



Information System for Payment
Sale Support Activity of P&G

by

Ms. Kanokkarn Kittayakuljaroen

A Final Report of the Three-Credit Course
CS 6998 - CS 6999 System Development Project

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

March 2003

St. Gabriel's Library, Au

**Information System for Payment
Sale Support Activity of P&G**

by
Ms. Kanokkarn Kittayakuljaroen

A Final Report of the Three-Credit Course
CS 6998 – CS 6999 System Development Project

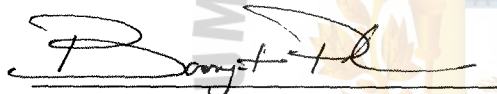

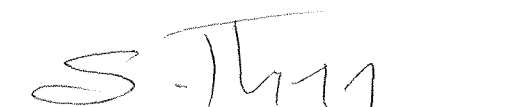
Submitted in Partial fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
Assumption University

March 2003

Project Title	Information System for Sales Support Activity Information System
Name	Ms. Kanokkarn Kittayakuljaroen
Project Advisor	Dr. Boonyarit Pokrud
Academic Year	March 2003

The Graduate School of Assumption University has approved this final report of the six-credit course, CS 6998 – CS 6999 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

Approval Committee:


(Dr. Boonyarit Pokrud)
Advisor
(Prof. Dr. Srisakdi Charmonman)
Chairman
(Air Marshal Dr. Chulit Meesajjee)
Dean and Co-advisor
(Asst. Prof. Dr. Vichit Avatchanakorn)
Member
(Assoc. Prof. Somchai Thayarnyong)
MUA Representative

March 2003

ABSTRACT

P&G is a recognized leader in the development, manufacturing and marketing of superior Fabric & home Care, Baby Care, Tissues, Beauty Care, Health Care, and Food products.

P&G Manufacturing has developed a Sales Support Activity (SSA) program to increase its sale volumes, as an incentive to its customer to buy more products and create a good relationship with wholesaler. SSA program is launched with a multitude of Promotions, for example Bouchours, Merchandisers program, premiums, Newly store opened incentives, Special discounts for specific brands, etc. The Merchandisers program offer sale assistant for the product recommendation in the stores, which is the sale assistant salary. The incentive would be 2% of the value of the first months total shipment, this applied for newly opened branches as well. Customers can reimburse promotion expenses after completion of the promotion period.

The existing system for the reimbursement of payments process, is a manual operation, which is not very efficiently. It consumes too much of time in collection of information and making a hard copy to respond to the customers's requests for promotion payments.

The purpose of proposed system in this project is to introduce a new computerized system to support P&G's operations and services by providing on-line promotion payment request system in web interface form; all data will be stored on the database server and will generate system reports to serve budget management and promotion

analysis processes. Users can access through the web server via a web browser such as Internet Explorer.

With proposed system running, there has been an improvement in the current reimbursement payment process and solutions for problems occurred in the old manual system. The operating cost is also resuced because less number of promotion staff and accountants are required.



ACKNOWLEDGEMENTS

The writer would like to thank dad and mom who gave me a budget for the CIS course and Dr. Boonyarit Pokrud, project advisor, for his suggestions and advice given for the project preparation.

Last but she would like to thank all the lecturers of the MS (CIS) program who have imparted their knowledge.



TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
ABSTRACT	i
ACKNOWLEDGEMENTS	iii
LIST OF FIGURES	vi
LIST OF TABLES	viii
I. INTRODUCTION	
1.1 Background of the project	1
1.2 Objectives of the Project	1
1.3 Scope of the Project	2
1.4 Deliverables	2
1.5 Project Plan	3
II. THE EXISTING SYSTEM	
2.1 Background of the Organization	4
2.2 The Existing Problems	8
2.3 The Existing Computer System	11
III. THE PROPOSED SYSTEM	
3.1 System Specifications	12
3.2 Requirement Analysis	13
3.3 System Design	19
3.4 Hardware/Software Requirements	28
3.5 Security and Controls	32

