



Financial Information System for
Siam Gulf Stevedoring LTD., PART.

by

Mr. Phattarayut Sopausavaporn

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

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

November 2003

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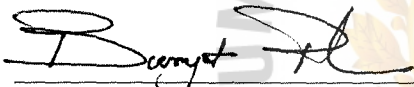
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| Project Title | Financial Information System for Siam Gulf Stevedoring LTD., PART |
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| Academic Year | November 2003 |

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


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ABSTRACT

At present it is widely accepted that information technology become the most critical tool for many in the businesses in Thailand such as beverage, food, agriculture industry and restaurant. Siam Gulf Stevedoring LTD.,PART acts as a intermediate between ship owner and shipment agency companies that take care of their customers. Siam Gulf Stevedoring has to take care of product that exported or imported.

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

The new system will be developed to replace the mainly manual and some computerized system. All data are kept in the database server. It helps to the number of staff, solve the problems of the manual system. The scope of the project involve Purchasing, Payroll, and Invoice receivable.

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

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TABLE OF CONTENTS

| <u>Chapter</u> | <u>Page</u> |
|--|-------------|
| ABSTRACT | i |
| ACKNOWLEDGEMENTS | ii |
| LIST OF FIGURES | v |
| LIST OF TABLES | vii |
| I. INTRODUCTION | 1 |
| 1.1 Background of the Project | 1 |
| 1.2 Objective of the Project | 2 |
| 1.3 Scope of the Project | 2 |
| 1.4 Deliverables | 3 |
| 1.5 Project Plan | 3 |
| II. THE EXISTING SYSTEM | 5 |
| 2.1 Background of the Organization | 5 |
| 2.2 Existing System and Business Function | 6 |
| 2.3 Current Problems and Areas for Improvement | 8 |
| III. THE PROPOSED SYSTEM | 12 |
| 3.1 User's Requirement | 12 |
| 3.2 System Design | 16 |
| 3.3 Hardware and Software Requirement | 25 |
| 3.4 Security and Control | 32 |
| 3.5 Cost and Benefit Analysis | 34 |
| IV. PROJECT IMPLEMENTATION | 45 |
| 4.1 Overview of Project Implementation | 45 |
| 4.2 Stages of Implementation | 45 |

| <u>Chapter</u> | <u>Page</u> |
|---|-------------|
| V. CONCLUSION AND RECOMMENDATIONS | 47 |
| 5.1 Conclusions | 47 |
| 5.2 Recommendations | 50 |
| APPENDIX A CONTEXT DIAGRAM OF EXISTING SYSTEM | |
| APPENDIX B CONTEXT DIAGREM OF PROPOSED SYSTEM | |
| APPENDIX C ENTITY RELATIONSHIP DIAGRAM | |
| APPENDIX D DATA DEFINITION | |
| APPENDIX E PROCESS SPECIFICATION | |
| APPENDIX F FEASIBILITY ANALYSIS | |
| APPENDIX G DATA DICTIONARY | |
| APPENDIX H INTERFACE DESIGN | |
| APPENDIX I OUTPUT REPORT | |
| BIBILIOGRAPHY | 101 |

LIST OF FIGURES

| <u>Figure</u> | <u>Page</u> |
|--|-------------|
| 1.1 Project plan of Financial Information System | 4 |
| 2.1 Organization Chart of the Company | 7 |
| 3.1 Hardware Configuration of Proposed System | 27 |
| 3.2 Break-Even Point Analysis | 39 |
| 3.3 Payback Period for Candidate 3 | 42 |
| A.1 Context Diagram of Existing System | 52 |
| A.2 Level 1 Data Flow Diagram of Existing System | 53 |
| B.1 Context Diagram of Proposed System | 54 |
| B.2 Level 0 Data Flow Diagram of Proposed System | 55 |
| B.3 Data Flow Diagram – Receive Information | 56 |
| B.4 Data Flow Diagram – Payment Process | 57 |
| B.5 Data Flow Diagram – Income Process | 58 |
| B.6 Data Flow Diagram – Print Report | 59 |
| C.1 Context Entity Relationship Diagram of Proposed System | 60 |
| C.2 Key Based Entity Relationship Diagram | 61 |
| C.3 Fully Entity Relationship Diagram | 62 |
| F.1 Payback period of First Candidate | 81 |
| F.2 Payback period of Second Candidate | 82 |
| F.3 Payback period of Third Candidate | 83 |
| H.1 Interface Design for Service Order Information | 90 |
| H.2 Interface Design for Purchasing Order Information | 91 |
| H.3 Interface Design for Employee Information | 92 |
| H.4 Interface Design for Main Menu | 93 |

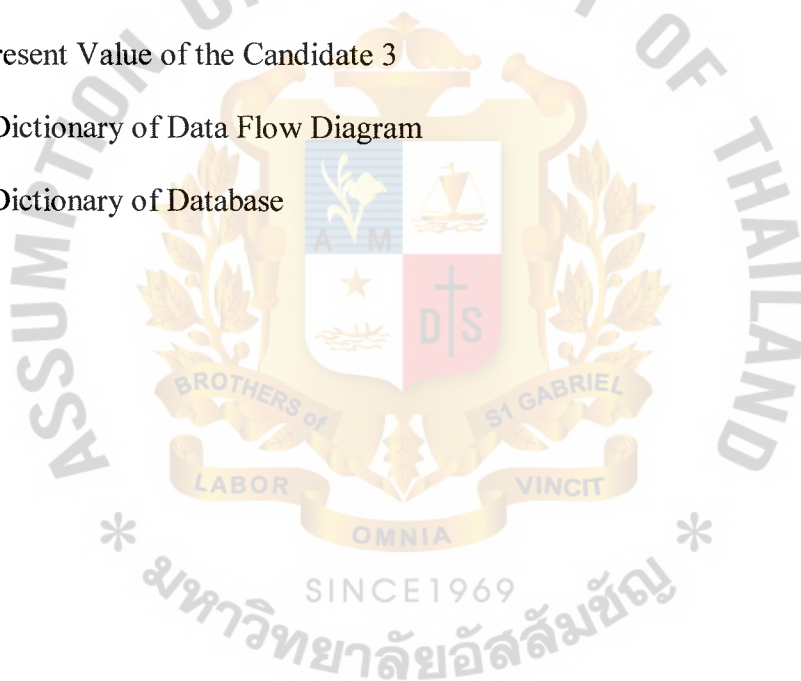
| <u>Figure</u> | <u>Page</u> |
|---|-------------|
| H.5 Interface Design for Login | 94 |
| H.6 Interface Design for Request Report | 95 |
| I.1 Order service Summary | 96 |
| I.2 Purchasing Order Summary | 97 |
| I.3 Summary of total Number of Ship Containers for a Year | 98 |
| I.4 Summary of Inbound Vessel for a Month | 99 |
| I.5 Summary of Outbound Vessel for a Month | 99 |
| I.6 Summary of Employee's Salary | 100 |



LIST OF TABLES

| <u>Table</u> | <u>Page</u> |
|--|-------------|
| 2.1 Manual System Versus Computerize System | 10 |
| 3.1 Candidate System Matrix | 19 |
| 3.2 Feasibility Analysis Matrix | 21 |
| 3.3 Cost Comparisons between the Existing System and Proposed System | 38 |
| 3.4 Payback Analysis | 41 |
| 3.5 Net Present Value of the Candidate | 44 |
| 5.1 Degree Achievement of the Proposed System | 49 |
| D.1 Structure of Officer and Transaction Table | 63 |
| D.2 Structure of Payment Table | 63 |
| D.3 Structure of Purchase Order Table | 64 |
| D.4 Structure of Payroll Table | 64 |
| D.5 Structure of Receive Income Table | 65 |
| E.1 Process Specification of Receive Information | 67 |
| E.2 Process Specification of New Customer Registration | 67 |
| E.3 Process Specification of Receive Information | 68 |
| E.4 Process Specification of Approve Payroll | 68 |
| E.5 Process Specification of Approve Purchasing | 69 |
| E.6 Process Specification of Issue Payment | 69 |
| E.7 Process Specification of Verify Income Order | 69 |
| E.8 Process Specification of Recall Customer Information | 70 |
| E.9 Process Specification of Generate Invoice | 70 |
| E.10 Process Specification of Receive Print Request | 71 |
| E.11 Process Specification of Distribute Report | 71 |

| <u>Table</u> | <u>Page</u> |
|--|-------------|
| F.1 Estimated Cost and Benefits for Candidate Solution 1 | 72 |
| F.2 Estimated Cost and Benefits for Candidate Solution 2 | 74 |
| F.3 Estimated Cost and Benefits for Candidate Solution 3 | 76 |
| F.4 Payback Period for the Candidate 1 | 78 |
| F.5 Payback Period for the Candidate 2 | 79 |
| F.6 Payback Period for the Candidate 3 | 80 |
| F.7 Net Present Value of the Candidate 1 | 84 |
| F.8 Net Present Value of the Candidate 2 | 85 |
| F.9 Net Present Value of the Candidate 3 | 86 |
| G.1 Data Dictionary of Data Flow Diagram | 87 |
| G.2 Data Dictionary of Database | 89 |



I. INTRODUCTION

1.1 Background of the Project

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

Stevedoring is business that concern with loading and unloading ship containers. It also has to repair ship containers ,which are damaged, to be working. The company also provides another services such as cleaning, checking availability of ship containers, supervision and keeping all ship containers in a good condition. Stevedoring has to provide labor service for customers who may need to load their products in ship containers. Sometime, customers may need to unload their products which come from another country.

The company has to deal with ship agency, which is intermediate between customer and ship owner, look for customer in Thailand. Customers export or import goods or raw material which are sold to or brought from another country and sent or received there. The company has to paid advance some fee for ship agency which will pay it back to the company. Sometime, the company has to spare money just in case of operating mistake. For example, the ship containers are loaded in wrong vessel. The mistake is responsible.

Siam Gulf Stevedoring has been established since 1980. The company supplies labor service for customers who export their products abroad. The financial department generates documents that are sent to other functions of the company. Therefore, development of existing system is going to be beneficial. The new computerized system will have a centralized database in which data are shared among departments. Finally, system provides convenient process of work flow level.

1.2 Objectives of the Project

The project objectives for financial information system are as follows:

- (1) To study and analyze the existing system, and design the system of financial information system.
- (2) To change the existing system from manual process to computerized system.
- (3) To enhance the effectiveness of the database.
- (4) To reduce cost and time in operation.
- (5) To reduce redundant information.
- (6) To reserve future growth of the company.

1.3 Scope of the Project

The project scope covers studying the appropriate database system in financial department. The system develops the computerized system to reduce the mistakes in work processes and increase efficiency of work. The new system is developed closely associated to bulk of financial system, which should spend the least possible time to respond to the user's commands.

The project scope covers the following:

- (1) To provide the user-friendly interface for officer who are not familiar with the new computerized system.
- (2) To plan the finance and budgeting process for all inquiries within company to optimize the use of time and money.
- (3) To record and trace the status of all finance and budgeting information.
- (4) To produce reports and responses to queries about finance and budgeting, projects record, etc.
- (5) To keep records of projects' performance to evaluate them for future.
- (6) To manage the potential resource of information.

1.4 Deliverables

The deliverables of this project are:

- (a) Input Screens
- (b) Project work, which contains the following contents
 - (1) Project Overview
 - (2) Data Flow Diagram
 - (3) Entity-Relationship Diagram(ER-Diagram)
 - (4) Input-Output
 - (5) System Flowchart
 - (6) Context Diagram
 - (7) Inspection and test plan, including results
 - (8) Conclusion and recommendations

1.5 Project plan

The project plan of financial information system for Siam Gulf Stevedoring LTD.,PART.is shown in figure 1.1.

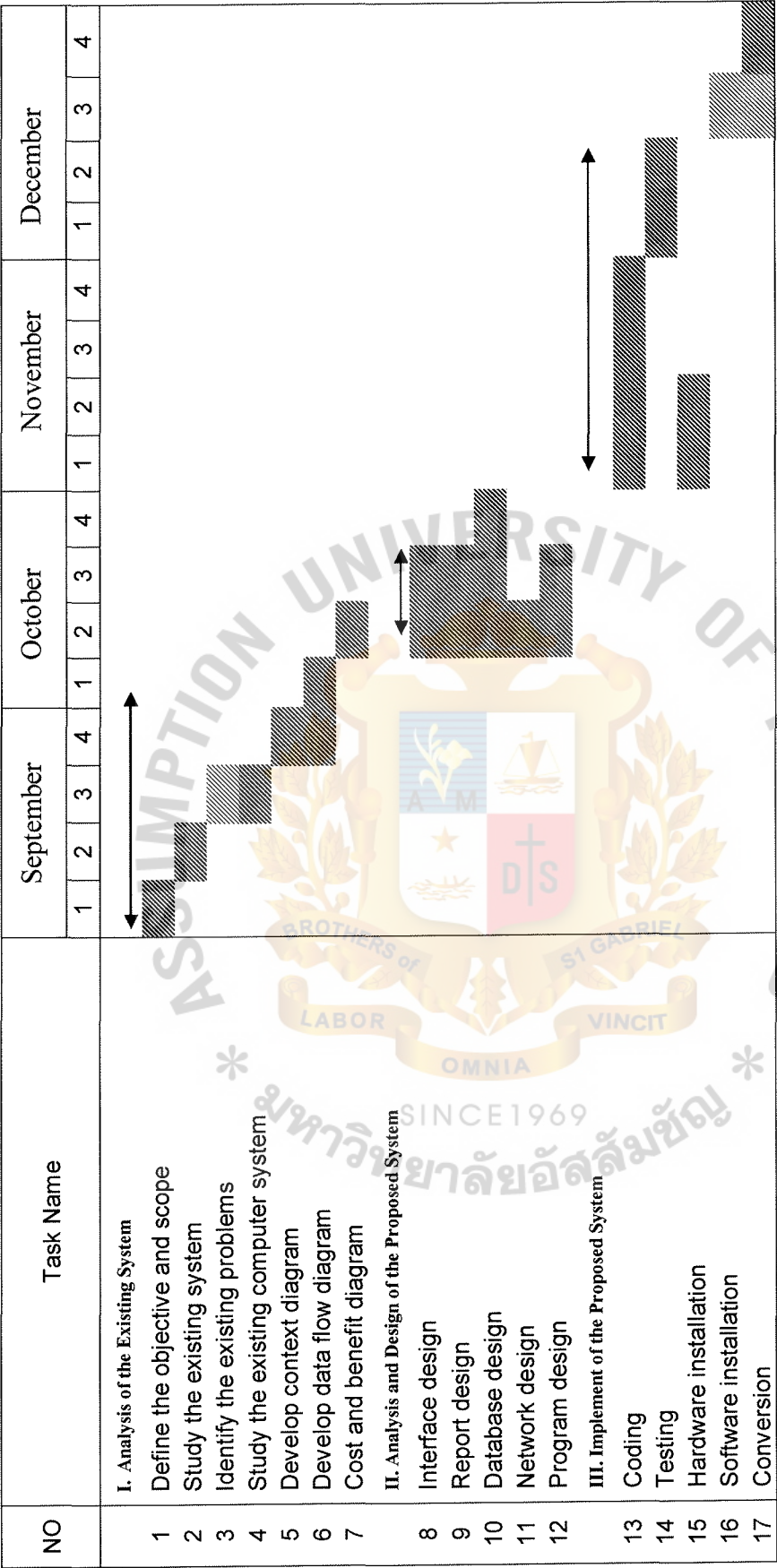


Figure 1.1. Project plan of financial information system.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Siam Gulf Stevedoring LTD.,PART. was established in 1980. It provides labor service for customers who export or import their goods or raw materials from another country. It also provides service for ship agency like cleaning ship containers, supervision, loading ship containers from port to ships and discharging ship containers from deck to trucks. The company commenced with only one hundred employees. The company act as intermediate between ship owners and ship agency. The company has to work about loading, unloading, cleaning, repairing, supervision ship containers for ship owners. Moreover, the company has to provide labor service for ship agency to respond customers' need. For example, the customer may need labor to load their products to ship containers. The customers will request service through ship agency and then ship agency will order the company provide labor in order to load customers' product into ship containers. On the other hand, customers may import some machines or raw material for another country. If customer need labor service, customers will request the service through ship agency. The company has to respond labor service for customer to unload machine or raw material from ship containers. According to this process, if the company's employees unintentionally damage machines, raw materials or even products of customer, the company has to take responsible. The officers have to correct all data as paper-work that is day by data documents. It is very difficult to handle all kind of document. Some documents were disappeared by officers unintentionally. Because, all kinds of documents are kept at finance department in order to keep as a raw data or historical files, whenever manger wants to see some information about customer or even supplier. He or she can see from historical file. The old system provide only weekly report and yearly report.

2.2 Existing Business Functions

Siam Gulf Stevedoring LTD.,PART is organized with the following departments:

(1) Sale Department

Company must to sign contact with shipment agency company. Shipment agency company and ship owners doesn't allow the company to supply labor or service for others. The officers have to carry all document which are paper-work and send to finance department. The details inside document contains information about the number of vessels which are inbound and outbound.

(2) Operation Department

Operation department is to provide service for both customers and ship agency and send the progress report as day by day. The officers have to send list of employee who present at that day.

(3) Inventory Department

Inventory department checks raw material that are used as complementary for service such as nail, corrugated paper, pallet, iron sheet, and so fourth. Officers have to send monthly report to financial department as paper-work that descript about the raw material and list of purchased raw materials.

(4) Financial Department

Finance department handles payment cycle in every sectors of the organization and undertakes the company's financial budget, revenues, cost and compensation for employees. The officers is here to receive the information from every department in order to keep all kinds of thing and some information needed for calculation. The come out from here is invoice or report.

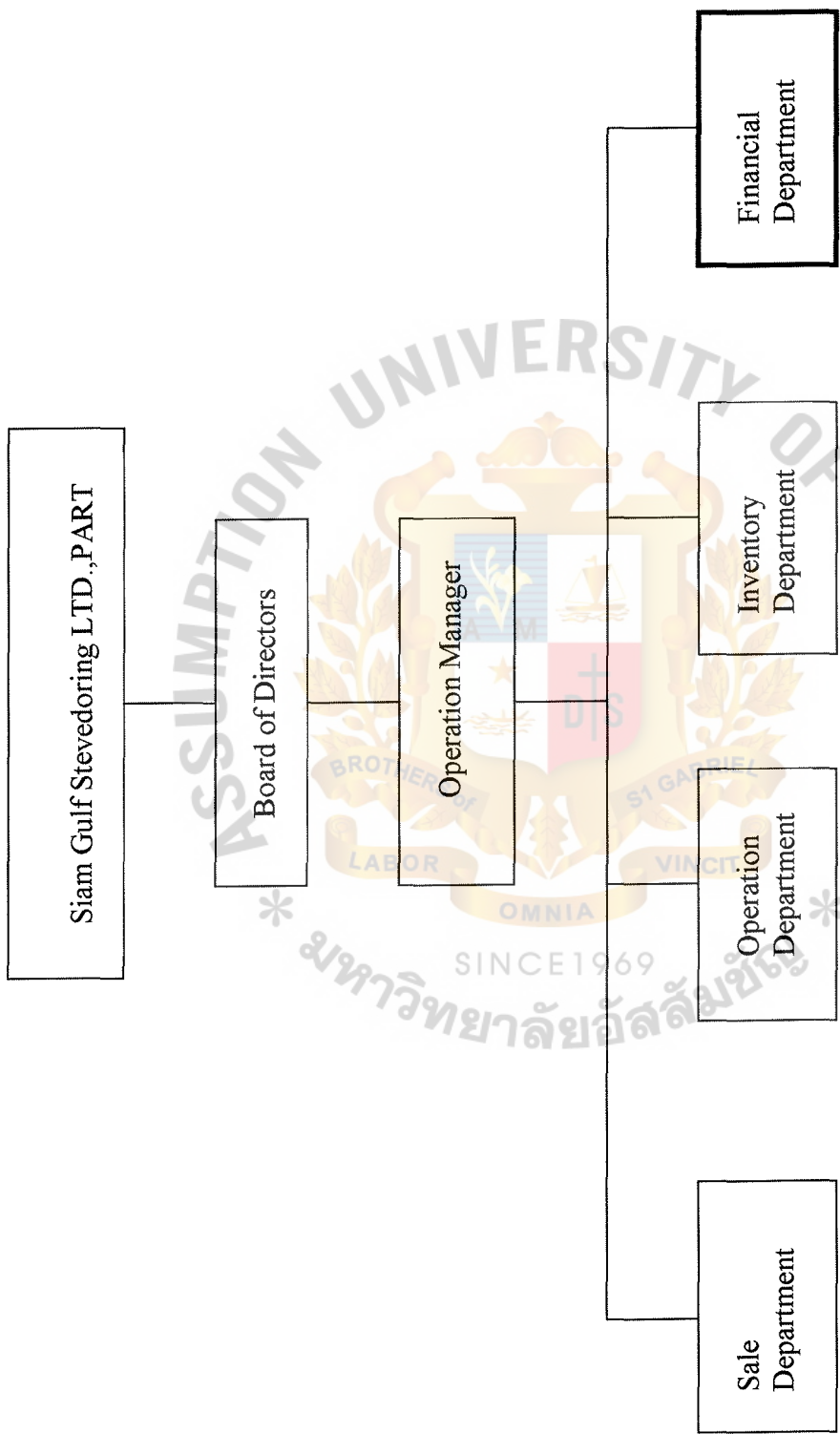


Figure 2.1. The organization chart of Siam Gulf Stevedoring LTD.,PART.

