7 %	560
		รวม	8,560

(แปดพันห้าร้อยหกสิบบาทถ้วน)

ผู้รับเงิน .....
( )

Figure F.4. Parts Receipt.

INSURED CAR REVENUE REPORT

วันที่ 30/6/44

ลำดับที่	ชื่อบริษัทประกัน	จำนวนรถที่รับ	จำนวนรถที่ซ่อมเสร็จแล้ว	ผลการดำเนินงาน (%)
1	บริษัท ทิพยประกันภัย จำกัด (มหาชน)	5	3	60
2	บริษัท สินมั่นคงประกันภัย จำกัด (มหาชน)	7	5	80
3	บริษัท พาณิชย์การประกันภัย จำกัด	10	7	70
4	บริษัท คุ้มเกล้าประกันภัย จำกัด	4	4	100

Figure F.5. Insured Car Revenue Report.

NON INSURED CAR REVENUE REPORT

วันที่ 30/6/44

ลำดับที่	ชื่อ	เบอร์โทรศัพท์	ยี่ห้อรถ/รุ่น/สี	ผลการดำเนินงาน (%)
1	คุณฝึกฝน ตั้งกิตติศัพท์	02-9303367	เปอร์โย / 306 / เขียว	100
2	คุณชัยวัฒน์ เกตุสุวรรณ	02-5742314	โตโยต้า / โคโลร่า / แดง	80
3	คุณณัฐกานต์ กอสวัสดิ์พัฒน์	01-7751381	นิสสัน / ซันนี่ / บรอนซ์	70
4	คุณอมรรัตน์ อักษร	01-9047854	วอลโว่ / S40 / ทอง	100

Figure F.6. Non Insured Car Revenue Report.

APPOINTMENT REPORT

วันที่ 30/6/44

ลำดับที่	ชื่อ	เบอร์โทรศัพท์	ทะเบียน	ยี่ห้อรถ/รุ่น/สี
1	คุณฝึกฝน ตั้งกิตติศัพท์	02-9303367	ภค 3345 กทม.	เปอร์โย / 306 / เขียว
2	คุณชัยวัฒน์ เกตุสุวรรณ	02-5742314	กข 347 เพชรบุรี	โตโยต้า / โคโลร่า / แดง
3	คุณณัฐกานต์ กอสวัสดิ์พัฒน์	01-7751381	ก-7799 เพชรบุรี	นิสสัน / ซันนี่ / บรอนซ์
4	คุณอมรรัตน์ อักษร	01-9047854	พพ 5031 กทม.	วอลโว่ / S40 / ทอง

รวม 4 คัน

Figure F.7. Appointment Report.

CUSTOMER INFORMATION REPORT

วันที่ 30/6/44

Customer ID.	First Name	Last Name	Address	Postal Code	Tel. no.	Fax no.
0001	ฝึกฝน	ตั้งกิตติศัพท์	30/1 ซอยพหลโยธิน 30 ลาดยาว จตุจักร กรุงเทพ	10900	02-9303367	02-9303367
0002	ชัยวัฒน์	เกตุสุวรรณ	87/78 ถนนพระราม 6 รองเมือง ปทุมวัน กรุงเทพ	10330	02-5742314	-
0003	ณัฐกานต์	กอสวัสดิ์พัฒน์	50 หมู่ 5 ตำบลคลองกระแชง อ.เมือง จ.เพชรบุรี	76000	01-7751381	-
0004	อมรรัตน์	อักษร	874 ถนนพานิชเจริญ ตำบลท่าราบ อ.เมือง จ.เพชรบุรี	76000	01-9047854	032-417564

Figure F.8. Customer Information Report.

Out of Stock Report

วันที่ 8-Oct-43

PartID	Category	Part Code	PartName	CarModel	Brand	Recorder
1	Engine	10001	หัวเทียน	A3	AUDI	10
4	Engine	10001	หัวเทียน	W123 230E	BENZ	10
7	Engine	10003	ไส้กรองน้ำมันเครื่อง	Accord 88	HONDA	25
16	Engine	1006	ไส้กรองอากาศ	W123 230E	BENZ	1

Figure F.9. An Example of Out of Stock Report.

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5. Laudon, Kenneth C. and Jane Price Laudon. Management Information Systems: A Contemporary Perspective. NY: Macmillan, 1988.

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