<u>Chapter</u>	<u>Page</u>
3.6 Cost/Benefit Analysis	36
IV. PROJECT IMPLEMENTATION	
4.1 Overview of Project Implementation	44
4.2 The Construction Phase	44
4.3 The Implementation Phase	45
V. CONCLUSIONS AND RECOMMENDATIONS	48
5.1 Conclusions	48
5.2 Recommendation	50
APPENDIX A ENTITY RELATIONSHIP DIAGRAM	
APPENDIX B DATA FLOW DIAGRAM	
APPENDIX C FEASIBILITY ANALYSIS	
APPENDIX D STRUCTURE CHART	
APPENDIX E PROCESS SPECIFICATION	
APPENDIX F DATA DICTIONARY	
APPENDIX G DATABASE DESIGN	
APPENDIX H WEB INTERFACE DESIGN	
APPENDIX I REPORT DESIGN	
BIBLIOGRAPHY	89

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
2.1 The Context Diagram of Existing System	9
2.2 Data Flow Diagram of Existing System	10
3.1 The Context Diagram of Proposed System	14
3.2 Function Decomposition of Proposed System	15
3.3 Data Flow Diagram of Proposed System	18
3.4 Network Configuration of the Proposed System	31
3.5 Break-even Analysis	41
3.6 Payback Period Analysis of the Proposed System	42
A.1 Context Data Model of the Proposed System	51
A.2 Key-Based Data Model of the Proposed System	51
A.3 Fully- Attributed Data Model of the Proposed System	52
B.1 Data Flow Diagram Reimbursement Data Entry Process	53
B.2 Data Flow Diagram Promotion Verification Process	54
B.3 Data Flow Diagram Payment Calculation Process	55
B.4 Data Flow Diagram Promotion Payment Process	56
C.1 Payback Period for Candidate 1	62
C.2 Payback Period for Candidate 2	63
C.3 Payback Period for Candidate 3	64
D.1 Structure Chart of Support Payment Activity Information System	65
D.2 Structure Chart of Reimbursement Data Entry	65

<u>Figure</u>	<u>Page</u>
D.3 Structure Chart of Promotion Verification	66
D.4 Structure Chart of Promotion Calculation	67
D.5 Structure Chart of Promotion Payment	67
H.1 Web Interface: Login Screen	81
H.2 Web Interface: Main Menu Screen	82
H.3 Web Interface: Data Entry Screen	83
H.4 Web Interface: Promotion Verification	84
H.5 Web Interface: Payment Calculation	85
H.6 Web Interface: Payment Inquiry	86
I.1 Report Design: Payment Summary Report	87
I.2 Report Design: Payment Analysis	88

LIST OF TABLES

<u>Table</u>	<u>Page</u>
3.1 Candidate System Matrix	22
3.2 Feasibility Analysis Matrix	25
3.3 Database Server Specifications	28
3.4 Server Software Specifications	29
3.5 Client Machine Specifications	29
3.6 Client Software Specifications	30
3.7 Network Peripheral Specification	30
3.8 Cost of Manual System	34
3.9 Five Years Accumulated Manual System Cost	34
3.10 Cost of Proposed System	36
3.11 Five Years Accumulated Computerized Cost	37
3.12 The Comparison of the Accumulated Manual Cost and Accumulated proposed Costs	37
3.13 Tangible Benefit of Proposed System	39
5.1 Break-even Analysis	49
C.1 Estimated Cost of Candidate 1	57
C.2 Estimated Cost of Candidate 2	58
C.3 Estimated Cost of Candidate 3	59
C.4 Payback Period for Candidate 1	60
C.5 Payback Period for Candidate 2	60
C.6 Payback Period for Candidate 3	60

<u>Table</u>	<u>Page</u>
C.7 Net Present Value Candidate 1	61
C.8 Net Present Value Candidate 2	61
C.9 Net Present Value Candidate 3	61
E.1 Process Specification of Process Reimbursement Data Entry	68
E.2 Process Specification of Process Assign Reimbursement ID	68
E.3 Process Specification of Process Record Customer Information	69
E.4 Process Specification of Process Record Promotion Information	69
E.5 Process Specification of Process Promotion Reimbursement Verification	70
E.6 Process Specification of Process Customer Budget Verification	70
E.7 Process Specification of Process Return Promotion Reimbursement Verification	71
E.8 Process Specification of Process Return Customer Budget Verification	71
E.9 Process Specification of Process Payment Calculation	72
E.10 Process Specification of Process Calculate Customer Budget	72
E.11 Process Specification of Process Confirm Customer Budget	73
E.12 Process Specification of Process Confirm Customer Payment	73
E.13 Process Specification of Process Promotion Payment	74
E.14 Process Specification of Process Generate Promotion Payment Summary	74
E.15 Process Specification of Process Generate Promotion Payment Analysis	75
F.1 Data Dictionary of Sales Support Activity Database	76
F.2 Data Dictionary of Data Flow Diagram	77