2.3 Current Problems and Areas for Improvements

After studying the existing inventory management system, the result demonstrates that this inventory management system is unable to handle a high volume of daily transactions. Many transactions happen each day, so all data records need to be updated very frequently and simultaneously. Each staff keeps his own data that are completely the same information but with different formats. This leads to problem of time consuming in data maintenance, which causes serious problems to the company. Moreover, the existing system does not record any transaction affecting the stock status. The operation system provides information about the status of the services to support other departments but is also unable to provide information to the manager immediately. Therefore, the existing system will be replaced by the new proposed computerized system in order to improve the current problems.

Current problems of the existing system can be summarized as follows:

- (1) The computer does not have an appropriate financial management system and most of the processing are manual. Therefore, it may cause an error or uncontrolled problem easily.
- (2) The staff in the office are specialists in the business, but lack the knowledge of using computer. Moreover, their point of views are blocked, because they are trained to respond only to their work following the job descriptions, so they cannot analyze complex reports with limited information, which are recorded by the manager.
- (3) One manager does the financial control on the existing system and if that manager is absent, the others cannot do the task with the program. So for the new system can work with or without manager. The system can generate report for manager in order to sign up that are needed some report.

- (4) Validity of the data is not reliable, because one person does the data record, which can go unchecked for correctness. Moreover, the manager has to respond to other jobs, so that he cannot update the information in time. Delivery schedule cannot be prepared according to poor logistics concept.
- (5) Lack of information sharing, because the information is centralized with the manager. The staffs cannot view the data for some ad hoc analyzing.
- (6) It is difficult to keep numerous paper work.
- (7) Some important documents are lost and some work processes are overlapped and it causes work duplication. Also, there is lack of data security, because all information is kept only in paper form and unauthorized person can access this data.
- (8) There are data redundancies and inconsistencies.
- (9) Human error causes problems to the existing system.
- (10) Manual System versus Computerized System.

The manual system and computerized system had its own advantage and disadvantage. The criteria and the pros and cons of both manual and computerized system are shown in Table 2.1. The computerized system has more advantage than the manual system. The computerized system can accelerate the operation, reduce the overall cost, and increase the reliability of the data and information. The computerized system can also provide the users-friendly interface that is provide for unskillful officers. The system also is designed the interface that is nearly the same as paper-work. The computerized system is relatively low cost against with manual system in long term. Computerized system also reduce the data redundancy. Furthermore, the computerized system can reduce the number of employee who relate in work flow process. Finally, the computerized system promote reliability and consistency data.

Table 2.1. Manual system versus computerized system.

| Criteria | Manual System | Computerized System |
|------------------|--|--|
| Operation Speed | The operation speed is too slow. | The operation speed is fast. |
| Investment | The investment is very low. | Hugh investment is required to set up the system. |
| Operation Cost | The operation cost is high and some cost is untraceable to source. | The operation cost is relatively low compare to the manual system. |
| Maintenance Cost | The maintenance cost is relatively low compare to the computerized system. | The maintenance cost is high for maintain the system. |
| Training Cost | The training cost is low because the system requires the less skill employees. | The training cost is high in order to educate employees about new system and technology. |
| Data Redundancy | Manual system generates very high data redundancy. | Computerized system reduces the date redundancy in the database. |
| Data Reliability | The data from manual system is unreliable and inconsistent. | Computerized system promotes the reliability and consistency of data. |

Table 2.1. Manual system versus computerized (continue).

| Criteria | Manual System | Computerized System |
|-----------------------------|--|---|
| Report | Report is generated not in time to be used and the difficult to understand. | The report is generated in the time to be used and easy to understand. |
| Accessibility to data | It is difficult to access to the data in manual system. | It is very easy to access or search the required data in computerized system. |
| Data Format | There is no standard in manual system to organize the data. | The data is organized in the standard format, which already define in the computer. |
| Data Securities | There is too little security in the manual system. The unauthorized person can access to the data. | The data is kept in the computer, which has the security system to protect the access form unauthorized person. |
| Data Error | The data contain many errors, which generated by human or other factor. | Computerized system will check the data input to minimize the data error rate. |
| Number of employee Required | Manual system required many employees to operate the business. | Computerized system minimizes the number of employee to reduce salary. |

III. THE PROPOSED SYSTEM

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

3.1 User Requirements

The system should display for necessary information that is needed by officers. The system should present the standard form on screen . Finally, the system must solve the problem and improve performance.

- (1) Financial Department has correct information about expenditure from all sectors of the organization.
- (2) The deposit slip details from customer should be automatically posted to the financial department in order to generate report for the manager to check monthly income.
- (3) The program should provide calculation to reduce time consuming of each transaction and to reduce errors that are caused by manual operation.
- (4) The program should be able generate invoice when operation is finished.
- (5) The program should be able to generate report whenever the manager needs to look at the summary.
- (6) The program should serve the information from any related department in order to generate the information needed.
- (7) The program should provide reports on the cash flow in and out of the company. The program reduce the number of human power errors. It should enhance the efficiency and effective of each work process. It should perform the right procedures in the right order. The system also can reduce cost of temporary staffs employments.

- (8) The program should allow only authorized users in entering the system for different levels of users to access different parts of the data.

The user requirement on the specification of the new system are identified and diagrams that document the flow of how the system will operate are produced. After interviewing the relevant users and managers and analyzing the existing system, the new system specifications are classified as categories.

3.1.1 Input Requirements

- (1) Financial file contains a record of each revenue and expense item that is regularly receiving money from customers and sending to suppliers. These records are used to manage and support the finance system. Data on the cash flow file include customer identification, receipt voucher identification number, description, price, cost, and quantity on hand, as well as any data needed to know when and how much cash flow to record and when to perform it.
- (2) Finance information needs in requesting a report requisition. The technique and method involved determining what are the requirements for reports and determining when to generate reports.
- (3) Financial information includes customer name, order description, categories, code, and price of service used to add a new order to the product to the system. Category and code must be able to be selected from a predefined list.
- (4) Financial information needs to provide the interface for employee who request the friendly-user interface. The officers who are unskillful with computerized system need familiar interface. System should provide interface that should be the same as documents.

3.1.2 Output Requirements

- (1) On a monthly basis, the system must produce a summary report. This report shows the code, customer name, quantity in service, and number of employees of each, date, and task ID.
- (2) On a daily basis, the system must produce order forms. Each order form must contain the customer ID and name, amount of quantity taken, and quantity of service.
- (3) The report and forms must be displayed on the screen before the user prints them out.

3.1.3 Database and File Requirements

- (1) The system must keep cash flow information, expense of purchase information, company information, supplier information, customer information, and category information.
- (2) Cash flow statement record must be accessible by cash flow number or cash flow identification.
- (3) Price of service must be accessible by type of service or service identification.

3.1.4 Proposed Processes

The proposed system is the new system that is created to solve some problems of the existing system. From the analysis of the existing system, both processes and resource, and the problems found, the key functions need to be analyzed are redundant information, human error, delay process and incorrect data. The proposed system covers the data organization that related to every department. This part shows the process descriptions to describe the logical processes precisely and concisely, and also the proposed system should have the following major processes as follows:

(1) Response To Check order

- (a) Received job progress after service is done by operation department has checked against the expected price of service and has been confirming it.
- (b) Upon payment of notification(deposit slip), the system processes to keep the information in payment notification file.
- (c) The system will receive financial information from every department.

(2) Make report summary

- (a) For making the report required by the manager, it has to compare the expected income from forecasting.
- (b) The system will generate the summary report. Moreover, the summary report of cash flow will be generated for the manager.

3.1.5 Data Flow Diagram

With CASE tool software, and software development, data flow diagrams of the system can be documented according to proposed processes. Appendix D contains the Data Flow Diagrams of the proposed system.

3.1.6 Data Dictionary

Data dictionary is created to provide a standard terminology. It allows people to decide what they mean by each term. By using CASE tool software, the data dictionary of the proposed system is shown in Appendix E and Appendix F. In data dictionary describe the function of system. It also arrange function that are describe follow alphabetical letter. There are data dictionary of data flow diagram and data dictionary for database. For data flow diagram, It explains processes, external entities and information that present in each diagrams. For database, it explains about primary key of database, activities that had been set in database and non-key attribute.

3.2 System Design

3.2.1 Candidate Solution

In the design of new system, this project research identified 3 possible alternative candidate solutions for the manager to make a decision so as to provide suitable utilities and operations for the proposed system. Finally, in order to support decision-making , there is a comparison of three candidates, which is shown in a tabular matrix. The explanations of the candidate solutions are as follows:

(1) Candidate Solution1

In candidate solution 1, a new employee is employed as a programmer who is graduated in computer field for programming the system following the analyzed proposed system. The system can be altered or updated. This can support most of the requirements, but it takes a long implementation time. And also, the company needs to hire a programmer, the cost which is expected to be high in the long term. This solution must be adjusted to be compatible with operations of the company, and it probably requires high maintenance cost. It support user requirements in the organization. Financial department can perform efficiently and effectively. At workstation and server, Pentium VI is used. In additional, candidate 1 use Ms Window 2000 for operating system that can support client/server architecture and more stable than other operating system versions that available in marketplace. Candidate 1 use Ms Visual FoxPro version 6.0 that can operate for customization and also use MS SQL Server version 7 as the database management system. Application Software is custom solution. The storage device is 40GB of IBM. The constraints in this candidate is that program is made by programmers who are employed in order to make program for the organization.

(2) Candidate Solution 2

In this solution, software package, which is low cost is used. This can help to reduce investment cost. The software package provides technology by using DOS Version and it also comprises a user-friendly interface. However, the software cannot be updated or modified because the vendor does not support it. This solution can not respond need of users against with another solutions. The disadvantage is that it use software package. Software tool is Express Accounting 4.0 from Express Software Group, Clipper version. Pentium III 450 MHz is used. Operating system is MS Window 98 that is no longer needed because another version better has been invented. It is stand alone architecture.

(3) Candidate Solution 3

In this solution, a programmer is provided by outsourcing in order to develop the specific application and for programming the system following the analyzed system proposal. That outsourcing company can maintain system implementation and maintenance. Also the application system can be expanded to handle high peak load of transaction in the future. Candidate solution 3 fully supports user requirements in business processes for the company. Technical architecture dictates Pentium IV 1.2 GHz. MS Window 2000 is operating system. Software tools is MS Visual Basic 6.0 and also use MS SQL Server 7.0 as the database management system. For the candidate 3 have already provided the GUI that are easy to used. The time consumption of candidate 3 is less than another candidate. So that time consumption is the feature of this candidate. Although the cost of development is more than candidate 2 that use software package, candidate 3 use time less than candidate 2. The score of technical feasibility for candidate 1 is less than candidate 3.

3.2.2 Candidate System Matrix

The matrix is a useful tool for effectively capturing, organizing, and communicating the characteristics of candidate solutions. The characteristics of candidate system matrix consists of portion of system computerization, benefits, server and workstations, software tools needed for application software, method of data processing, output devise and implications, input devices and implication and storage devices and implementations. The candidate system matrix is shown in Table 3.1. and Appendix F.



Table 3.1. Candidate System Matrix.

| Characteristics | Candidate 1 | Candidate 2 | Candidate 3 |
|----------------------------------|---|---|--|
| Portion of System Computerized | Supplying products to customers and reports to manager and other departments. | Supplying products to customers and reports to manager and other departments. | Supplying products to customer and reports to manager and other departments. |
| Benefits | This solution can support user requirements for the company. Plus more efficient performance at Operation department and Financial department | This solution can be implemented quickly because it is a purchased solution. | Fully supports user requirements in business processes for the company. Plus more efficient performance at Operation department and Financial department |
| Servers and Workstations | Technically architecture dictates Pentium IV 1.7GHz,MS Window 2000 Class Servers and Pentium, MS Window 2000server Workstations. (Client/Server) | Pentium III 450 MHZ, Window 98 (Stand Alone) | Technically architecture dictates Pentium IV 1.7GHz, MS window 2000 Class Servers and Pentium,MS Window 2000server Workstations. (Client/Server) |
| Software Tools Needed | MS Visual FoxPro version6.0 can operate for customization and use MS SQL Server version 7 as the database management system | MS Visual FoxPro version6.0 can operate for customization | MS Visual Basic 6.0, and use MS SQL Server 7.0 as the database management system. |
| Application Software | Custom solution | Software package | Custom solution |
| Method of data processing | Clients/Servers (method) | Stand Alone (method) | Clients/Server (method) |
| Output Devices and Implications | -Cannon LBP-660 Laser Printer -Epson LQ-1170 1 Dot Matrix | -Cannon LBP-660 Laser Printer -Epson LQ-1170 1 Dot Matrix | -Cannon LBP-660 Laser Printer -Epson LQ-1170 1 Dot Matrix |
| Input Devices and Implications | Keyboard & Mouse | Keyboard & Mouse | Keyboard & Mouse |
| Storage Devices and Implications | Hard Disk IBM 40 GB | Hard Disk IBM 40 GB | Hard Disk IBM 40 GB |

3.2.3 Feasibility Analysis

After the candidate solutions have been identified, the next step is to analyze the feasibility of each alternative of each solution. Each candidate system solution must be analyzed for feasibility. This can occur as each candidate is identified or after all candidates have been identified. Feasibility analysis should not be limited to costs and benefits. Most analysts evaluate solutions against at least four criteria. When completing this task, the analysts and users must take care not to compare the candidates. The feasibility analysis is performed on each individual candidate without regard to feasibility of other candidates.

Feasibility analysis is the process that is used to measure the benefits or practicality of the information system development in an organization. There are four categories of feasibility analysis.

- (1) Operational Feasibility: it is used to measure how well the solution performs in the organization and the feeling or acceptability of the user.
- (2) Technical Feasibility: it is a manager of the practicality of a specific technical solution and also the availability of technical resources and expertise.
- (3) Schedule Feasibility: the measure of how long this project should be developed.
- (4) Economic Feasibility: dealing with the cost and benefits of the information system.

The feasibility analysis matrix is an analysis and ranking of the candidate solutions matrix. But it is difficult to know which one is the best. Sometimes the solution is good for operation but the cost is very high. So the best way to get the final decision is with the end-users. The feasibility analysis matrix is shown in Table 3.2.

Table 3.2. Feasibility Analysis Matrix.

| Feasibility Criteria | Weight | Candidate1 | Candidate2 | Candidate3 |
|---|--------|---|--|---|
| Operation Feasibility | 20% | Using LAN, That can support the heavy load of processing tasks by separating work to different computer. 1. Server 2. Transaction 3. Documentation and report Score : 100 | This software package supports only Inventory Department. Moreover, it will not fully meet all requirements and it cannot modify the program. The inventory program is the legacy system – DOS, which is difficult than the Windows. Score : 60 | Using LAN, we can share the heavy load of processing tasks by separating work to different computers. Fully supports user required functionality 1. Server 2. Transaction 3. Documentation and report Score : 100 |
| Technical feasibility- Technology | 30% | -Easy Graphic User Interface and many options provided. Score : 80 | -Easy Graphic User Interface. -The software is the application that cannot modify to meet further requirement in the future. The software company will set up the system and training class for the staff, also have the manual to support usage. Score : 60 | -Easy Graphic User Interface. -Provides feature of object oriented programming. Requires hardware specialist to set up the network and for application. It requires training and knowledge of database. Score : 100 |
| Economic Feasibility -Cost of develop -Payback Period (discounted) -Detailed Calculation | 40% | Approximately 702,900 Baht Approximately 5Years See Appendix F Score : 80 | Approximately 371,500 Baht Approximately 4Years See Appendix F Score : 95 | Approximately 521,600 Baht Approximately 3Years See Appendix F Score : 90 |
| Schedule Feasibility | 10% | About 5-7 Months Score : 85 | Less than 1 Months Score : 100 | About 3-5 Months Score : 95 |
| Ranking | 100% | 60.5 | 78 | 95.5 |

3.2.4 New System Design

The proposed system is designed to support the financial information system of the company so that financial operation becomes easier, faster, and more accurate. The candidate solution 3 best suites to the system requirement. After thorough review and investigation of the company and all aspects of each candidate in Candidate Matrix and Feasibility Matrix, candidate solution 3 is selected and implemented. In the proposed system, the implementation that will be used due to it has to concentrate on user requirements and economic factor, whereas it does not concern much about implementation time.

After basic technical decisions are made, technologies to be used by this information system in terms of data, process, interface and network components for the new system are defined.

The user will handle the new system by processing the button on the menu screen, starting from the main menu screen and going further to the sub-menu. The users will be able to learn how to use the new system quickly. If they have any problem in handling the new system, the trainer or the system manual will be available for them for consulting. It enables users who have little or no experience in computers to handle the new system.

The context diagram and the logical data flow diagrams (DFD) use both tools of structure analysis and system design. The details are in Appendix B and C. The system structure chart in Appendix H is used to evaluate system quality and to determine the coupling and cohesion of modules.

3.2.5 Input design

According to the input requirements of the new financial control information system, it does not do any automatic data collection for this system. It prefers to enter

the data by the keyboard and mouse from the source documents, for instance Customer Order, Delivery Document or Goods Catalogue, which are the main data capture of the company and then translate them to machine-readable format. However, the input screen design is made for users to enter the data easily, especially the screens of Order Header, and Order Detail because the source documents are internal creation form(see the input design as shown in Appendix K). Therefore, the screens are the same as the source document from Operation Department. In order input screen design, it depends on the general pattern of source documents, which are outside papers.

In the process of input data, it will do with on-line input as soon as it receives the source documents. Although, the new system will use the on-line system to process the input, it also has the internal control to ensure the correctness of inputs.

In a broad view, the summary of the inputs will be shown at the end of the day's report for checking against the source document. However, the number of input transactions will be immediately viewed by the Financial staff during the process or access the system to ask for report on their demand.

Additionally, data input will be verified while the user enters it on process. Most default value of each important attribute will be fixed to reduce the missing field. However, in case the users miss to enter any field and such attribute is left blank for the default value, it is also protected, because all completeness of data entry will be checked to guarantee that there is no field missed. If it is not, the alert box will be displayed to ask the user to complete the screen before he or she changes to other screen to enter more or save the data in the system.

Furthermore, data type, and the limit and range of each data field will be investigated, because it will be fixed when the system is creating the input screen. It has the capability of self-auto checking, while the staff use the system.

3.2.6 Output Design

In the output design for the proposed system, it will classify each type of output from the system. Most of them are internal outputs, which are prepared for other departments to report business transactions of the company. The reports are detailed reports or some of them are summary reports. Additionally, the output media and formats are specified.

According to the printed forms and reports, the output screen is designed so that the user can examine those documents before printing them. Figure K.10 illustrates the button, which offers the options for previewing reports. The user can select to preview either product summary reports or product transaction detail report.

3.2.7 Database and File Layout Design

The design of computer database and files is implemented in parallel with the design of input and output. The relational database is chosen to the standard of the new system. Microsoft Access is used to create the database chosen for the system . All files in the system can be shown by entity-relationship diagram (see Figure 1.1)

The following are information required to be stored in the database:

- (a) Customer details
- (b) Invoice details
- (c) Purchase order
- (d) Cash flow details
- (e) Suppliers
- (f) Service details
- (g) Payment notification
- (h) Salary
- (i) Compensation

3.3 Hardware and Software Requirement

The information is obtained from the user requirements and manager, in order to achieve the objectives for supporting the on-line purpose and sharing the resources together. The hardware and software specification are described below:

3.3.1 Hardware Specification

- | | |
|--|-------|
| (1) File Server | 1Set |
| (a) CPU Intel Pentium 1.7 GHZ | |
| (b) RAM 128 MB SD-RAM | |
| (c) Hard disk 40 GB | |
| (d) Mini Tower case & Power250 Watt | |
| (e) Disk drive 1.44 MB | |
| (f) CD-ROM Pioneer Drive 52x Speed | |
| (g) Monitor 15" Trinitron CTX Res. 1280*1024 Low Radiation | |
| (h) Keyboard 104 keys support Window 98 | |
| (i) Ethernet Card PCI 10/100 Mbit | |
| (2) Workstation | 4Sets |
| (a) CPU CELERON 1GHz | |
| (b) RAM 128 MB | |
| (c) Hard disk 40 GB | |
| (d) Mini Tower case & Power 250 Watt | |
| (e) Disk Drive 1.44 MB | |
| (f) CD-ROM Pioneer Drive 52x Speed | |
| (g) Monitor 15"Res. TrinitronCTX 1280*1024Low Radiation | |
| (h) Keyboard 104 keys support Windoew98 | |
| (i) Ethernet Card PCI 10/100 Mbit | |

- (4) Printer 5Sets
 - (a) 4 Sets Dot matrix printer(EPSON LQ 2170, 24pin)
 - (b) 1 Set Laser Printer(HP Laser jet 1200)
- (5) UPS(Uninterruptible Power Supply) 1Set
 - (a) 650 VA
- (6) Network Peripheral 1Set
 - (a) UTP (Unshield Twisted Pair)
 - (b) Ethernet Hub 10/100 8port

3.3.2 Software Specification

- (1) Microsoft Window 2000
- (2) Microsoft office 2000
- (3) Microsoft Window 2000 Server
- (4) Microsoft Visual Basic 6.0
- (5) Norton 2002(Software Anti-Virus)

The main goal is to serve the best service performance. Thus, the software requirement requires a specific operating system that works synchronously with Local Area Network.