<u>Table</u>		<u>Page</u>
G.1	Structure of Customer Promotion Reimbursement Table	78
G.2	Structure of Customer Promotion Table	78
G.3	Structure of Customer Reimbursement Value Table	80
G.4	Structure of Customer Budget Table	80



I. INTRODUCTION:

1.1 P & G.

P&G is a recognized leader in the development, manufacturing and marketing of superior Fabric & home Care, Baby Care, Tissues, Beauty Care, Health Care, and Food products.

P&G markets approximately 250 brands to nearly five billion consumers in over 130 countries. These brands include big names such as Pampers, Tide, Ariel, Always, Whisper, Pantene, Bounty, Pringles, Folgers, Charmin, Downy, Olay, Crest, Vicks and Actonel.

Location

P&G Manufacturing (Thailand) Ltd. 622, 20th-22nd Floor, The Emporium Tower Sukhumvit Road, Kwaeng Klongton Khet Klongtoey Bangkok 10110 Thailand.

1.2 Objectives of the Project

The Objectives of this project are as follows:

- (1) To improve “promotion payment process” of the company, by increasing the efficiency of working system and reducing time-taken for the payment process.
- (2) To analysis the existing system and design a new system for the company payment process.
- (3) To design a promotion information database which is computer-based with massive data storage & management capability.
- (4) To eliminate the complication of paper work and filing system by using a computerization instead of a manual system.

- (5) To provide reliable information and to prepare the promotion reports to the Customer Business Development Department.

1.3 Scope of the project

The project is covered with major parts of promotion budget and promotion payment which can be describe as follows:

- (1) Promotion Information should be accurate and unique for each customer, provide the facilities for Customer Business Development and Credit Control and Cashier to check customer budget and customer promotion payment information.
- (2) The promotion payment should be automatically deducted from customer's promotion budget and generate the processing report in a period of time.
- (3) Promotion budget should have individual code and description of type of promotion and customer moreover the system must show the budget's balance and the historical data for the previous year budget.

1.4 Deliverables

The deliverables of the project on Sales support activity information system are as follows:

- (1) Data Modeling (ER Diagram)
- (2) Process Modeling (Context Diagram, Data Flow Diagram)
- (3) System Specification (Hardware and Software specification)
- (4) Cost Benefit Analysis (Payback Period, Net Present Value)
- (5) Input Design (Input Screen of proposed system)
- (6) Output Design (Report from proposed system)
- (7) Structured Design (Structured Chart)
- (8) Process Specification (Detail of each process of proposed system)

1.5 Project plan

After gaining an approval of the project proposal by the management, the development team would prepare a project plan, which is composed of three phases that run as follows:

- (1) System Analysis Phase, this consists of is the survey and planning of the system and project, the study and analysis of the existing business and information system, and the definition of business requirements and priorities for a new improved systems. The output of this phase would be a model for the business requirement and the proposed system in the form of a logical diagram called ERD (Entity-Relationship Diagram), and DFD (Data Flow Diagram).
- (2) System Design Phase, this is an evaluation of the alternative solutions provided and a detailed Specification of the computer-based solution. This phase, deals with the physical or implementation-dependent aspects of the system (the system's technical specifications) rather than logical emphasis done in system analysis. The main activity here is to design all system components including a web interface, reports, a database, the network, and program.
- (3) System Implementation Phase, this stage involves is the construction of a new system and the delivery activities which are typical done in the phased of system implementation, also user training and testing the developed programs before implementation must not be neglected. A training course for users is provided to illustrate a clear picture of the new system, and a system test is performed to guarantee that the new system operates smoothly.