3.3.3 Application Architecture

Application architecture generally serves as a framework for a general design. It defines an approved set of technologies to be used when building any new information system designed to use distributed data (Two-tier/server) as shown in figure 3.1.

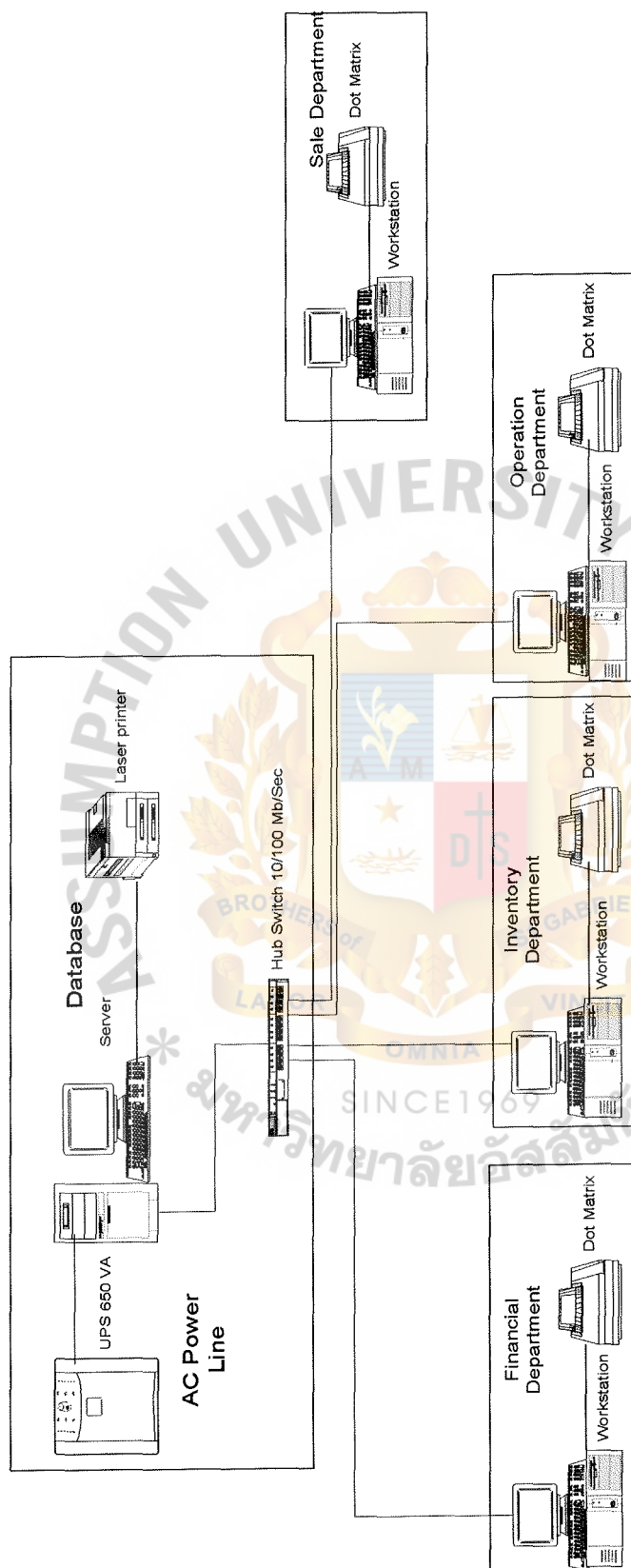


Figure 3.1. Hardware Configuration of the Proposed System.

The server serves the information system's server(file server) which means all data is kept at one place for data consistency. If data is in more than one place, it is impossible to know which data is most reliable or up to date or which one should be used.

For the proposed system, file server is used in order to store all data for use with the financial information system as database files. This system will use Microsoft Access as the database software, which the clients computer will execute all database instruction. The entire database and table have to be transported to and from the client across the network. The server even provides shared database and, it also provides processing and interface services and activity to all clients.

The clients provide user interface services, appropriate database that does not affect data consistency of the main database, processing services and connectivity services to the server.

Clients/server programs are installed at client sides, Microsoft Visual Basic is used for running the business logic. The program executes on the side to separate work for the efficiency and reduce network traffic. Network topology of this system is Star and, the connection of this system is not very complicated. The Star topology is sufficient enough to handle the traffic on the network, required Hub equipment to transmit and distribute the information, and also has less cost.

The explanations below are the application architecture in the proposed system, which comprise of Network Architecture, Data Architecture, Interface Architecture, and Process Architecture.

(1) Network Architecture

The proposed system will use Distributed Data Architecture or two-tiered Client/Server as the Network Architecture. This is because it

has only one server that stores the data and the business logic and interfaces will be on the clients. The system uses Microsoft Access as a database on client/server as it is suitable for distributed database architecture. In the new financial information system, it has to manage and update the data about cash flow of the company by the user. Therefore, it must set the server to be a file server which allows the user to create, update or delete all the data on the client computer. The network will be set to be LAN because it has only one server(file server) and the system has only four clients, all of which are in the same area. And it is decided to use UTP(Unshielded twisted pair) wire as a medium to connect the LAN, and for the network topology it prefers to use Star Network, because the clients are located not very far from the server. If one of nodes couldn't work, the other nodes are still functioning and only the node that connects to the malfunction node can not be used. The line is also easy to be repaired or replaced because the cost of UTP is not expensive.

(2) Data Architecture

Data is a resource that must be controlled and managed. Correspondingly, it becomes a business resource in a database environment. The system's network architecture provides a map for distributing data to optimal locations and without loss of centralized control. The control is being accomplished through distributed relational database.

The new system is designed to store data at the server to centralize and control the control performance at the central computer(file server) for data consistency and security.

Microsoft Access is selected as a personal computer database management. The database engine of this software executes all database command but data is stored on the file server. Software is required to implement distributed relational databases in the proposed system, because it is responsible for storing and making data available in table, maintaining the relationship between tables, ensuring the integrity of data, back up, recovery and providing security of database. Moreover, it will also reduce the data traffic on the network, if the company increases the number of users in the future.

(3) Interface Architecture

In the interface architecture, the new system uses the on-line process instead of others, because it has to update the available balance at the point of sales. Updating the balance is a must. If it uses other processes, the balance that is kept in the database will not be the actual available amount. Moreover, on-line processing can support the process that is easy and fast to do business transactions, inquiries, and modifications with correct in time information. The clients are responsible for input of the data with the on-line mode for processing and keeping in the database at the server, and then the output of the transactions will be viewed on the screen at the operating computer. All business transactions(create new transactions, or delete the information) is done on-line, so the information will be up date all the time. Additionally, an error can be found immediately. Therefore, mistake report will be generated by system in order to knowledge is more accurate. The proposed system will be designed to access via the GUI(Graphic User Interface) for entering the system , but it still uses the

keyboard as the tool data input. However, the screen will have the supporting system-repository-based programming. Such support tools can help the user to key in the data and reduce errors that occur when the staff key in. Due to the key-less entry by using the auto-identification system, the bar code and bar code reading is not necessary by the office that will process the document, and not the physical goods which have attached bar codes. The Microsoft Window software package has the program that can support the work group. It is the Microsoft Outlook. There is no need to invest more for such technology. The Microsoft Outlook has the ability to mail electronically to colleagues, make appointments, meeting request, scheduling among the staffs in the office, or distributing the data by attaching on the mail, daily reporting to the manager or other departments. It is more convenient and reduces the cost of printing paper. Such electronic message will increase the channel of the contact between the staff in each department. The Operation department can ask for information via electronic mail, or the manager can request for the report, which can be replied back with attached information on the same route. The new system design intends to use Microsoft Visual Basic because MS Visual Basic provides quick building of the GUI and prototype. It can execute all clients, naturally, but the program cannot interpret by itself, so it needs a middleware to understand the command from MS Visual Basic. The middleware that will be selected to use the ODBC(Open Database Connectivity Standard). We use the ODBC standard for connecting to the database server and understanding any command from MS Visual Basic.

(4) Process Architecture

In the new system, MS Visual Basic is chosen because it is widely used to write programs, automatic generation of the source code for GUI and associated system events. It supports the business requirement that is designed in terms of client/server (two-tier) architecture. Typically the system is compatible with two-tier client/server. The application that is used in the system consists of client-based program with database engines.

MS Visual Basic can provide quick building of the GUI and prototype. It can execute all clients and also reduce the network traffic associated with validating the server fields default value, which in combination with constraint help to maintain data integrity throughout the system.

3.4 Security and control

3.4.1 Application Access

- (1) The system will check whether a user is authorized to use the system application or not before allowing user to enter the system application
- (2) The user authorization levels can handle security and control. Each level has different rights to access to different parts of the system application.

3.4.2 Output Security

- (1) Every report is appropriately titled and includes the data the report prepared and the period covered by the report.
- (2) Reports produce precise information.
- (3) Report pages are numbered consecutively, and the end of report is explicitly identified.
- (4) Only the required number of forms and copies are produced.
- (5) Confidential reports are kept under security.
- (6) All pages of confidential reports are clearly labeled as such.

3.4.3 Input Security

- (1) Once the data has been entered, source documents should be stored in a safe location for some specified length of time for protecting the data from loss or damage and recovering the data when it is lost.
- (2) To prevent duplicating data from entering the system, a source document should be stamped or otherwise marked as it goes through a data entry process.
- (3) A customer record, purchasing record and job progressive record and cash flow may be, changed, or deleted only by authorized staff.

3.4.4 Database Security

- (1) Database Administration(DBA) must be in charge of the database. They must define authorization procedures to ensure that only legitimate end users access the database and can allow different end users to have different types of access to the same data.
- (2) Database must be backed up once a week, and backup copies must be retained monthly. In the event of database failure, recovery procedures can be used to restore the database to the state it was in at the point of the last backup.
- (3) Manager can access job progress records ,purchase record, payroll and cash flow records.

3.4.5 Physical Security

- (1) UPS(uninterruptible Power Supply) is used to protect the information loss when electronic damage occurs.
- (2) The diskette should pass a virus scan program before using.
- (3) Users must plan for the backup data everyday reserving for data recovery.

3.5 Cost and Benefit Analysis

3.5.1 Cost Analysis

(1) Investment Cost

(a) Hardware Cost

| | |
|---------------------------------------|--------------|
| 1 Set of File Server | 55,800 Baht |
| 4 Set of workstation(4@25,900) | 103,60 Baht |
| 1 Set of Laser printer | 15,700 Baht |
| 4 Set of Dot Matrix Printer(4@20,500) | 82,000 Baht |
| 1 Set of UPS 650 VA | 5,500 Baht |
| 1 Set of HUB | 7,500 Baht |
| UTP Cable 500 Meters and Connector | 3,500 Baht |
| Total Hardware Cost | 273,600 Baht |

(b) Software Cost

| | |
|---|--------------|
| Microsoft Window 2000(4@4,500) | 18,000 Baht |
| Microsoft Office 2000(4@12,000) | 48,000 Baht |
| Microsoft Window 2000 Server(1License) | 37,000 Baht |
| Microsoft Visual Basic Version6.0(1License) | 14,500 Baht |
| Norton 2002(Software Anti-Virus)(5@2,100) | 10,500 Baht |
| Total Software Cost | 128,000 Baht |

(c) Software Development and Training Cost

| | |
|---------------------------------|--------------|
| System Analyst(40Hours@900Baht) | 36,000 Baht |
| Programmer(90Hours@700Baht) | 63,000 Baht |
| Training Cost | 21,000 Baht |
| Total Development Cost | 120,000 Baht |
| Total Investment Cost | 521,600 Baht |

(2) Annual Operating Cost

| | |
|----------------------------------|-------------|
| (a) Diskettes(400Baht/month) | 4,800 Baht |
| (b) Ribbon(1,400Baht/month) | 16,800 Baht |
| (c) Toner(1,500Baht/month) | 18,000 Baht |
| (d) Paper(2,000Baht/month) | 24,000 Baht |
| (e) Miscellaneous(500Baht/month) | 6,000 Baht |
| (f) Maintenance Cost (per year) | 16,000 Baht |
| Total Annual Operation Cost | 85,600 Baht |

3.5.2 Benefit Analysis

The proposed system provides both tangible and intangible benefits as follows:

(a) Tangible Benefit

(1) Personnel

The existing system has 6 officers to run and operate the business transactions of the company with the cost estimate on monthly salary as 72,000 Baht(1person@12,000Baht). The proposed system decreases monthly salary cost due to the reduction from 6 officers to 4officers, which costs 48,000 Baht(1 person@12,000Baht). Therefore, in the first year, the proposed system can save on monthly salary of officers up to 24,000 Baht per month. The company can save on salary of officers dramatically in the following years.

Reduce cost of human labor

(24,000 Baht per month) 288,000 Baht/Year

(2) Operational

(2.1) Reduce paper usage and office supplies

(3,000 Baht per month) 36,000 Baht/Year

(2.2) Reduce cost of overtime

(5,000 Baht per month)

60,000 Baht/month

Total Annual Tangible Benefits

384,000 Baht

(b) Intangible Benefit

(1) Smoothing of operation flows

(2) Paperless

(3) Information is updated, accurate, consistent and rapid

(4) Improved decision process by providing faster access to information

(5) Achieve customer satisfaction

(6) More satisfied employees

(7) Provide information about cash flow in any department that keeps the information and reduce time to find the historical record of cash flow.

3.5.3 Calculations of Break Even Year

Break Even Analysis

It is reasonable to apply the concept of break-even analysis to compare between the current system and the proposed system. In this case, the cost of proposed system is compared with the cost of the existing system to determine whether the proposed system costs are the same as the existing system. Figure 3.2 shows such a break-even analysis, in which the cost of the proposed system initially would be higher than the existing system. In 1 year 9 months, the proposed system will reach the break-even point and thereafter, becomes more economical to operate than the existing system.

3.5.4 Cost Comparison

Comparing the cost of two system, the cost of the existing system and cost of proposed system are summarized and shown in Table 3.3. From the implementation of break-even analysis as shown in Figure3.2, the difference of costs between two systems

can be seen in full view. These represent the time when the benefit is equal to the investment cost. There is one factor that reflects cost; it is time value of money. Some of the cost of the system will be incurred in the future; so that should be adjusted in both costs and benefits to current baht. The break-even point is 1 year 2 months. From the point of 1 year 7 months onward, the new system will be more economical than the existing system because of labor saving and operating cost saving.



Table 3.3. Cost Comparison Between The Existing System & The Proposed System.

| Cost Items | Yr1 | Yr2 | Yr3 | Yr4 | Yr5 |
|--|-----------|-----------|-----------|-----------|-----------|
| <u>Existing System</u> | 1,044,000 | 1,096,200 | 1,151,010 | 1,208,561 | 1,268,989 |
| Staff (increase 5% per year) | 120,000 | 126,000 | 132,300 | 138,915 | 145,861 |
| Operating Cost (increase 5% per year) | 12,000 | 126,000 | 132,300 | 138,915 | 145,861 |
| Utility Cost (increase 5% per year) | 60,000 | 63,000 | 66,150 | 69,458 | 72,930 |
| Total Cost | 1,224,000 | 1,285,200 | 1,349,460 | 1,416,934 | 1,487,779 |
| Accumulated Cost | 1,224,000 | 2,509,200 | 3,858,660 | 5,275,594 | 6,763,373 |
| <u>Proposed System</u> | | | | | |
| Hardware Cost | 273,600 | - | - | - | - |
| Software Cost | 128,000 | - | - | - | - |
| Development Cost | 120,000 | - | - | - | - |
| Staff (increase 5% per year) | 900,000 | 945,000 | 992,250 | 1,041,863 | 1,093,956 |
| Operating Cost (increase 5% per year) | 85,600 | 89,880 | 94,374 | 99,093 | 104,047 |
| Utility Cost (increase 5% per year) | 50,000 | 52,500 | 55,125 | 57,881 | 60,775 |
| Total Cost | 1,557,200 | 1,087,380 | 1,141,749 | 1,198,836 | 1,258,778 |
| Accumulated cost | 1,557,200 | 2,644,580 | 3,786,329 | 4,985,165 | 6,243,944 |

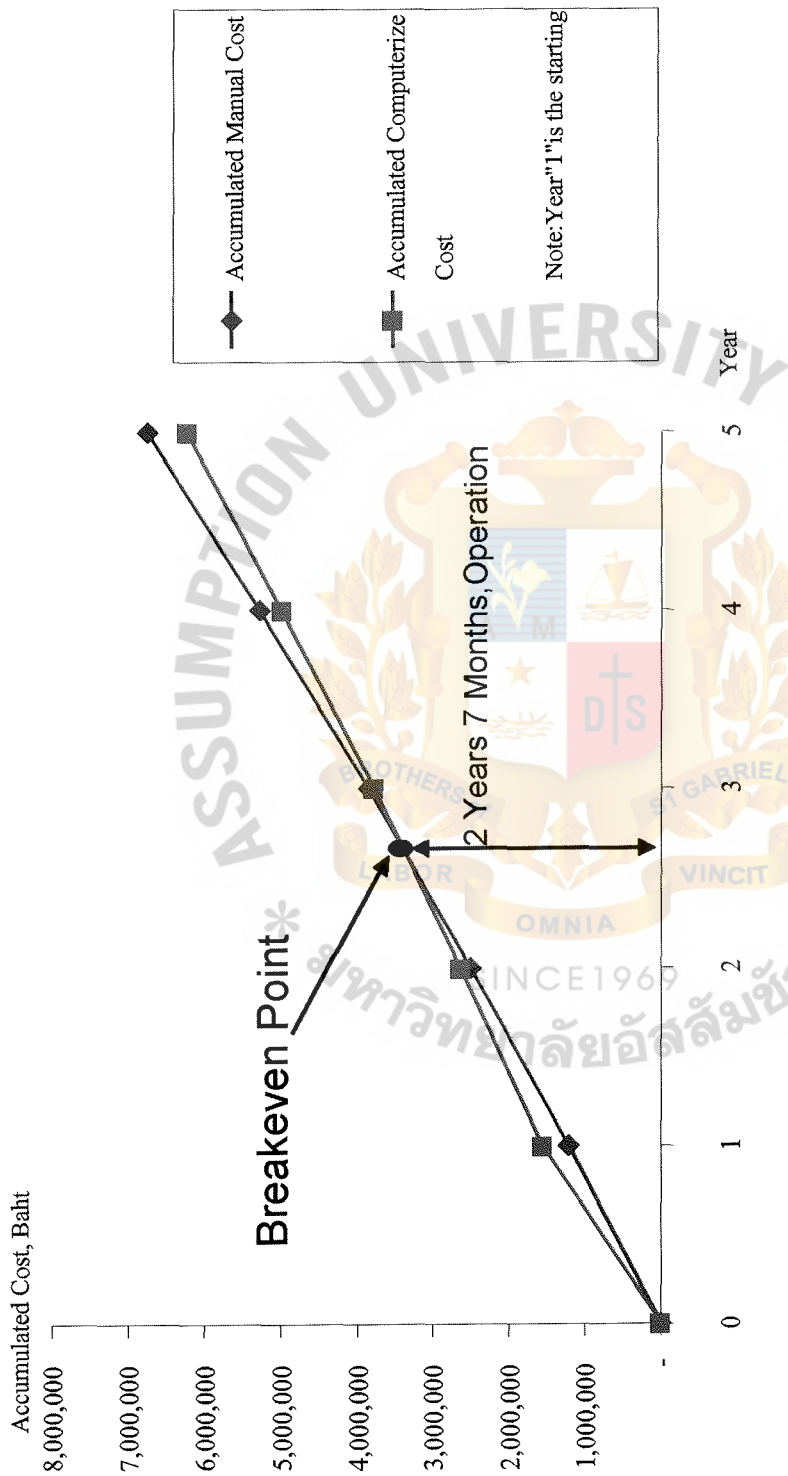


Figure 3.2.- Cost Comparison between Existing System and Proposed System.

3.5.5 Payback Analysis

The payback period is determined from original investment divided by annual net cash inflow and is shown below. It is the number of years or how much time will lapse before accrued benefits overtake accrued and continuing costs. After implementation, additional operating expenses that must be recovered will incur.

$$\text{Number of years to payback} = \frac{\text{Original Investment}}{\text{Annual net cash inflow}}$$

The payback period of the proposed system is 3 years. It will take about 3 years to payback the initial investment. Figure 3.3 shows Payback Chart Analysis and payback period calculation is shown in Table 3.4.



Table 3.4. Payback Analysis(in Baht).

| Cost Items | Year 0 | Year 1 | Year 2 | Year3 | Year 4 | Year 5 |
|---|----------|----------|----------|----------|-----------|-----------|
| Development cost: | -521,600 | | | | | |
| Operation& maintenance Cost: | | -85,600 | -89,880 | -94,374 | -99,093 | -104,047 |
| Discount factors for 12% | 1.00 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted costs (adjusted to present value) | -521,600 | -76,441 | -71,634 | -67,194 | -63,023 | -58,995 |
| Cumulative time- adjusted costs over lifetime: | -521,600 | -598,041 | -669,675 | -736,869 | -799,892 | -858,887 |
| | | | | | | |
| Benefits derived from operation f new system: | 0 | 384,000 | 403,000 | 423,360 | 444,528 | 466,754 |
| Discount factor for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted benefits (adjusted to present value): | 0 | 342,912 | 321,350 | 301,432 | 282,720 | 264,650 |
| Cumulative time- adjusted benefits over lifetime: | 0 | 342,912 | 644,262 | 965,695 | 1,248,415 | 1,513,064 |
| | | | | | | |
| Cumulative life time-adjusted costs + benefits: | -521,600 | -255,129 | -5,413 | 228,826 | 448,523 | 654,177 |

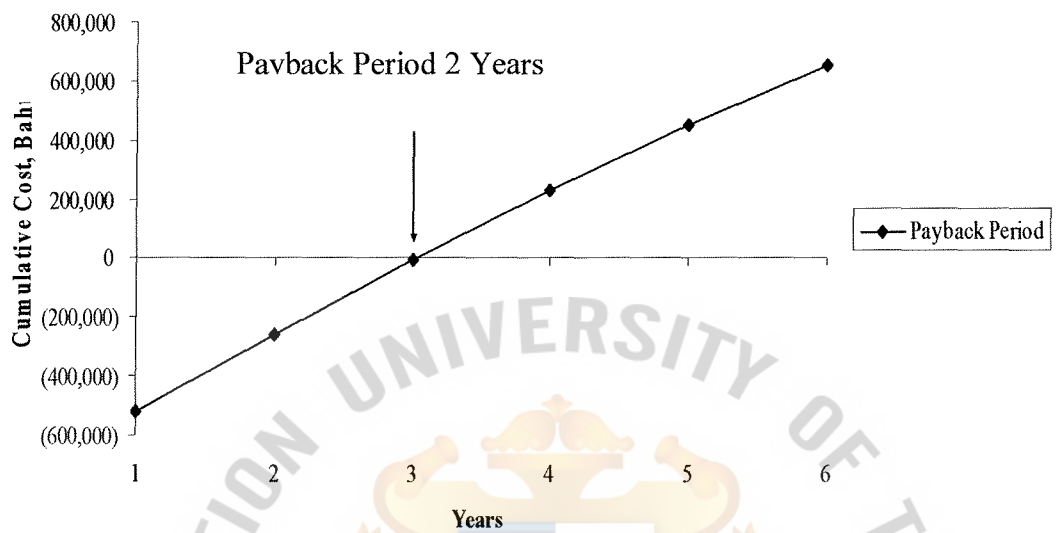


Figure 3.3. Payback Period For Candidate 3.

3.5.6 Net Present Value (NPV)

Net Present value is a sophisticated capital budgeting technique, which is calculated by subtracting the project's initial investment cost from the present value of cash inflows discounted at a rate of the company's cost of capital. The formula for net present value is shown as follows.

Net present value= Present value of expected cash flow-initial investment cost

The Net Present Value calculation is shown in Table 3.5

If NPV is more than zero, the project should be accepted. If NPV is less than zero, the project should be rejected. After NPV calculation, it is positive at 654,177 Baht and therefore, the proposed system should be accepted.

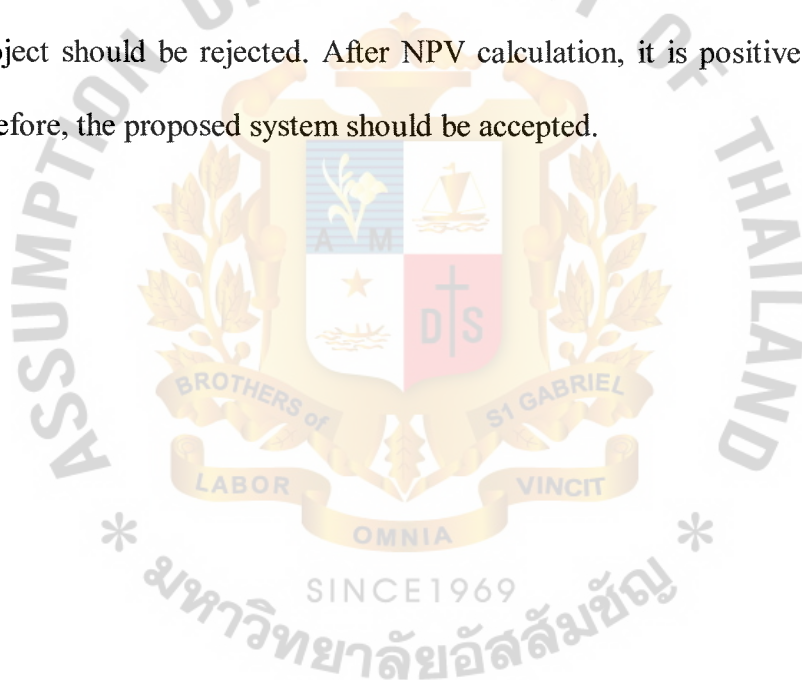


Table 3.5. Net Present Value Analysis(in Baht).

| Cost Items | Year 0 | Year 1 | Year 2 | Year3 | Year4 | Year5 | Total |
|---|----------|----------|---------|---------|---------|---------|-----------|
| Develop cost: | -521,600 | | | | | | |
| Operation & maintenance cost: | | -85,6000 | -89,880 | -94,374 | -99,093 | -104047 | |
| Discount factor for 12% | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual costs: | -521,600 | -76,441 | -71,634 | -67,194 | -63,023 | -58,995 | |
| Total Present value of lifetime costs: | | | | | | | -858,887 |
| | | | | | | | |
| Benefits derived from operation of new system | 0 | 384,000 | 403,200 | 423,360 | 444,528 | 466,754 | |
| Discount factors for 12% | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual benefits: | 0 | 342,912 | 321,350 | 301,432 | 282,720 | 264,650 | |
| Total present value of lifetime benefits: | | | | | | | 1,513,064 |
| | | | | | | | |
| Net Present Value: | | | | | | | 654,177 |

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The company's application of analysis and design technique alone is hardly sufficient to ensure a successful system. Once the analysis and design are complete, the new system is constructed. The implementation phase includes programming and testing for the efficiency of the software. Users must be trained and the site must be prepared for the computer. The latter process is to transfer data to the new system.

4.2 Stages of Implementation

4.2.1 Programming

The programmer generates the program following the design system. The design of input, output (is shown in Appendix K and Appendix L), the process specification (shown in Appendix G) and the database (shown in Appendix J) are used.

4.2.2 Testing

The purpose of the software testing is for reliability, which requires error detection and removal in order to ensure that application programs written in isolation work properly when they are integrated into the total system. Just because a single program works properly does not mean that it works properly with other programs. The integrated set of programs should be run through a system test to make sure one program properly accepts, as input, the output of other programs. Software testing cannot turn a poorly designed software into a good one but it can help to determine the level of reliability before the software is released for use. The target software is subjected to test data, which generate test result. Data that test every decision in the system is devised. Test data is created to carry out both normal path and exception path test.

- (1) A normal path test employs data that are considered to be valid for a

given decision.

- (2) The exception path test utilizes values that are not valid for a given decision.

4.2.3 Installation

During the test application period, data for data conversion is prepared. All information has to be put into fields following the data dictionary and checking for accuracy of data. The users need to be sure that all data is correct before posting into the new system. After the application has been tested and the data conversion has already been done, the application is installed into the server. The installation follows the parallel conversion so that users simultaneously use the current system while starting the new system.

4.2.4 Training

Most of the users are not familiar to computers. Once the application is ready for users, a training class schedule has to be set up. Training classes have to be provided for basic computer knowledge(Windows 98) and how to use the application. Let the users practice by themselves after class. This will help the user to learn the application quickly.

4.2.5 Documentation

Documentation is the activity of recording facts and specifications for a system, and also documentation of the user manual describes the way to use the system and other details has to be made for later reference.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The current system cannot efficiently support the business workflow. The computerized system serves better service. The manager is concerned and agrees to change the manual operation to the computerized operation.

This project was initiated on requests from users and the manager. After the documentation was collected and the data flow diagram for the existing system was accepted, current problems and the areas for improvement were explained and planned. The problems of system accuracy, and timeliness throughout the existing system is caused by inefficiency of the manual operation. Areas for improvement cover the computerized system for financial information system that integrates the financial control of different departments together. Therefore, the financial information system can easily check the cash flow inside the company. The computerized system provides accurate and consistent information and eliminates redundant operation. Moreover, the new application also helps the Operation Department to quickly generate the service order that the operation staff do not need to have the technical knowledge. The hardware and software requirements concern the best-utilized resources and the environment of the company.

Implementation was started and the test case was used to see whether the new application can accurately perform the transaction or not. The installation plan was set up in parallel with the current transactions. Since the computerized system is used only to support financial control, other departments should improve their operation as well. The company should be aware of information, quantity request, product on-hand information, payable notification, supplier invoice, and return service information. Each process is evolved by enormous amount of paper. Financial staff find it strenuous

in keeping all this information up-to-date. Evidently, for instance, in processing financial information and summary reports for the manager, the data must be accurate and current for proper data analysis.

The data of cash flow in the financial section is dramatically increasing because of human errors from daily process that financial staff have to manage every single day. It is considerably inextricable to obtain a few records out of a big pile of paper organized manual by in a limited amount of time. With perpetual problems, as mentioned, it brings difficulty in processing information as required.

The problems mentioned above can be figured out by establishing the newly proposed system. With the hand of computerization, errors are finally eradicated and operating every function will be improved, comfortable and less trouble some. The proposed system can manage the pool of data very well since the data will be kept in the database and users feel free to retrieve the data any time they wish.

Keeping data up-to-date will no longer be a laborious task to do so. Users will find it easy and less time consuming in updating data in the database through the user-friendly interface. Everything will be automated, Therefore, data processing will yield very less response time, when compared to the existing manual system enabling highly effective overall performance to happen. Table 5.1, show the comparison of time between the proposed system and the existing system in the financial information system.

Table 5.1. Degree of achievement of the proposed system.

| Process | Existing System | Proposed System |
|---------------------|-----------------|-----------------|
| Receive Information | 10 Minutes | 5 Second |
| Income Process | 20 Minutes | 5 Second |
| Payment Process | 30 Minutes | 4 Second |
| Report | One hour | 10 minutes |

5.1.1 Receive Information

The existing system spends one hour to check, distinguish and input information.

The proposed system provides the user interface to ease the input process of formulation through electronic form.

5.1.2 Income Process

The proposed system is able to retrieve the information from operation department in order to check the service order before generate either report or invoice

5.1.3 Payment Process

The Proposed system is able to retrieve the information about employees from human resource department and purchasing order from inventory department in order to make sure that all report from both department are collect.

5.1.4 Report

System can show all summary report that is requested by other department or manager in order to check or make sure the things that has already done. The database in financial information system keep the all information about the expenditure or revenue from all department inside the company. Manager can retrieve the information of the transaction and progressive job.

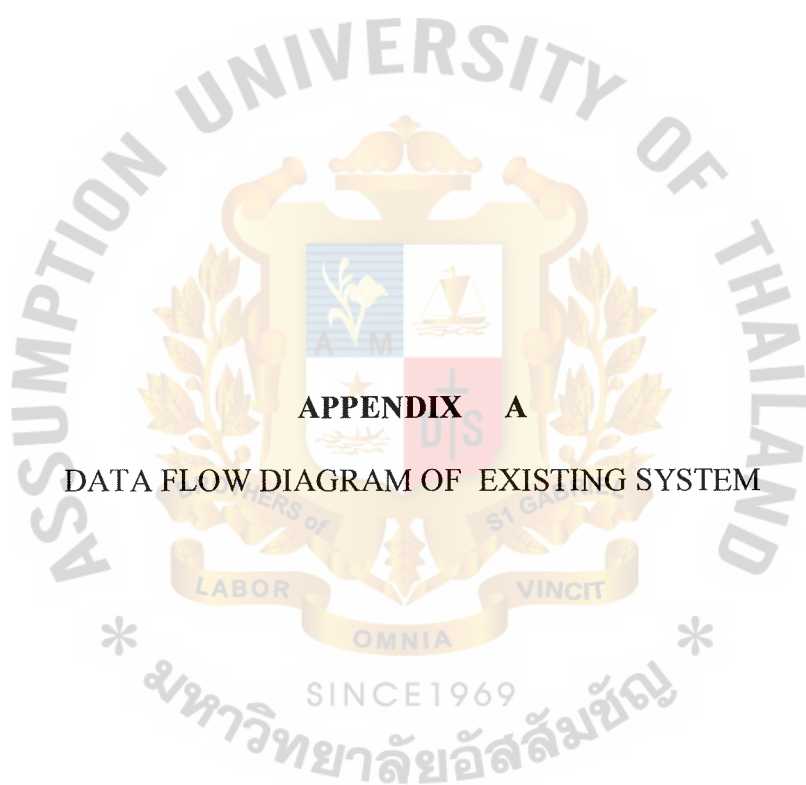
5.2 Recommendations

Recommendations for the company are as follow:

- (1) The computer should be concerned with information technology that will used to assist the staff to operate business functions effectively.
- (2) Updating and expansion of the system have to be made easily or developed further according to user requirements. To support future business improvements, system performance should be checked to ensure that the system is still serving well for the workflow of business.
- (3) Plan to use of E-commerce technology in order to provide 24 hours service to the customers, such as on-line catalogue, order, billing and payment, customer services, etc.
- (4) The proposed system architecture is designed for support the new technology that is about wireless local area network .It is a new way to efficiently run a business, also lowering supplier cost by using
- (5) The more challenging parts are keeping technology, as well as the business processes and business models built upon it, in synchronization with the radically changing business environment and the evolving of modern organization and modern knowledge workers.
- (6) The application system can be expanded to handle high peak loads of transactions in the future. The network architecture of the system must be revised and changed to serve the best performance. User requirements have to be surveyed and analyzed frequently. The system can be changed to serve the new requirements.
- (7) Extending the information system to cover purchasing to be fully integrated purchasing information system.

- (8) Developing the system to be an Enterprise Application Integration (EAI) by integrating all systems together.
- (9) The company has to provide computer skills to its staff. Trained staff can become easily familiar to the computer and learn the new application fast. Finally, they can improve the business service and business flow.





APPENDIX A

DATA FLOW DIAGRAM OF EXISTING SYSTEM

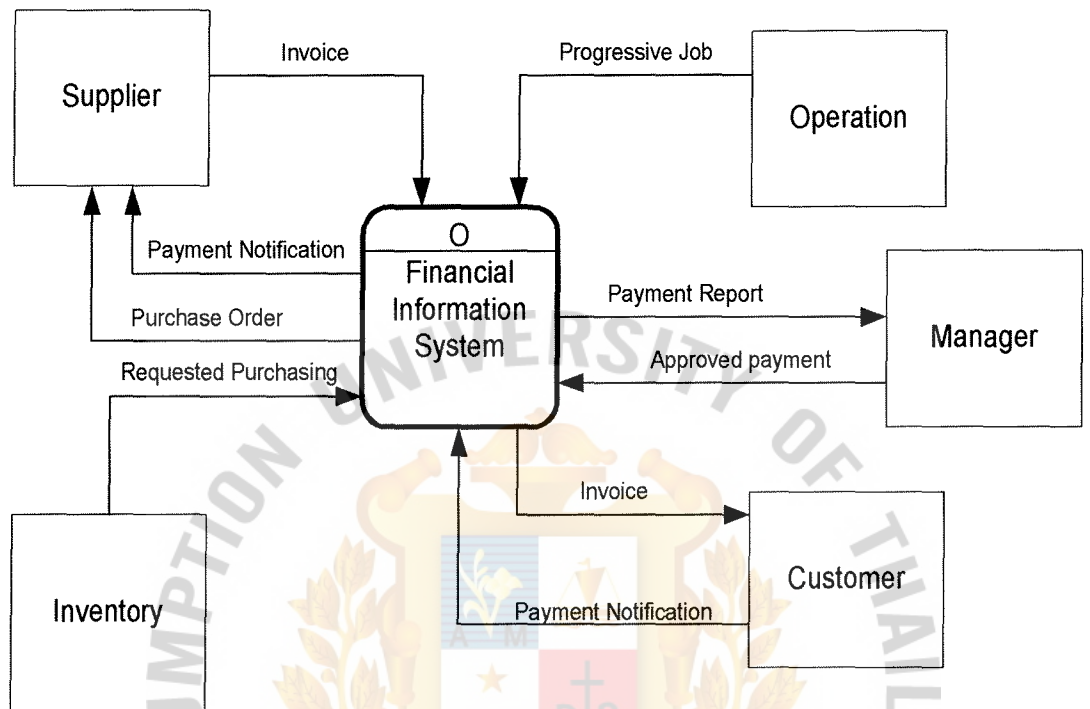


Figure A.1. Context Diagram of Existing System.

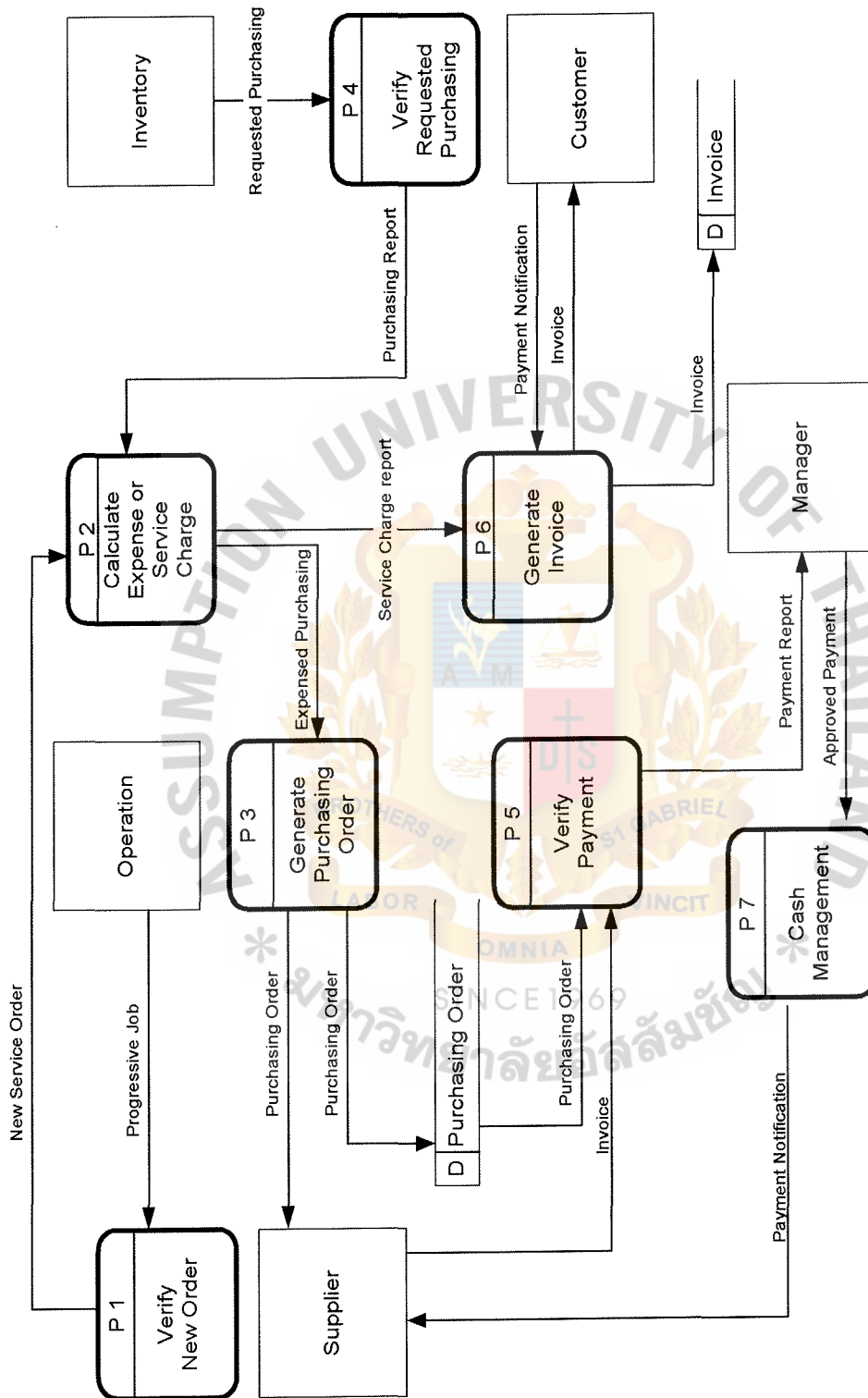
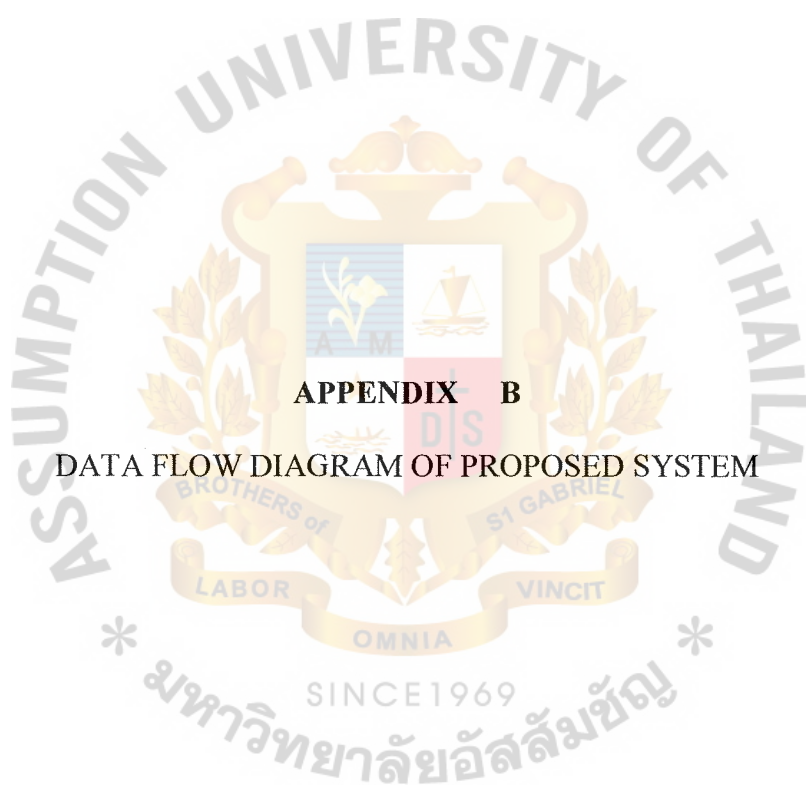


Figure A.2. Data Flow Diagram(Level 0)Existing System.