II. THE EXISTING SYSTEM

2.1 Background of the organization

P&G Manufacturing has developed the Sales Support Activity (SSA) program to increase sale volumes, incentives to customers to buy more products and create an effective relationship between wholesalers and P&G. SSA program is launched with many types of Promotions for example Bouchures, Merchandisers program, premiums, newly opened store open incentives, Special discounts for specific brands, etc. Merchandisers program offer sale assistant for product recommendation in the stores. This is the sale assistant salary. The incentive would be 2% of first months total shipment and this applies to newly opened branches as well. Customers can reimburse the promotion expense after the promotion period has been completed.

Wholesalers who join this program are P&G customers as such Lotus, Top Supermarket and Sale Distribution Organizations etc. With the increasing number of wholesalers branch in the nation, the existing reimbursement process, which is a manually operated, is not very efficient and feasible. It drows more time in information collection to hard copies to respond to the customer requests with regards to promotion payment. The objective of this project is to introduce a new computerized system to support the operations and services by providing an on-line promotion payment request through a web interface, and a system to generate the system reports that help serve the budget management and promotion analysis processes.

P & G

(1) Customer Service Development (Sales)

The main objectives of this department are to identify business-development opportunities and persuasively communicate them to the customers, develop customer alliances that build our business. Gain expertise in account management, personnel development, and marketing strategies.

(2) Finance & Accounting

The main objectives of this department are to provide leadership for a variety of business decisions, analyze accounting data to identify opportunities for business improvement, maximize long-term profits, cash flow, and return on investments, work with Marketing, Customer Business Development (Sales), Product Supply, and other departments.

(3) Human Resources

The main objectives of this department are to focus on people and organizational development to improve business productivity and continuously enhance value to customers, employees, and shareholders, engage in the process of strategy development and deployment, recruitment, training, compensation, benefits, and general work process improvement, providing support for building strategic/efficient organizations with a work environment that attracts, motivates, and retains the most qualified individuals.

(4) Information Technology

The main objectives of this department are to deliver information and information systems technologies when and where they are needed to improve P&G's worldwide business results, lead development and application of information and

communication systems throughout P&G, manage hardware, software, and network infrastructure, provide consulting and operating services to all divisions.

Overview of the Current System

P&G uses a combination of manual and computer based system for its operations. The Finance & Accounting departments payment process for customers is very complicated because the varieties of promotions and the number of customers. Customer's information stored in databases are not well managed thus leading to redundancy. It is hard to trace customers and difficult to see the history of every customer's promotions. Salemen who set up a budget and make new promotion plans have to prepare voluminous promotion documents and calculate the balance of the budget within a year manually before making another promotion. Apart from this the Finance & Accounting Department would calculate the spent budget using Excel, closing of the accounting year in order to post data in the General Ledger System.

Problem of the Existing System

- (1) Various departments such as CBD, Credit Control, Cashiers in Finance & Accounting department have to handle large volumes of paper work as the most work process are done manually.
- (2) Data cannot be shared easily among different departments. This leads to the problem of data duplication, data redundancy and data inconsistency.
- (3) Not enough information is available for management to make right decisions for new promotions.
- (4) It is highly time-consuming to create budget reports and accounting information.

- (5) Presently data is incomplete and not adequate for supporting to Customer Business Development, Credit Control and Cashiers in Finance & Accounting Departments.