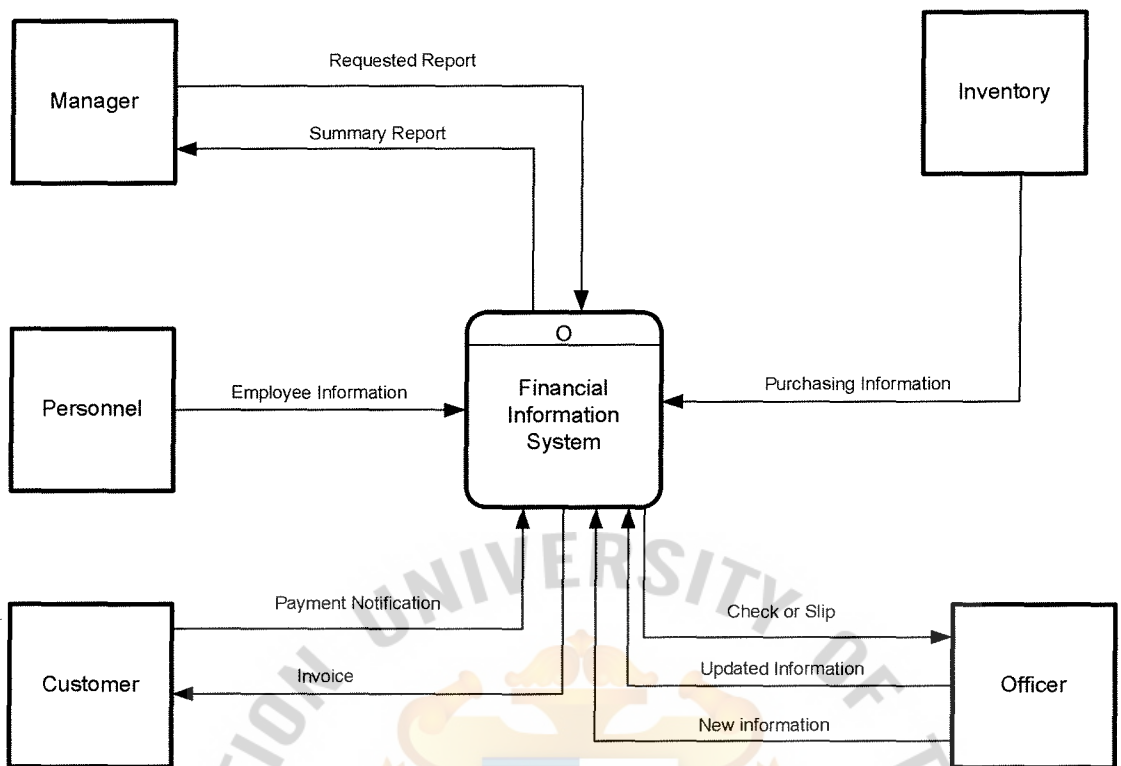


Figure B.1. Context Diagram of Proposed System.

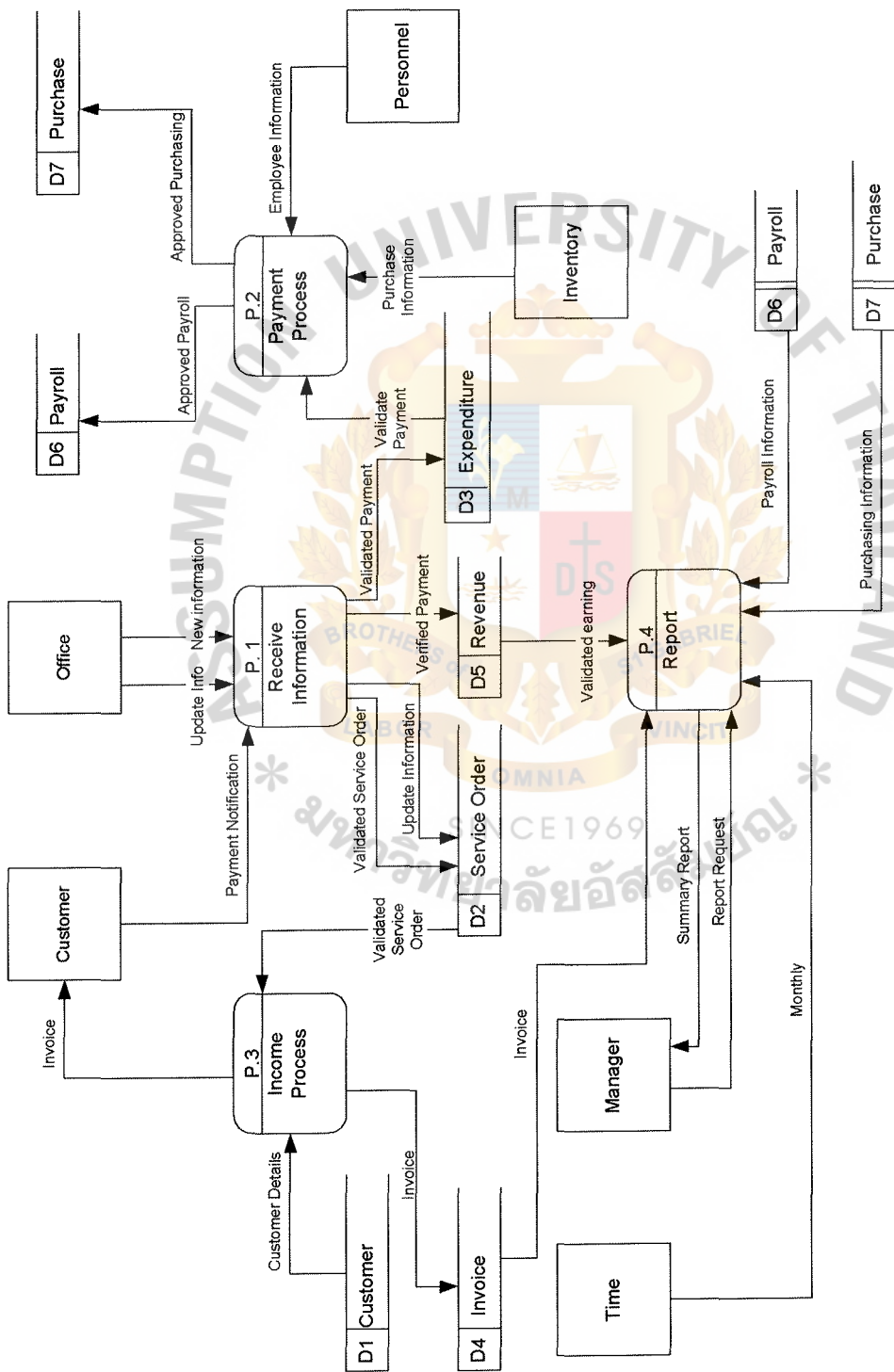


Figure B.2. Data Flow Diagram(Level 0) of Proposed System.

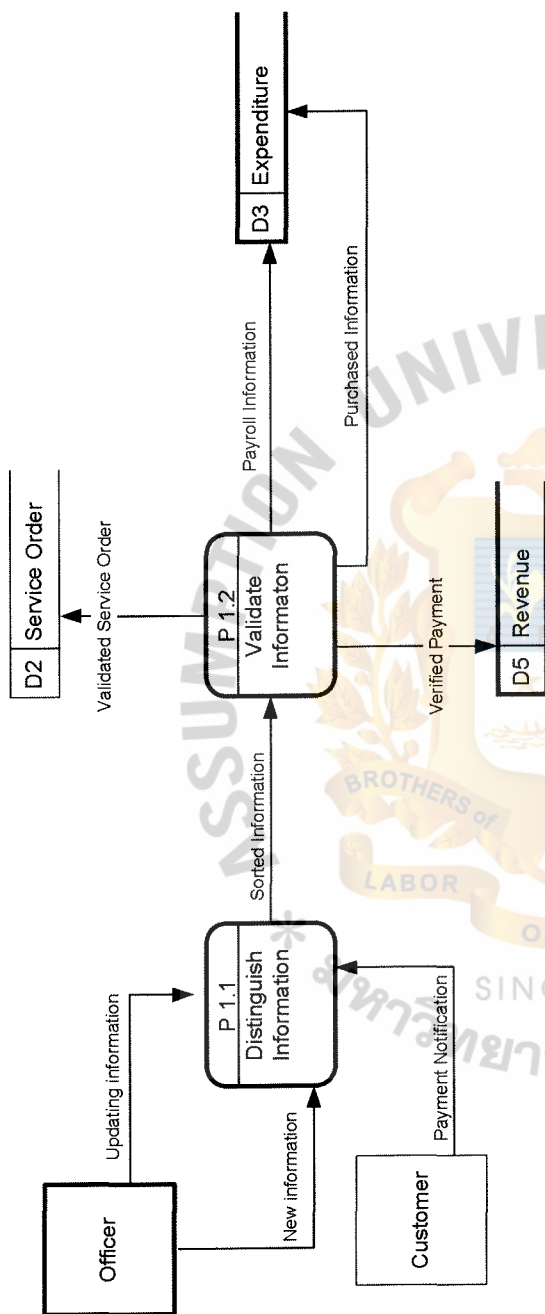


Figure B.3. Data Flow Diagram(Level 1) Receive Information.

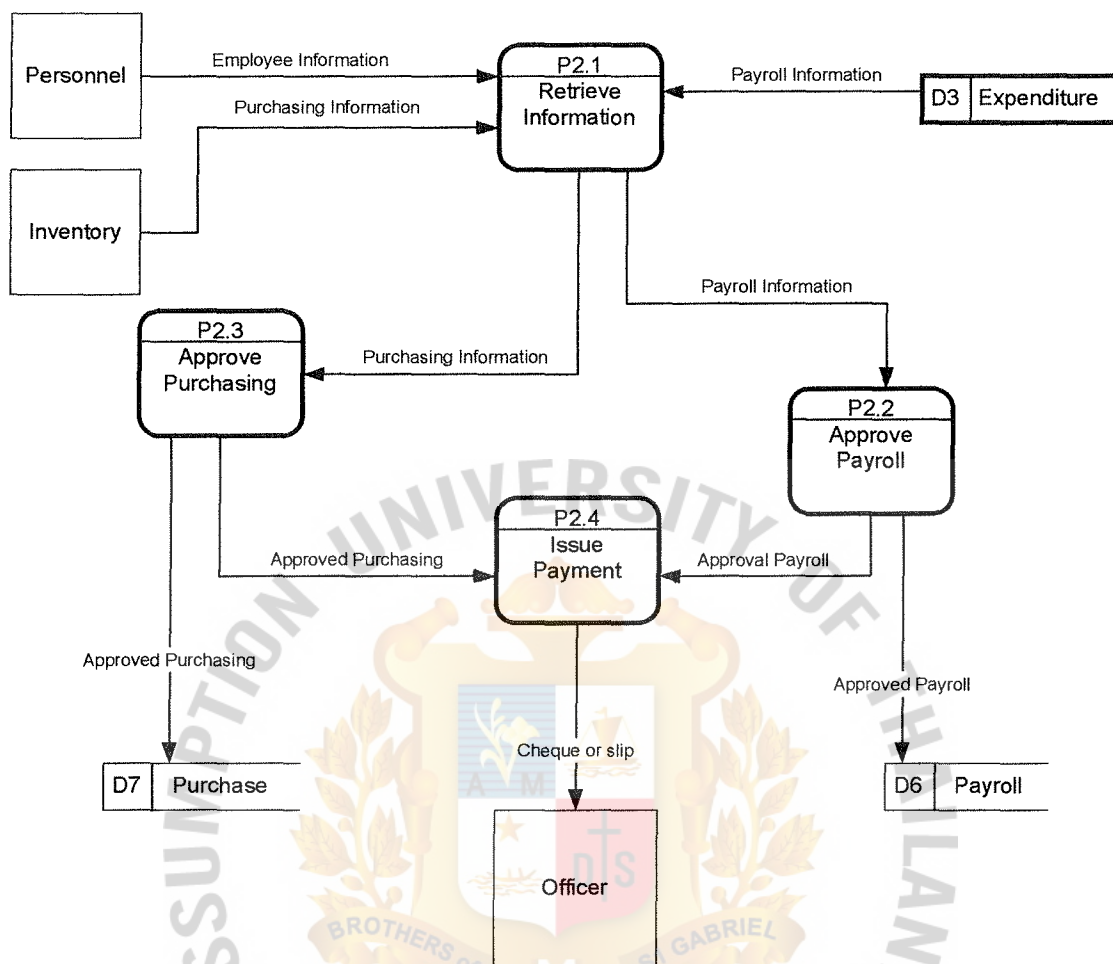


Figure B.4. Data Flow Diagram(Level 1) Payment Process.

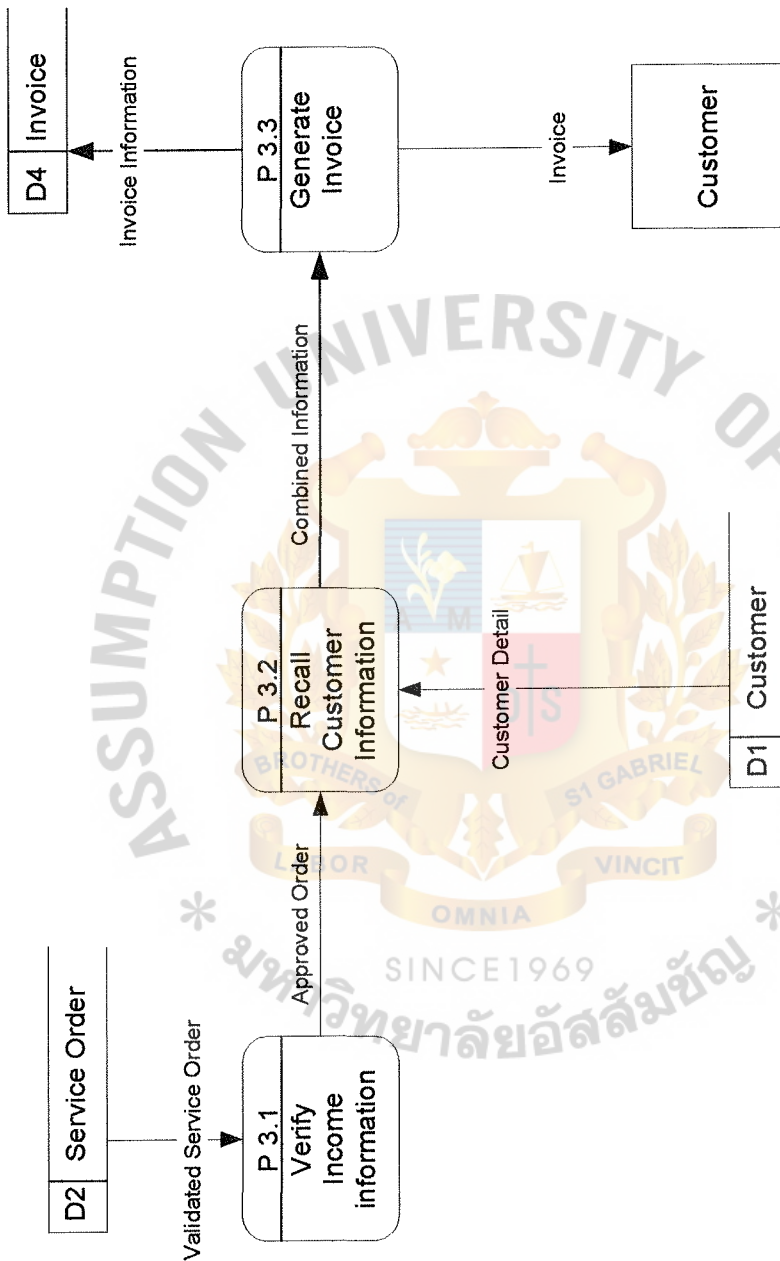


Figure B.5. Data Flow Diagram(Level 1) Income Process.

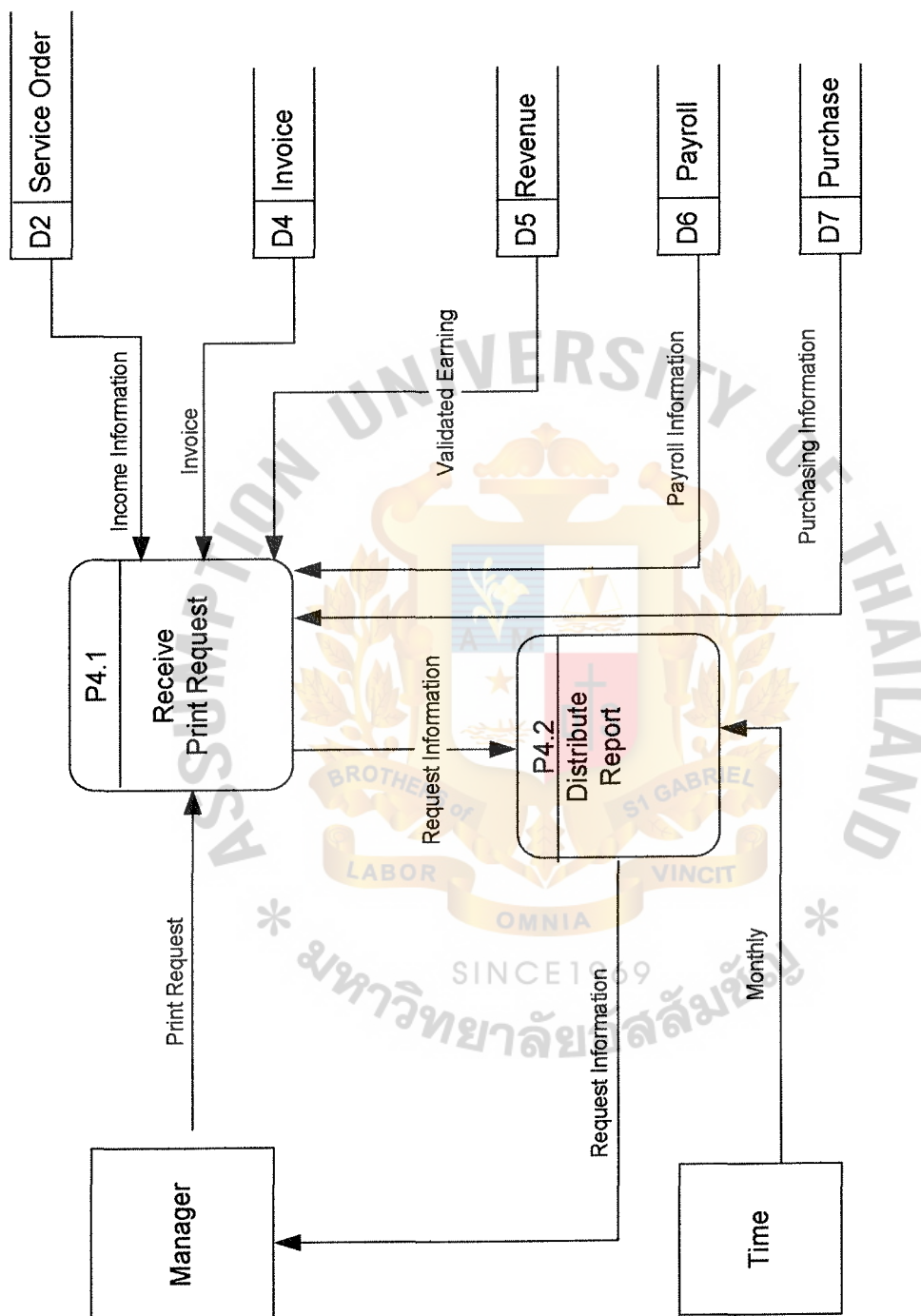


Figure B.6. Data Flow Diagram(Level 1) Generate Report.



APPENDIX C

DATABASE DESIGN

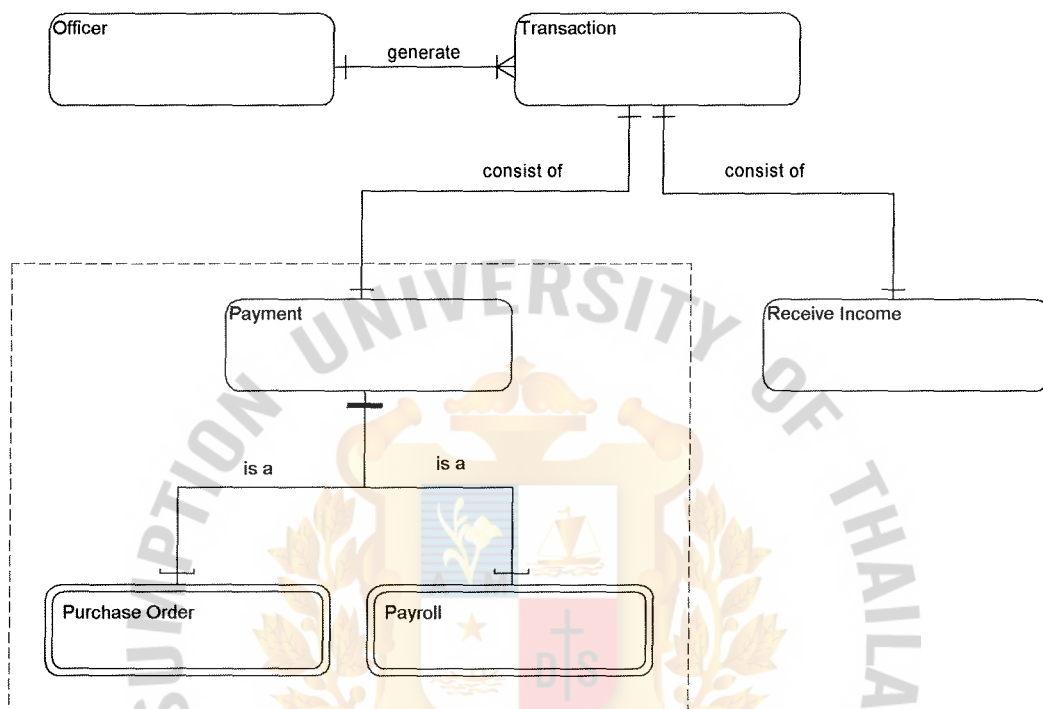


Figure C.1. Context Entity Relationship Of Proposed System.

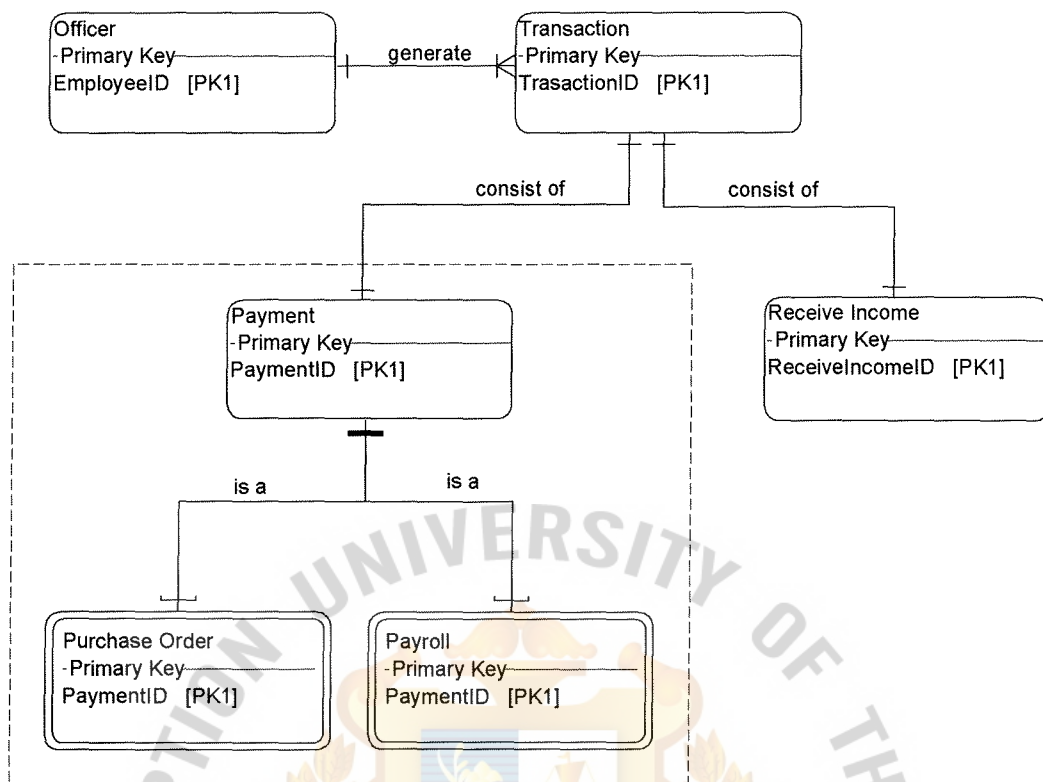


Figure C.2. Key based Entity Relationship Diagram of Proposed System.

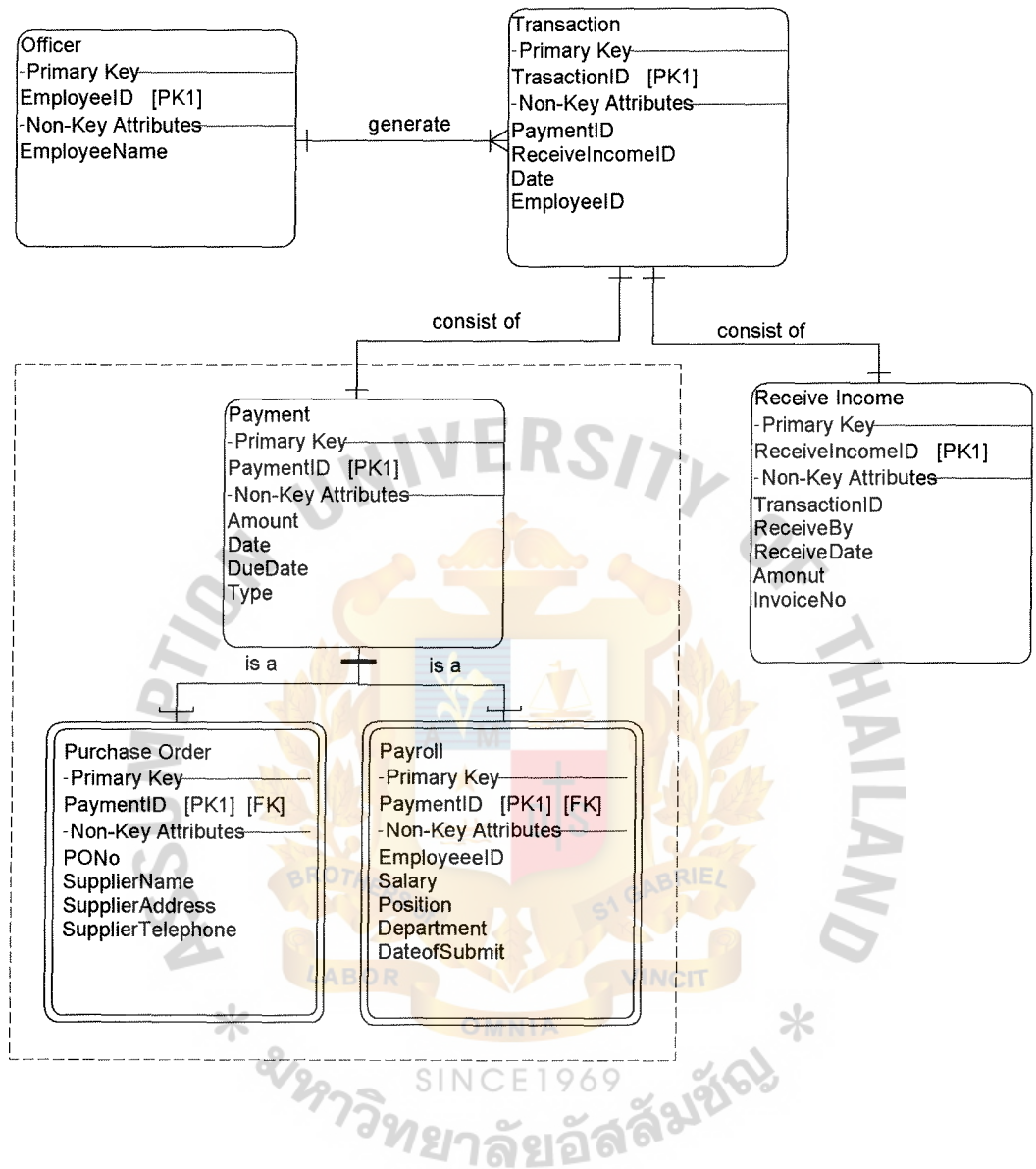


Figure C.3. Fully Entity Relationship of Proposed system.



APPENDIX D
DATA DEFINITION

Table D.1.1. Structure of Officer and Transaction Table.

| Name | Type | Null | Foreign key to table | Check | Key Type |
|-----------------|--------|------|----------------------|-------|-------------|
| Employee ID | Text | Not | - | - | Primary Key |
| Name | Text | Not | - | - | Attribute |
| Transaction ID | Text | Not | - | - | Primary Key |
| Payment ID | Text | Not | - | - | Attribute |
| ReceiveIncomeID | Text | Null | - | - | Attribute |
| Date | Text | Not | - | - | Attribute |
| EmployeeID | Number | Null | - | - | Attribute |

Table D.2. Structure of Payment Table.

| Name | Type | Null | Foreign key to table | Check | Key Type |
|-----------|------|------|----------------------|-------|-------------|
| PaymentID | Text | Not | - | - | Primary Key |
| Amount | Text | Not | - | - | Attribute |
| Date | Text | Null | - | - | Attribute |
| Due Date | Text | Not | - | - | Attribute |
| Type | Text | Null | - | - | Attribute |

Table D.3. Structure of Purchase Order Table.

| Name | Type | Null | Foreign key to table | Check | Key Type |
|--------------------|------|------|----------------------|-------|-------------|
| PaymentID | Text | Not | - | - | Primary Key |
| PO No(Purchase No) | Text | Not | - | - | Attribute |
| Supplier Name | Text | Null | - | - | Attribute |
| Supplier Address | Text | Null | - | - | Attribute |
| Supplier Telephone | Text | Null | - | - | Attribute |

Table D.4. Structure of Payroll Table.

| Name | Type | Null | Foreign key to table | Check | Key Type |
|----------------|------|------|----------------------|-------|-------------|
| PaymentID | Text | Not | - | - | Primary Key |
| EmployeeID | Text | Not | - | - | Attribute |
| Salary | Text | Null | - | - | Attribute |
| Position | Text | Null | - | - | Attribute |
| Department | Text | Not | - | - | Attribute |
| Date of Submit | Text | Not | - | - | Attribute |

Table D.5. Structure of Receive Income Table.

| Name | Type | Null | Foreign key to table | Check | Key Type |
|-----------------|--------|------|----------------------|-------|-------------|
| ReceiveIncomeID | Text | Not | - | - | Primary Key |
| TransactionID | Text | Not | - | - | Attribute |
| ReceiveBy | Text | Null | - | - | Attribute |
| ReceiveDate | Text | Null | - | - | Attribute |
| Amount | Number | Not | - | - | Attribute |
| InvoiceNo | Number | Not | - | - | Attribute |



APPENDIX E
PROCESS SPECIFICATION

PROCESS SPECIFICATION

Process Specification shows the process of Financial Information System that consists of:

- (1) Process Distinguish Data
- (2) Process Validate Data
- (3) Process Receive Information
- (4) Process Approve Payroll
- (5) Process Approve Purchasing
- (6) Process Issue Payment
- (7) Process Verify Income Information
- (8) Process Recall Customer Information
- (9) Process Generate Invoice
- (10) Process Receive Print Request
- (11) Process Distribute Report

Table E.1. Process Specification of Receive Information.

| Items | Description |
|----------------|--|
| Process Name : | Receive Information |
| Data In : | 1.Update Information 2.New Information 3.Payment Notification |
| Data Out : | Sorted Information |
| Process : | (1) Receive information from related departments (2) Sort out information (3) Send information to process2 |

Table E.2. Process Specification of New Customer Registration.

| Items | Description |
|----------------|--|
| Process Name : | Validate Information |
| Data In : | Sorted Information |
| Data Out : | 1.Validated Service Order 2.Payroll Information 3.Purchasing Information 4.Verified Payment |
| Process : | (1) Receive Sorted Information (2) Send Categorized Information to Data Store |

Table E.3. Process Specification of Receive Information.

| Items | Description |
|----------------|---|
| Process Name : | Receive Information |
| Data In : | 1.Employee Information 2.Purchasing Information 3.Payroll Information |
| Data Out : | 1.Payroll Information 2.Purchasing Information |
| Process : | (1) Receive Information from Personnel, Inventory. (2) Check Information before sending (3) Send accepted request information to the Next Process |

Table E.4. Process Specification of Approve Payroll.

| Items | Description |
|----------------|--|
| Process Name : | Approve Payroll |
| Data In : | Payroll Information |
| Data Out : | Approved Payroll |
| Process : | (1) Verify payroll information (2) Send request information to Issue payment and keep in data store |

Table E.5. Process Specification of Approve Purchasing.

| Items | Description |
|----------------|--|
| Process Name : | Approve Purchasing |
| Data In : | Purchasing Information |
| Data Out : | Approved Purchasing |
| Process : | (1) Verify purchasing information (2) Send request information to the next process and keep in data store |

Table E.6. Process Specification of Issue Payment.

| Items | Description |
|----------------|---|
| Process Name : | Issue Payment |
| Data In : | Approved Payroll Approved Purchasing |
| Data Out : | Cheque or Slip |
| Process : | (1) Receive Approved Payroll or Purchasing (2) Generate Cheque or Slip |

Table E.7. Process Specification of Verify Income Order.

| Items | Description |
|----------------|--|
| Process Name : | Verify Income Order |
| Data In : | Validated Service Order |
| Data Out : | Approved Order |
| Process : | (1) Receive request information which to be verified service order (2) Send information to the next process |

Table E.8. Process Specification of Recall Customer Information.

| Items | Description |
|----------------|---|
| Process Name : | Recall Customer Information |
| Data In : | Customer Detail Approved Order |
| Data Out : | Combined Information |
| Process | (1) Receive Customer Detail and Approved order service information (2) Send notification to the next process |

Table E.9. Process Specification of Generate Invoice.

| Items | Description |
|----------------|--|
| Process Name : | Generate Invoice |
| Data In : | Combined Information |
| Data Out : | Invoice Information Invoice |
| Process | (1) Receive request information (2) Update Invoice (3) Send bill to customer |

Table E.10. Process Specification of Receive Print Request.

| Items | Description |
|----------------|--|
| Process Name : | Receive Print Request |
| Data In : | Report Information |
| Data Out : | Report Information |
| Process | (1) Receive report information from manager (2) Read information from records (3) Send information to next process |

Table E.11. Process Specification of Distribute Report.

| Items | Description |
|----------------|---|
| Process Name : | Distribute Report |
| Data In : | Report Information Time reminder |
| Data Out : | Report Information |
| Process | (1) Receive report information (2) Receive reminder from timer (3) Distribute report information to manager |



APPENDIX F
FEASIBILITY ANALYSIS

Table F.1. Estimated Costs and Benefits for Candidate Solution 1.

| Costs and Benefits | Year | | | | |
|---------------------------------------|--------------|--------------|--------------|--------------|--------------|
| | 1 | 2 | 3 | 4 | 5 |
| <u>Costs</u> | | | | | |
| <u>Fixed Cost</u> | | | | | |
| Hardware Cost: | | | | | |
| Computer Server 1@55,800 | 55,800.00 | 55,800.00 | 55,800.00 | 55,800.00 | 55,800.00 |
| Workstation 4@25,900 | 103,600.00 | 103,600.00 | 103,600.00 | 103,600.00 | 103,600.00 |
| Laser Printer 1@15,700 | 15,700.00 | 15,700.00 | 15,700.00 | 15,700.00 | 15,700.00 |
| Dot Printer 4@20,500 | 82,000.00 | 82,000.00 | 82,000.00 | 82,000.00 | 82,000.00 |
| USP 1@5,500 | 5,500.00 | 5,500.00 | 5,500.00 | 5,500.00 | 5,500.00 |
| HUB 1@7,500 | 7,500.00 | 7,500.00 | 7,500.00 | 7,500.00 | 7,500.00 |
| UTP CAT5 1 Package | 3,500.00 | 3,500.00 | 3,500.00 | 3,500.00 | 3,500.00 |
| Total Hardware Cost | 273,600.00 | 273,600.00 | 273,600.00 | 273,600.00 | 273,600.00 |
| Software Cost: | | | | | |
| MS Visual FoxPro Version6.0 | 25,000.00 | 25,000.00 | 25,000.00 | 25,000.00 | 25,000.00 |
| MS SQL Server 2000 | 69,400.00 | 69,400.00 | 69,400.00 | 69,400.00 | 69,400.00 |
| MS Window 2000 Advance Server | 189,400.00 | 189,400.00 | 189,400.00 | 189,400.00 | 189,400.00 |
| MS Window 2000 Workstation 4@17,00.00 | 68,000.00 | 68,000.00 | 68,000.00 | 68,000.00 | 68,000.00 |
| Total Software Cost | 351,800.00 | 351,800.00 | 351,800.00 | 351,800.00 | 351,800.00 |
| Implementation Cost: | | | | | |
| Advanced Training Cost | 30,000.00 | - | - | - | - |
| Basic Training Cost | 30,000.00 | - | - | - | - |
| Set up Cost | 17,500.00 | - | - | - | - |
| Total Implementation Cost | 77,500.00 | - | - | - | - |
| Maintenance Cost: | | | | | |
| Maintenance Cost | - | - | - | 17,000.00 | 17,000.00 |
| Total Development Cost | 702,900.00 | 625,400.00 | 625,400.00 | 625,400.00 | 625,400.00 |
| <u>Operating Cost</u> | | | | | |
| People-Ware cost: | | | | | |
| Programmer Salary | | | | | |
| 2person@20,000 | 40,000.00 | 42,000.00 | 44,100.00 | 46,305.00 | 48,620.00 |
| Officer Staff | 48,000.00 | 50,400.00 | 52,920.00 | 55,566.00 | 58,344.00 |
| 4person@12,000 | 88,000.00 | 92,400.00 | 97,020.00 | 101,871.00 | 106,975.00 |
| Total Monthly Salary Cost | 1,056,000.00 | 1,108,800.00 | 1,164,240.00 | 1,222,452.00 | 1,283,575.00 |
| Total Annual Salary Cost | | | | | |

Table F.1. Estimated Costs and Benefits for Candidate Solution 1 (Continued).

| Costs and Benefits | Year | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | 1 | 2 | 3 | 4 | 5 |
| Office Suppliers & Miscellaneous Cost: | | | | | |
| Paper 2,000 per month | 24,000.00 | 25,200.00 | 26,460.00 | 27,783.00 | 29,172.00 |
| Utility 5,000 per month | 60,000.00 | 63,000.00 | 66,150.00 | 69,458.00 | 72,930.00 |
| Miscellaneous 500 per month | 6,000.00 | 6,300.00 | 6,6150.00 | 6,946.00 | 7,293.00 |
| Annual Office Suppliers&Miscellaneous Cost | 90,000.00 | 94,500.00 | 99,225.00 | 104,186.00 | 109,396.00 |
| Total Operating Cost | 1,146,000.00 | 1,203,300.00 | 1,263,300.00 | 1,326,638.00 | 1,392,970.00 |
| Total Computerized System Cost | 1,848,900.00 | 1,828,700.00 | 1,888,865.00 | 1,969,038.00 | 2,035,370.00 |
| <u>Benefits</u> | | | | | |
| -Reduce cost of human labor 24,000 per month | 288,000.00 | 302,400.00 | 317,520.00 | 333,396.00 | 350,066.00 |
| -Reduce paper usage&Office Supplier 3,000 per month | 36,000.00 | 37,800.00 | 39,690.00 | 41,675.00 | 43,759.00 |
| -Reduce cost of overtime 5,000 per month | 60,000.00 | 63,000.00 | 66,150.00 | 69,458.00 | 72,931.00 |
| Total Annual Benefits | 384,000.00 | 403,200.00 | 423,360.00 | 444,528.00 | 466,754.00 |

Table F.2. Estimated Costs and Benefits for Candidate Solution 2.