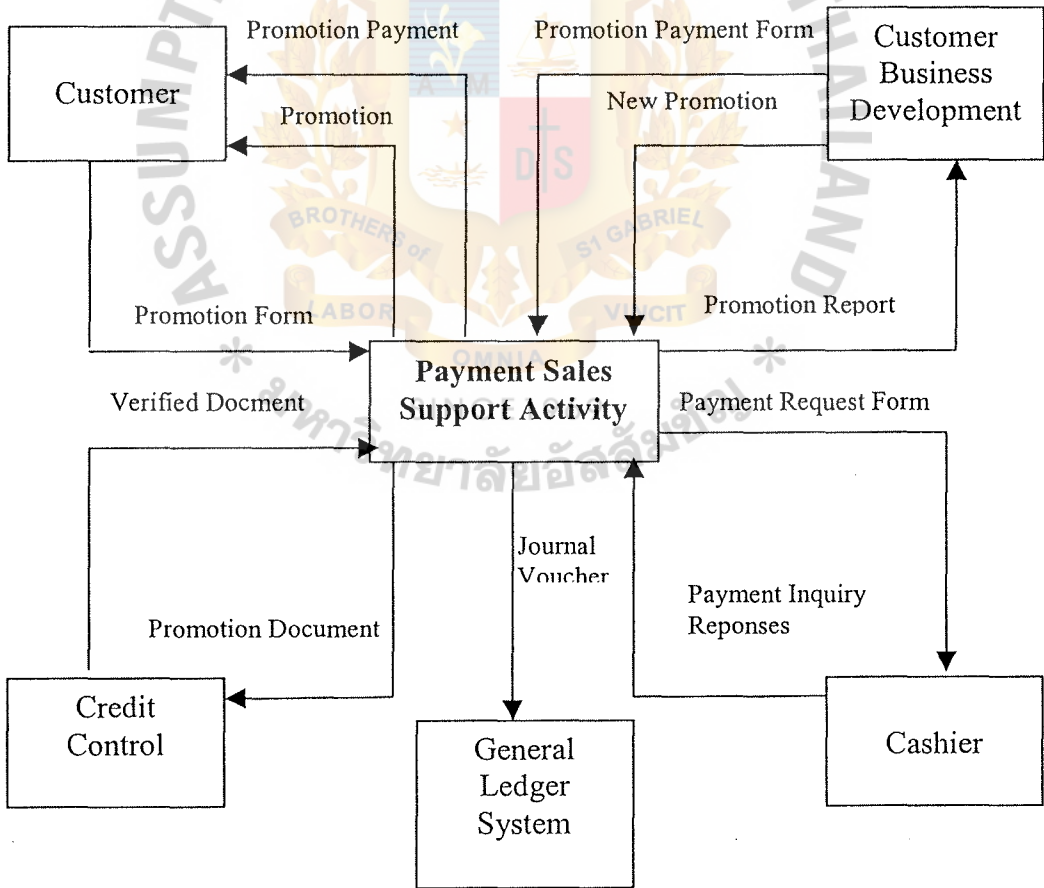
2.2 Intricate Existing Problems

At present Customer Business Development and Credit control units are responsible for handling the processes promotion reimbursement. The promotion information, such as customer promotions, budgets and promotion payments, comes from manual calculation using tools such as Excel. All reports and document are in paper form, and distributed through the Credit Control department and Cashiers, thus, the existing system produces excessive paperwork, and requires too many officers and staff to work continually. The results are redundant processes, human errors, and inefficient operations.

As shown in Figures 2.1 and 2.2, the current promotion reimbursement process begins from the customer who sends a promotion form to the Customer Business Development unit (CBD) to calculate the promotion budget and record promotion payments in excel work sheet. The Customer Business Development unit (CBD) prepares a promotion payment form to show budget and payment information with the promotion support documents, and forwards this to the Credit Control Department. The Promotion budget information and support documents are approved if a customer's budget is enough to reimburse for the each promotion and original support documents are correct. Then Credit control issues a payment request form from the cashiers and a journal voucher using Excel is produced to record the promotion information that makes a payment using the SAP system. The promotion reports are generated by the end of each month through SAP. With all these to this procedures, the budget data and promotion payment inquiry transactions are redundant and very time-consuming processes. Errors may occur due to the manual calculation of promotion budgets and payments, and causes problems for other department as information is not accurate.

Information stored in excel sheets is inflexible and takes a lot of time to update, search, and access which is not very conducive for efficient business operations.

The proposed system is designed to improve the process of promotion payments. The promotion form will be verified through a computerized system with a centralized database. Every customer's account and promotions will automatically be calculated with regards to promotion budget and cost. The promotion transaction inquiry can be done through on-line inquiry screen. The promotion payment report would also be generated automatically through the same system; making it more accurate and reliable. The time spent in updating, searching and accessing information would be reduced drastically through the new graphical user interface.