| Costs and Benefits | Years | | | | |
|---------------------------|------------|------------|------------|------------|------------|
| | 1 | 2 | 3 | 4 | 5 |
| <u>Costs</u> | | | | | |
| <u>Fixed Cost</u> | | | | | |
| Hardware Cost: | | | | | |
| Computer Server 1@55,800 | 55,800.00 | 55,800.00 | 55,800.00 | 55,800.00 | 55,800.00 |
| Workstation 4@25,900 | 103,600.00 | 103,600.00 | 103,600.00 | 103,600.00 | 103,600.00 |
| Laser Printer 1@15,700 | 15,700.00 | 15,700.00 | 15,700.00 | 15,700.00 | 15,700.00 |
| Dot Printer 4@20,500 | 82,000.00 | 82,000.00 | 82,000.00 | 82,000.00 | 82,000.00 |
| USP 1@5,500 | 5,500.00 | 5,500.00 | 5,500.00 | 5,500.00 | 5,500.00 |
| HUB 1@7,500 | 7,500.00 | 7,500.00 | 7,500.00 | 7,500.00 | 7,500.00 |
| UTP CAT5 1 Package | 3,500.00 | 3,500.00 | 3,500.00 | 3,500.00 | 3,500.00 |
| Total Hardware Cost | 273,600.00 | 273,600.00 | 273,600.00 | 273,600.00 | 273,600.00 |
| Software Cost: | | | | | |
| Express Accounting 5.0 | 25,000.00 | 25,000.00 | 25,000.00 | 25,000.00 | 25,000.00 |
| MS Window NT 4.0 | 23,400.00 | 23,400.00 | 23,400.00 | 23,400.00 | 23,400.00 |
| MS Window 98 4@4,500 | 18,000.00 | 18,000.00 | 18,000.00 | 18,000.00 | 18,000.00 |
| Total Software Cost | 351,800.00 | 351,800.00 | 351,800.00 | 351,800.00 | 351,800.00 |
| Implementation Cost: | | | | | |
| Training Cost | 16,000.00 | - | - | - | - |
| Set up Cost | 15,500.00 | - | - | - | - |
| Total Implementation Cost | 31,500.00 | - | - | - | - |
| | 77,500.00 | - | - | - | - |
| Maintenance Cost: | | | | | |
| Maintenance Cost | - | - | - | 12,000.00 | 12,000.00 |
| Total Development Cost | 317,500.00 | 340,000.00 | 340,400.00 | 352,000.00 | 352,000.00 |
| <u>Operating Cost</u> | | | | | |
| People-Ware cost: | | | | | |
| Officer Staff | | | | | |
| 4person@20,000 | 48,000.00 | 50,400.00 | 52,920.00 | 55,566.00 | 58,344.00 |
| Total Monthly Salary Cost | 48,000.00 | 50,400.00 | 52,920.00 | 55,566.00 | 58,344.00 |
| Total Annual Salary Cost | 576,000.00 | 604,800.00 | 635,040.00 | 666,792.00 | 700,132.00 |

Table F.2. Estimated Costs and Benefits for Candidate Solution 2(Continued).

| Costs and Benefits | Years | | | | |
|---|--------------|--------------|--------------|--------------|--------------|
| | 1 | 2 | 3 | 4 | 5 |
| Office Suppliers & Miscellaneous Cost: | | | | | |
| Paper 2,000 per month | 24,000.00 | 25,200.00 | 26,460.00 | 27,783.00 | 29,172.00 |
| Utility 3,000 per month | 36,000.00 | 37,800.00 | 39,690.00 | 41,675.00 | 43,758.00 |
| Miscellaneous 500 per month | 6,000.00 | 6,300.00 | 6,6150.00 | 6,946.00 | 7,293.00 |
| Annual Office Suppliers&Miscellaneous Cost | 66,000.00 | 69,300.00 | 72,765.00 | 76,403.00 | 80,223.00 |
| Total Operating Cost | 642,000.00 | 674,100.00 | 707,805.00 | 743,195.00 | 780,355.00 |
| Total Computerized System Cost | 1,013,500.00 | 1,014,100.00 | 1,048,205.00 | 1,095,195.00 | 1,132,355.00 |
| <u>Benefits</u> | | | | | |
| -Reduce cost of human labor 24,000 per month | 144,000.00 | 151,200.00 | 158,760.00 | 166,698.00 | 175,033.00 |
| -Reduce paper usage&Office Supplier 3,000 per month | 18,000.00 | 18,900.00 | 19,845.00 | 20,837.00 | 21,879.00 |
| -Reduce cost of overtime 5,000 per month | 30,000.00 | 31,500.00 | 33,075.00 | 34,729.00 | 36,465.00 |
| Total Annual Benefits | 192,000.00 | 201,600.00 | 211,680.00 | 222,264.00 | 233,377.00 |

Table F.3. Estimated Costs and Benefits for Candidate Solution 3.

| Costs and Benefits | Year | | | | |
|----------------------------------|------------|------------|------------|------------|------------|
| | 1 | 2 | 3 | 4 | 5 |
| <u>Costs</u> | | | | | |
| <u>Fixed Cost</u> | | | | | |
| Hardware Cost: | | | | | |
| Computer Server 1@55,800 | 55,800.00 | 55,800.00 | 55,800.00 | 55,800.00 | 55,800.00 |
| Workstation 4@25,900 | 103,600.00 | 103,600.00 | 103,600.00 | 103,600.00 | 103,600.00 |
| Laser Printer 1@15,700 | 15,700.00 | 15,700.00 | 15,700.00 | 15,700.00 | 15,700.00 |
| Dot Printer 4@20,500 | 82,000.00 | 82,000.00 | 82,000.00 | 82,000.00 | 82,000.00 |
| USP 1@5,500 | 5,500.00 | 5,500.00 | 5,500.00 | 5,500.00 | 5,500.00 |
| HUB 1@7,500 | 7,500.00 | 7,500.00 | 7,500.00 | 7,500.00 | 7,500.00 |
| UTP CAT5 1 Package | 3,500.00 | 3,500.00 | 3,500.00 | 3,500.00 | 3,500.00 |
| Total Hardware Cost | 273,600.00 | 273,600.00 | 273,600.00 | 273,600.00 | 273,600.00 |
| Software Cost: | | | | | |
| MS Window98 4@4,500 | 18,000.00 | 18,000.00 | 18,000.00 | 18,000.00 | 18,000.00 |
| MS Office 97 4@12,000 | 48,000.00 | 48,000.00 | 48,000.00 | 48,000.00 | 48,000.00 |
| MS Window NT Server | 37,000.00 | 37,000.00 | 37,000.00 | 37,000.00 | 37,000.00 |
| MS Visual Basic Version 6.0 | 14,500.00 | 14,500.00 | 14,500.00 | 14,500.00 | 14,500.00 |
| Norton 2002(Anti-Virus) | 10,500.00 | 10,500.00 | 10,500.00 | 10,500.00 | 10,500.00 |
| 5@2,100.00 | 128,000.00 | 128,000.00 | 128,000.00 | 128,000.00 | 128,000.00 |
| Total Software Cost | | | | | |
| Implementation Cost: | | | | | |
| System Analyst(40hours@900 Baht) | 36,000.00 | - | - | - | - |
| Programmer(90 hours@700 Baht) | 63,000.00 | - | - | - | - |
| Training Cost | 21,000.00 | - | - | - | - |
| Total Implementation Cost | 120,000.00 | - | - | - | - |
| Maintenance Cost: | | | | | |
| Maintenance Cost | - | - | - | 16,000.00 | 16,000.00 |
| Total Development Cost | 521,600.00 | 401,600.00 | 401,600.00 | 417,600.00 | 417,600.00 |
| <u>Operating Cost</u> | | | | | |
| People-Ware cost: | | | | | |
| Officer Staff 4person@20,000 | 48,000.00 | 50,400.00 | 52,920.00 | 55,566.00 | 58,344.00 |
| Total Monthly Salary Cost | 48,000.00 | 50,400.00 | 52,920.00 | 55,566.00 | 58,344.00 |
| Total Annual Salary Cost | 576,000.00 | 604,800.00 | 635,040.00 | 666,792.00 | 700,132.00 |

Table F.3. Estimated Costs and Benefits for Candidate Solution 3(Continued).

| Costs and Benefits | Year | | | | |
|--|--------------|--------------|--------------|--------------|--------------|
| | 1 | 2 | 3 | 4 | 5 |
| Office Suppliers & Miscellaneous Cost: | | | | | |
| Paper 2,000 per month | 24,000.00 | 25,200.00 | 26,460.00 | 27,783.00 | 29,172.00 |
| Diskettes 400 per month | 4,800.00 | 5,040.00 | 5,292.00 | 5,5570.00 | 5,834.00 |
| Ribbon 1,400 per month | 16,800.00 | 17,640.00 | 18,522.00 | 19,448.00 | 20,420.00 |
| Toner 1,500 per month | 18,000.00 | 18,9000.00 | 19,845.00 | 20,837.00 | 21,879.00 |
| Miscellaneous 500 per month | 6,000.00 | 6,300.00 | 6,6150.00 | 6,946.00 | 7,293.00 |
| Annual Office Suppliers&Miscellaneous Cost | 69,600.00 | 73,080.00 | 76,734.00 | 80,571.00 | 84,599.00 |
| Total Operating Cost | 645,600.00 | 677,880.00 | 711,774.00 | 747,363.00 | 784,731.00 |
| Total Computerized System Cost | 1,167,200.00 | 1,079,480.00 | 1,113,374.00 | 1,164,963.00 | 1,202,331.00 |
| <u>Benefits</u> | | | | | |
| -Reduce cost of human labor 24,000 per month | 288,000.00 | 302,400.00 | 317,520.00 | 333,396.00 | 350,066.00 |
| -Reduce paper usage & Office Supplier 3,000 per month | 36,000.00 | 37,800.00 | 39,690.00 | 41,675.00 | 43,759.00 |
| -Reduce cost of overtime 5,000 per month | 60,000.00 | 63,000.00 | 66,150.00 | 69,458.00 | 72,931.00 |
| Total Annual Benefits | 384,000.00 | 403,200.00 | 423,360.00 | 444,528.00 | 466,754.00 |

Table F.4. Payback period of First Candidate.

Payback Analysis for First Candidate

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|--|-----------|-----------|-----------|-----------|-----------|-------------|
| Development cost: | (702,900) | | | | | |
| Operation & maintenance cost: | | (90,000) | (94,500) | (99,225) | (104,186) | (109,396) |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted costs (adjusted to present value): | (702,900) | (80,370) | (75,317) | (70,648) | (66,262) | (62,028) |
| Cummulative time-adjusted costs over lifetime: | (702,900) | (783,270) | (858,587) | (929,235) | (995,497) | (1,057,525) |
| Benefits derived from operation of new system: | 0 | 384,000 | 403,200 | 423,360 | 444,528 | 466,754 |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted benefit (current of present value): | 0 | 342,912 | 321,350 | 301,432 | 282,720 | 264,650 |
| Commulative time-adjusted benefits over lifetime: | 0 | 342,912 | 664,262 | 965,695 | 1,248,415 | 1,513,064 |
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Commulative lifetime time-adjusted costs + benefits: | (702,900) | (440,358) | (194,324) | 36,460 | 252,918 | 455,540 |

Table F.5. Payback period of Second Candidate.

Payback Analysis for Second Candidate

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| Development cost: | (371,500) | | | | | |
| Operation & maintenance cost: | | (66,000) | (69,300) | (72,765) | (76,403) | (80,223) |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted costs (adjusted to present value): | (371,500) | (58,938) | (55,232) | (51,809) | (48,592) | (45,486) |
| Cummulative time-adjusted costs over lifetime: | (371,500) | (430,438) | (485,670) | (537,479) | (586,071) | (631,558) |
| Benefits derived from operation of new system: | 0 | 192,000 | 201,600 | 211,680 | 222,264 | 233,377 |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted benefit (current of present value): | 0 | 171,456 | 160,675 | 150,716 | 141,360 | 132,325 |
| Commulative time-adjusted benefits over lifetime: | 0 | 171,456 | 332,131 | 482,847 | 624,207 | 756,532 |
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Commulative lifetime time-adjusted costs + benefits: | (371,500) | (258,982) | (153,539) | (54,631) | 38,136 | 124,974 |

Table F.6. Payback period of Third Candidate.

Payback Analysis for Third Candidate

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| Development cost: | (521,600) | | | | | |
| Operation & maintenance cost: | | (85,600) | (89,880) | (94,374) | (99,093) | (104,047) |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted costs (adjusted to present value): | (521,600) | (76,441) | (71,634) | (67,194) | (63,023) | (58,995) |
| Cummulative time-adjusted costs over lifetime: | (521,600) | (598,041) | (669,675) | (736,869) | (799,893) | (858,887) |
| Benefits derived from operation of new system: | 0 | 384,000 | 403,200 | 423,360 | 444,528 | 466,754 |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 |
| Time-adjusted benefit (current of present value): | 0 | 342,912 | 321,350 | 301,432 | 282,720 | 264,650 |
| Commulative time-adjusted benefits over lifetime: | 0 | 342,912 | 664,262 | 965,695 | 1,248,415 | 1,513,064 |
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Commulative lifetime time-adjusted costs + benefits: | (521,600) | (255,129) | (5,413) | 228,825 | 448,522 | 654,177 |

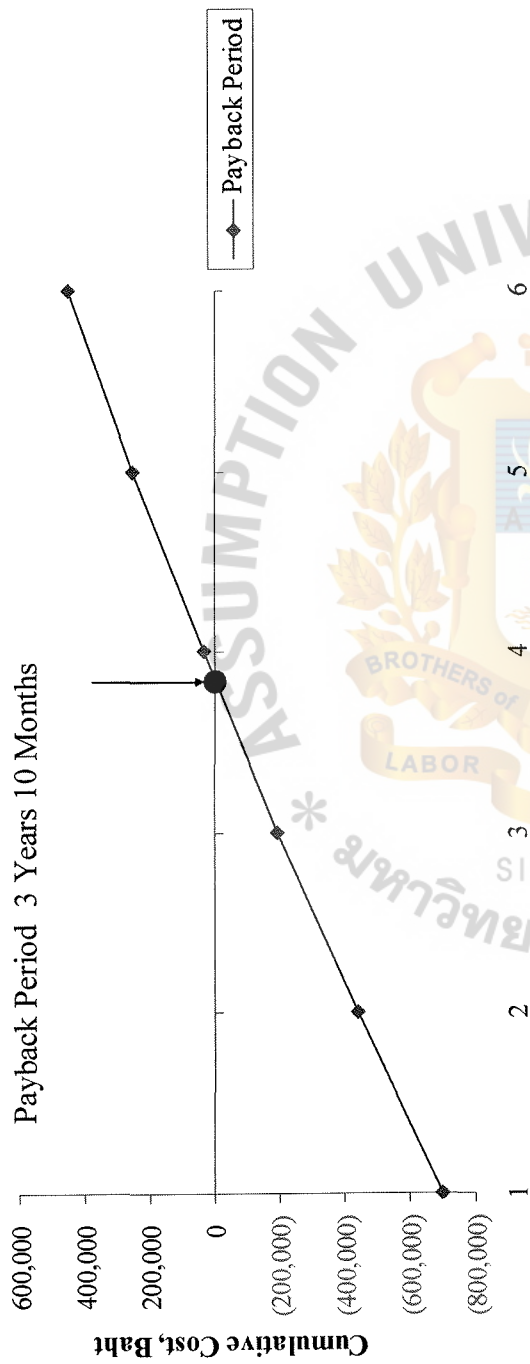


Figure F.1. Payback period of First Candidate.

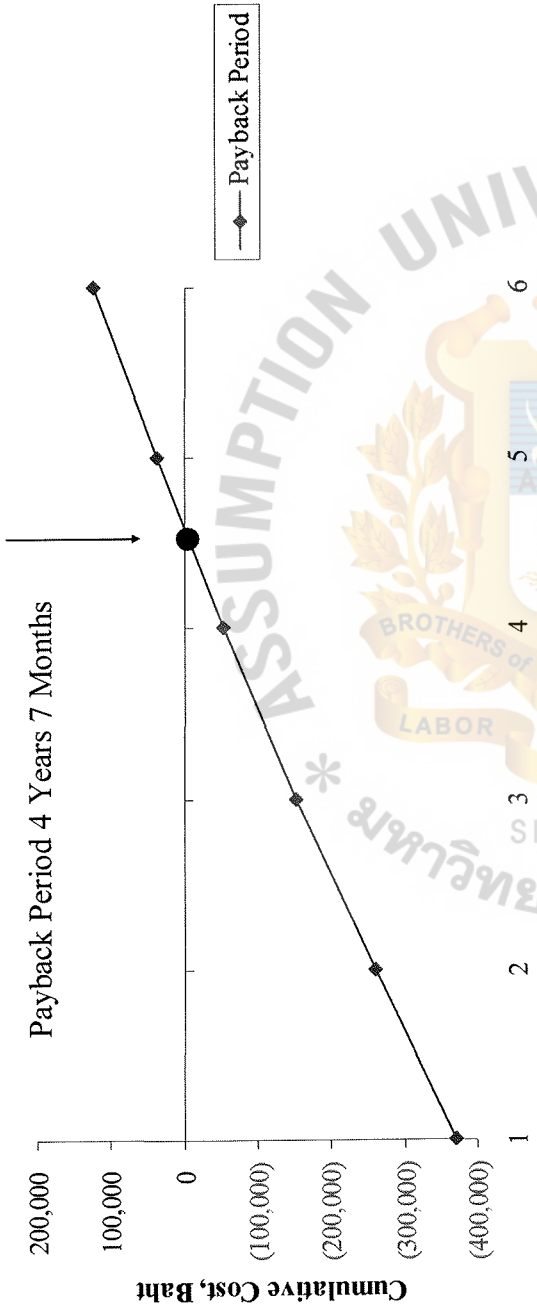


Figure F.2. Payback period of Second Candidate.

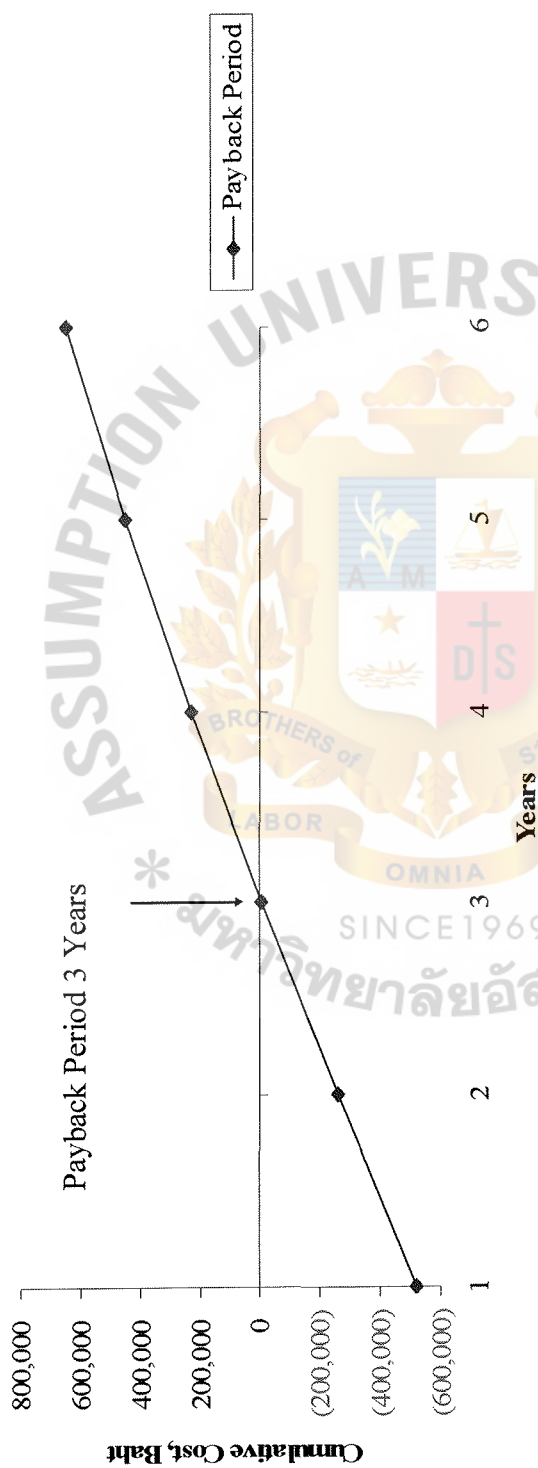


Figure F.3. Payback period of Third Candidate.

Table F.7. Net Value Analysis for First Candidate.

Net Present Value Analysis for First Candidate

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--|-----------|----------|----------|----------|-----------|-----------|-------------|
| Development cost: | (702,900) | | | | | | |
| Operation & maintenance cost: | | (90,000) | (94,500) | (99,225) | (104,186) | (109,396) | |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual costs: | (702,900) | (80,370) | (75,317) | (70,648) | (66,262) | (62,028) | |
| Total present value of lifetime costs: | | | | | | | (1,057,525) |
| Benefits derived from operation of new system: | 0 | 384,000 | 403,200 | 423,360 | 444,528 | 466,754 | |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual benefits: | 0 | 342,912 | 321,350 | 301,432 | 282,720 | 264,650 | |
| Total present value of lifetime benefits: | | | | | | | 1,513,064 |
| Net Present Value of this alternative: | | | | | | | 455,540 |

Table F.8. Net Present Value for Second Candidate.

Net Present Value Analysis for Second Candidate

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--|-----------|----------|----------|----------|----------|----------|-----------|
| Development cost: | (371,500) | | | | | | |
| Operation & maintenance cost: | | (66,000) | (69,300) | (72,765) | (76,403) | (80,223) | |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual costs: | (371,500) | (58,938) | (55,232) | (51,809) | (48,592) | (45,486) | |
| Total present value of lifetime costs: | | | | | | | (631,558) |
| Benefits derived from operation of new system: | 0 | 192,000 | 201,600 | 211,680 | 222,264 | 233,377 | |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual benefits: | 0 | 171,456 | 160,675 | 150,716 | 141,360 | 132,325 | |
| Total present value of lifetime benefits: | | | | | | | 756,532 |
| Net Present Value of this alternative: | | | | | | | 124,974 |

Table F.9. Net Present Value Analysis for Third Candidate.

Net Present Value Analysis for Third Candidate

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--|-----------|----------|----------|----------|----------|-----------|-----------|
| Development cost: | (521,600) | | | | | | |
| Operation & maintenance cost: | | (85,600) | (89,880) | (94,374) | (99,093) | (104,047) | |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual costs: | (521,600) | (76,441) | (71,634) | (67,194) | (63,023) | (58,995) | |
| Total present value of lifetime costs: | | | | | | | (858,887) |
| | | | | | | | |
| Benefits derived from operation of new system: | 0 | 384,000 | 403,200 | 423,360 | 444,528 | 466,754 | |
| Discount factors for 12%: | 1.000 | 0.893 | 0.797 | 0.712 | 0.636 | 0.567 | |
| Present value of annual benefits: | 0 | 342,912 | 321,350 | 301,432 | 282,720 | 264,650 | |
| Total present value of lifetime benefits: | | | | | | | 1,513,064 |
| | | | | | | | |
| Net Present Value of this alternative: | | | | | | | 654,177 |



Table G.1. Data Dictionary of Data Flow Diagram.

| Name | Type | Description |
|-------------------------|-------------------|--|
| Approval Payroll | Data Flow | Approved payroll to be issued and kept in data store |
| Approved Purchasing | Data Flow | Information about purchase to be issued and kept in data store |
| Approve Payroll | Process | To verify payroll before paying |
| Approve Purchasing | Process | To verify purchasing order before paying |
| Approved Order | Data Flow | Information about service order that is drawn from data store |
| Customer | External Entities | Customers who are willing to request service |
| Customer Detail | Data Flow | Information that keeps customer detail provided for invoice |
| Combined Information | Data Flow | Information that contains both customer detail and service fee |
| Distinguish Information | Process | Distinguish Information to be kept in data store |
| Distributed Report | Process | To distribute information to the manger |
| Expenditure | Data Store | Store information about expense of company |
| Employee Information | Data Flow | Employee information used to generate slip |
| Generate Invoice | Process | Print out invoice and invoice data in data store |
| Inventory | External Entities | Department that keeps detail about raw material |
| Issue Payment | Process | To release cheque or slip for both suppliers and employees |
| Monthly | Data Flow | Reminder from time |
| New Information | Data Flow | New Information to offer data about both receive and pay money |
| Officer | External Entities | Officer who key in data through process |

Table G.1. Data Dictionary of Data Flow Diagram(Continued).

| Name | Type | Description |
|-----------------------------|-------------------|--|
| Payroll Information | Data Flow | Categorized payroll information |
| Purchased information | Data Flow | Purchased information to be verified |
| Personnel | External Entities | Personnel that keeps information about employee |
| Print Request | Data Flow | Information requested by manager |
| Recall Customer Information | Process | To recall customer information for printing invoice |
| Retrieve Information | Process | To receive information all about expenses |
| Revenue | Data Store | Store information about income of company |
| Request Information | Data Flow | Information that contains requested information |
| Service Order | Data Store | Store information about Service order |
| Validated Service Order | Data Flow | Information of service order already verified by process |
| Validate Information | Process | Check information before keeping in data store |
| Validated Service Order | Data Flow | Information that from data store |
| Verify Income Information | Process | To approve income information |
| Verified Payment | Data Flow | Approved Payment Information stored in data store |

Table G.2. Data Dictionary of Database.

| Field Name | Meaning |
|--------------------|--|
| Amount | Value of charge |
| Date | Date of keying each transaction |
| Date of submitted | Date of pay out |
| Due Date | Day of deal |
| Department | Description about department |
| Employee ID | Identification number of each employee |
| Employee Name | Full name of employee |
| Invoice No | Identification number of each invoice that is already sent out to customer |
| Payment ID | Identification Number of payment |
| Position | Position of employee |
| PO No | Purchasing Order |
| Receive Income ID | Identification number of series income conclusion |
| Receive By | Description of income conclusion |
| Receive Date | Date of receiving |
| Salary | Amount of money for each employee |
| Supplier Address | Address of supplier including zip code |
| Supplier Name | Name of supplier's company |
| Supplier Telephone | Telephone No |
| Transaction ID | Identification of Each Transaction |



APPENDIX H
INTERFACE DESIGN

Income

Customer

Customer ID : E-031011

Name : Evergreen Star CO.,LT

Vessel

Vessel ID : 254/256

Name : Uni-Unific

Order ID

05526

Date

18-Nov-03

| Service ID | Type of Service | Size | Price/Unit | Quantity | Amount |
|-------------|-----------------|------|------------|----------|------------|
| 001 | Stuffing | 40' | 1,050.00 | 10 | 10,500.00 |
| 002 | Unstuffing | 40' | 1,050.00 | 21 | 22,050.00 |
| 003 | Restuffing | 20' | 1,260.00 | 7 | 8,820.00 |
| 004 | Discharge | 40' | 60.00 | 11 | 660.00 |
| 001 | Loading | 20' | 60.00 | 8 | 480.00 |
| 003 | Restuffing | 40' | 2,100.00 | 17 | 35,700.00 |
| 004 | Discharge | 40' | 60.00 | 31 | 1,860.00 |
| 001 | Stuffing | 40' | 1,050.00 | 19 | 19,950.00 |
| Total | | | | | 100,020.00 |
| VAT 7 % | | | | | 7,001.40 |
| Grand Total | | | | | 107,021.40 |

Create

Update

Accept

Exit

Figure H.1. Service Order Information.

Employee Payroll

Employee ID : EMP 2345

Employee Name : Ms. Srisong Surname : Draratong

Position : Secretary

Salary : 12,000.00

Allowance : 1,200.00

Create Update Delete Preview Cancel Accept

Figure H.3. Employee Information.

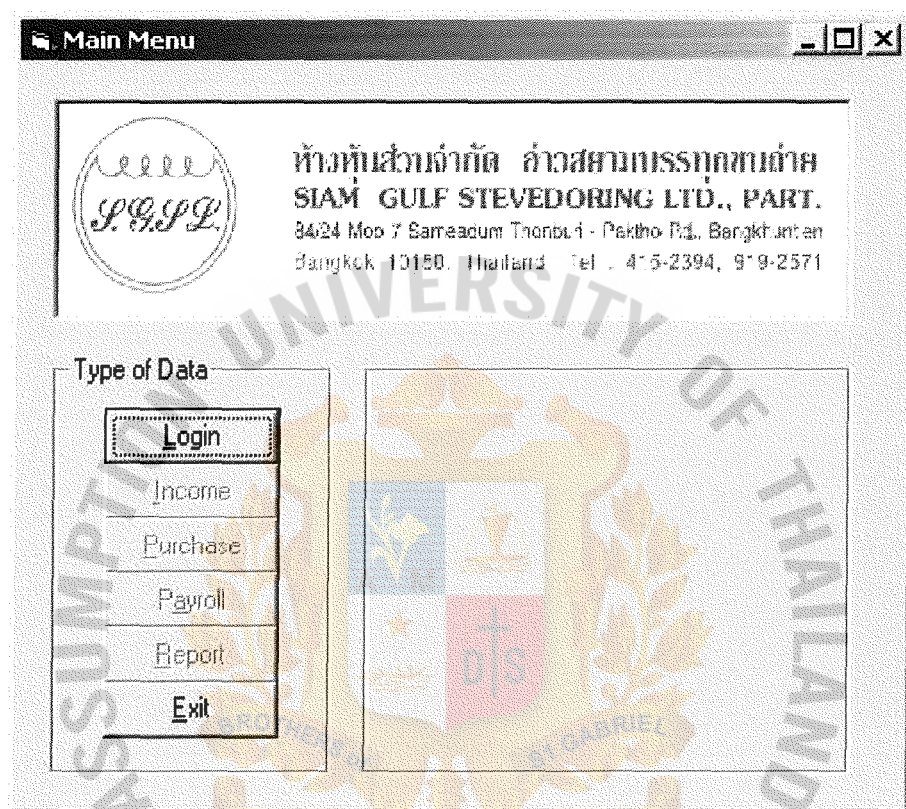



Figure H.4. Main Menu.

Please Login



หัวหุ้นส่วนจำกัด คำวสหามบรรทุกขนถ่าย

SIAM GULF STEVEDORING LTD., PART.

84/24 Moo 7 Sameadum Tamburi - Paktho Rd., Bangkokten

Bangkok 10150, Thailand Tel : 415-2394, 919-2571

Type of Data

Login

Income

Purchase

Payroll

Report

Exit

Login

Username : stevedoring

Password : xxxxxxx


OK

Cancel

Figure H.5. Login Interface.

94

Please Select Type of Report



ห้างหุ้นส่วนจำกัด สยามอ่าวเบงกอล
SIAM GULF STEVEDORING LTD., PART.
84/24 Moo 7 Sammaum Thonburi - Paktho Rd., Bangkokten
Bangkok 10150, Thailand Tel : 4-6-2394, 9-9-2571

Type of Data

| |
|----------|
| Login |
| Income |
| Purchase |
| Payroll |
| Report |
| Exit |

Type of Report

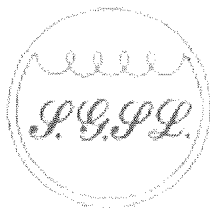
☒ Summary Purchase Request Report
☐ Summary Income Report
☐ Summary Payroll Report

Month Year

Figure H.6. Request Report



APPENDIX I
OUTPUT DESIGN



ห้างหุ้นส่วนจำกัด อ่าวสยามบรสรทุกขนถ่าย
SIAM GULF STEVEDORING LTD., PART.
 84/24 Moo 7 Sameadum Thonburi - Paktho Rd., Bangkhuntien
 Bangkok 10150, Thailand Tel : 415-2394, 919-2571

| | | | | | | | |
|--------------|------|------------|----------|-----------|--|------------|--|
| Customer ID: | | E-031011 | | DATE : | | 18/10/2003 | |
| Vessel | ID | 254/256 | | | | | |
| Service Type | Size | Price/Unit | Quantity | Amount | | | |
| Stuffing | 40' | 1,050.00 | 3 | 3,150.00 | | | |
| | 20' | 630.00 | 5 | 3,150.00 | | | |
| Unstuffing | 40' | 1,050.00 | 7 | 7,350.00 | | | |
| | 20' | 630.00 | 5 | 3,150.00 | | | |
| Restuffing | 40' | 2,100.00 | 3 | 6,300.00 | | | |
| | 20' | 1,260.00 | 9 | 11,340.00 | | | |
| Discharge | 40' | 60.00 | 12 | 720.00 | | | |
| | 20' | 60.00 | 143 | 8,580.00 | | | |
| Loading | 40' | 60.00 | 324 | 19,440.00 | | | |
| | 20' | 60.00 | 56 | 3,360.00 | | | |
| Total | | | | 63,180.00 | | | |
| VAT 7% | | | | 4,422.60 | | | |
| Grand Total | | | | 67,602.60 | | | |

Figure I.1. Summary of Service Fee.



ห้างหุ้นส่วนจำกัด อ่าวสยามบัสทุกขนถ่าย
SIAM GULF STEVEDORING LTD., PART.
84/24 Moo 7 Sameadum Thonburi - Paktho Rd., Bangkhuntien
Bangkok 10150, Thailand Tel . 415-2394, 919-2571

| | | | | |
|----------|-----|-------|-------|------------|
| Supplier | ID: | S-01 | DATE: | 18/11/2003 |
| Purchase | ID | SP-69 | | |

| Product Name | Pro ID | Price/Unit | Quantity | Amount |
|------------------|--------|------------|----------|------------|
| Ply Wood | P-01 | 1,050.00 | 3 | 3,150.00 |
| Nail | P-02 | 1,050.00 | 5 | 5,250.00 |
| Plastic Sheet | P-03 | 1,260.00 | 7 | 8,820.00 |
| Pallet | P-04 | 30,000.00 | 5 | 150,000.00 |
| Corrugated Paper | P-05 | 60.00 | 3 | 180.00 |
| Iron Sheet | P-06 | 2,100.00 | 9 | 18,900.00 |
| Colton | P-07 | 60.00 | 12 | 720.00 |
| Lubricant | P-08 | 1,050.00 | 143 | 150,150.00 |
| Total | | | | 337,170.00 |
| VAT 7% | | | | 23,601.90 |
| Grand Total | | | | 360,771.90 |

Figure I.2. Summary of Purchasing Order.



ห้างหุ้นส่วนจำกัด อ่าวสยามบรรทุกขนถ่าย
SIAM GULF STEVEDORING LTD., PART.
 84/24 Moo 7 Sameadum Thonburi - Paktho Rd., Bangkhuntien
 Bangkok 10150, Thailand Tel : 415-2394, 919-2571

Yearly report for number of ship containers
 Year of 2003

| Type of service | Number of Ship Containers | | | | | | | | | | | |
|-----------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | JAN | FRE | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| Stuffing | 1,234 | 1,500 | 1,436 | 1,890 | 1,546 | 1,345 | 1,230 | 1,456 | 1,300 | 1,900 | 1,900 | 2,000 |
| Unstuffing | 565 | 435 | 324 | 457 | 546 | 487 | 309 | 980 | 655 | 435 | 453 | 453 |
| Restuffing | 234 | 123 | 155 | 234 | 222 | 298 | 123 | 120 | 234 | 109 | 234 | 256 |
| Discharge | 799 | 558 | 479 | 691 | 768 | 785 | 432 | 1100 | 889 | 544 | 687 | 709 |
| Loading | 1,300 | 1,500 | 1,500 | 1,900 | 1,600 | 1,400 | 1,230 | 1,460 | 1,300 | 1,900 | 1,900 | 2,000 |

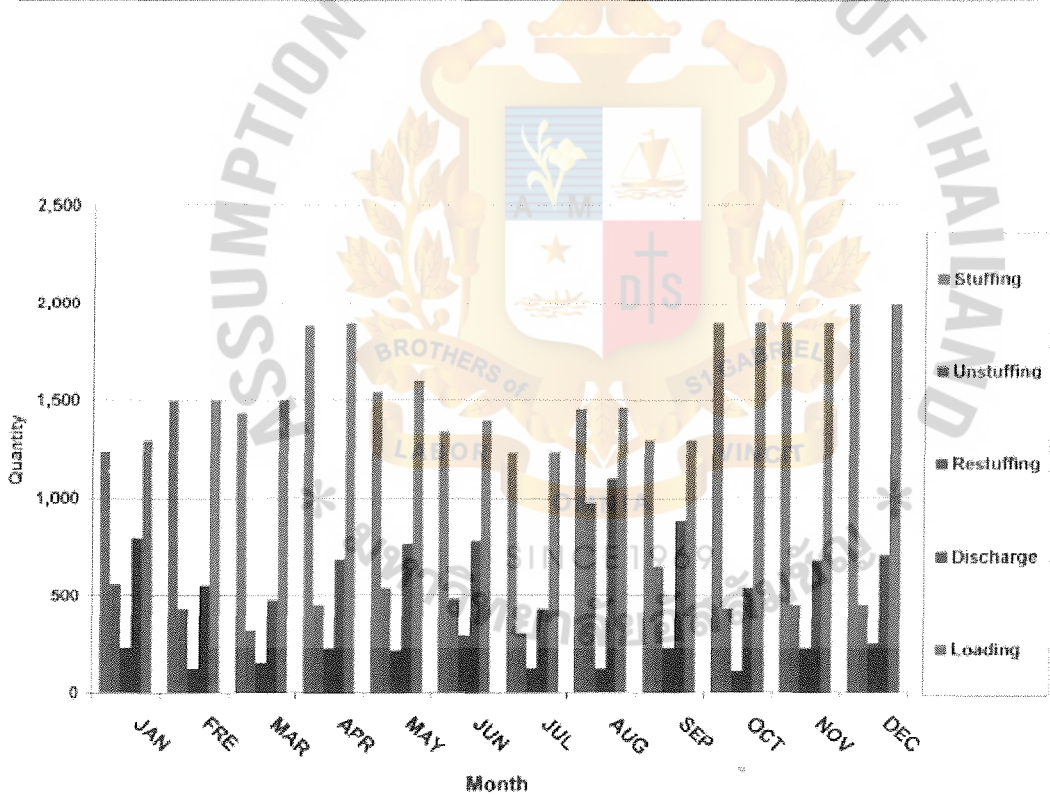


Figure I.3. Summary for total number of ship containers for a year.



ห้างหุ้นส่วนจำกัด อ่าวสยามบรรทุกขนถ่าย
SIAM GULF STEVEDORING LTD., PART.
84/24 Moo 7 Sameadum Thonburi - Paktho Rd., Bangkhuntien
Bangkok 10150. Thailand Tel : 415-2394, 919-2571

Monthly report for Inbound
Month : May

| No | Vessel I.D. | Name of Vessel | Quantity | | |
|----|-------------|----------------|------------|------------|-----------|
| | | | Unstuffing | Restuffing | Discharge |
| 1 | 256 | HSB KUSU | 245 | 23 | 268 |
| 2 | 0897CN-91 | Uni Concert | 123 | 12 | 135 |
| 3 | 8560CS-01 | Uni Corona | 300 | 0 | 300 |
| 4 | T651 | Aris III | 32 | 6 | 38 |
| 5 | LT456 | Lt-Peace | 45 | 7 | 52 |
| 6 | LY657 | Lt-Patriot | 234 | 12 | 246 |
| 7 | LK645 | Lt-Universe | 342 | 4 | 346 |
| 8 | N-453 | Nanta Bhum | 125 | 43 | 168 |
| 9 | B-567 | Bani Bhum | 234 | 43 | 277 |

Figure I.4. Summary for Inbound Vessel for a month.



ห้างหุ้นส่วนจำกัด อ่าวสยามบรรทุกขนถ่าย
SIAM GULF STEVEDORING LTD., PART.
84/24 Moo 7 Sameadum Thonburi - Paktho Rd., Bangkhuntien
Bangkok 10150. Thailand Tel : 415-2394, 919-2571

Monthly report for Outbound
Month : May

| No | Vessel I.D. | Name of Vessel | Quantity | | |
|----|-------------|----------------|----------|------------|---------|
| | | | Stuffing | Restuffing | Loading |
| 1 | 254 | HSB KUSU | 245 | 23 | 268 |
| 2 | 0897CN-92 | Uni Concert | 123 | 12 | 135 |
| 3 | 8560CS-02 | Uni Corona | 300 | 0 | 300 |
| 4 | T652 | Aris III | 32 | 6 | 38 |
| 5 | LT457 | Lt-Peace | 45 | 7 | 52 |
| 6 | LY658 | Lt-Patriot | 234 | 12 | 246 |
| 7 | LK646 | Lt-Universe | 342 | 4 | 346 |
| 8 | N-454 | Nanta Bhum | 125 | 43 | 168 |
| 9 | B-568 | Bani Bhum | 234 | 43 | 277 |

Figure I.5. Summary for Outbound Vessel for a month.



ห้างหุ้นส่วนจำกัด อ่าวสยามบรสทุกชนถ่าย
SIAM GULF STEVEDORING LTD., PART.
84/24 Moo 7 Sameadum Thonburi - Rakthong Rd., Bangkhuntien
Bangkok 10160, Thailand Tel : 415-2394, 919-2571

Monthly report for payment of employee
Month : May

| NO | Emp No | Name | Surname | Expenditure | | |
|----|--------|---------------|-------------|-------------|----------|-----------|
| | | | | Salary | Overtime | Allowance |
| 1 | E-102 | Mr. Somchai | Somfahkun | 12,000.00 | 130.00 | 150.00 |
| 2 | E-103 | Mr. Thongtai | Arunvang | 12,000.00 | 233.00 | 200.00 |
| 3 | E-104 | Ms. Chula | Thanokaocha | 12,000.00 | 654.00 | 300.00 |
| 4 | E-105 | Ms. Manee | Faagthang | 12,000.00 | 45.00 | 423.00 |
| 5 | E-106 | Mr. Manop | Lonyan | 12,000.00 | 32.00 | 534.00 |
| 6 | E-107 | Mr. Somsak | Soomboon | 12,000.00 | 170.00 | 123.00 |
| 7 | E-108 | Mr. Boomma | Gritichoan | 12,000.00 | 653.00 | 756.00 |
| 8 | E-109 | Ms. Aurawan | Roungnat | 12,000.00 | 766.00 | 233.00 |
| 9 | E-110 | Ms. Ramee | Juvattana | 12,000.00 | 866.00 | 876.00 |
| 10 | E-111 | Mr. Nop | Houngkai | 12,000.00 | 453.00 | 435.00 |
| 11 | E-112 | Ms. Malia | Khunthai | 12,000.00 | 93.00 | 231.00 |
| 12 | E-113 | Mr. Thavatcha | Mouengmai | 12,000.00 | 231.00 | 543.00 |

Figure I.6. Summary for Expenditure of Employee for a month.

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