**Figure 2.1: The Context Diagram of Existing System
Payment Sales Support Activity.**

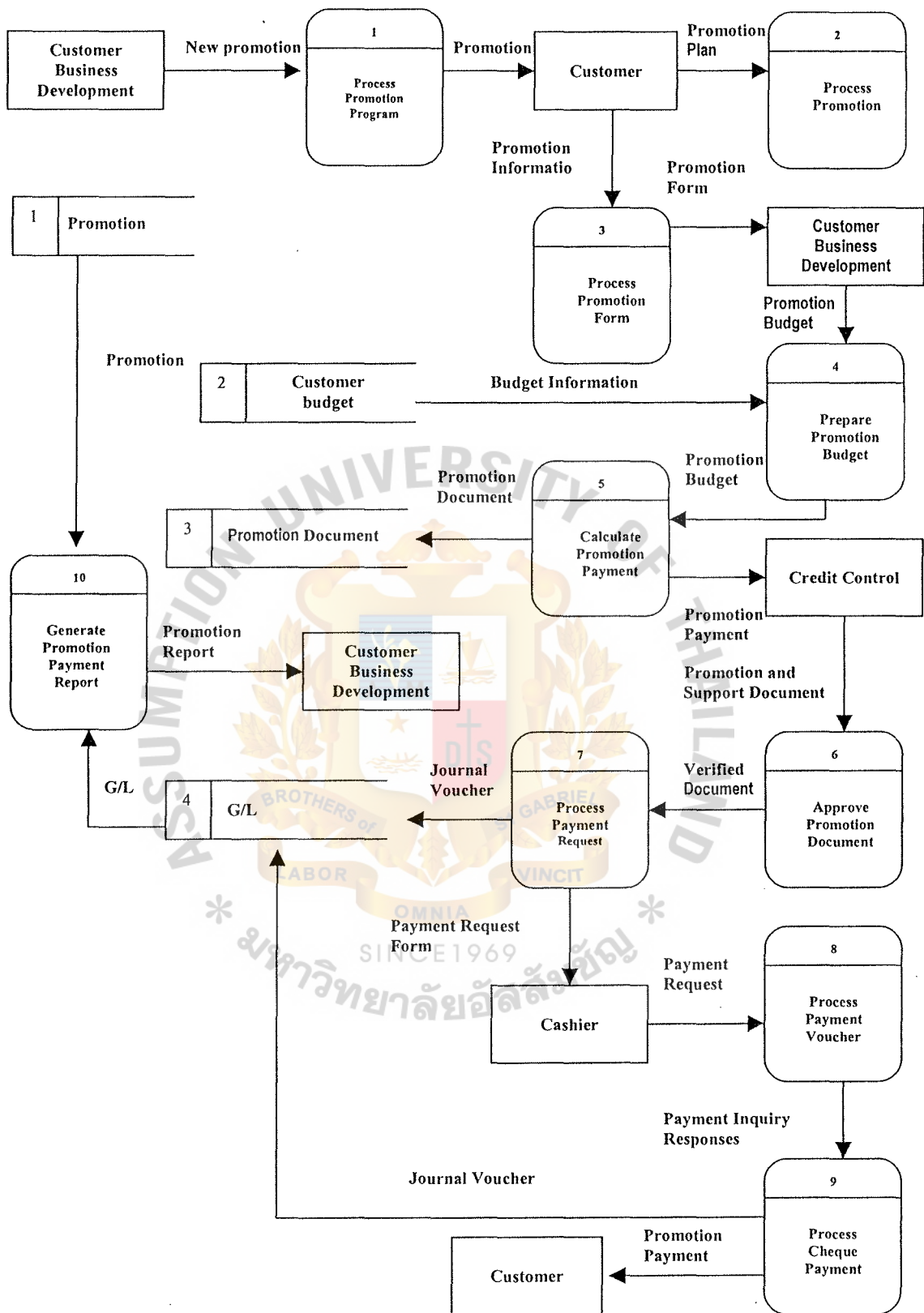


Figure 2.2: Data Flow Diagram of Existing System Sales Support Activity.

2.3 The Existing Computer Based System

In the present working environment, all teams and departments within P&G have their own PC (Personal Computer) to perform normal operations. All PCs are connected through a LAN (Local Area Network) and a Leased line is used for Internet and intranet. The computer resources such as printers and computer files are shared through the LAN, which is a Leased line as well.

The developed application applies the concept of Client/Server, technology that distributes applications and databases to a separate servers, and one backup server for data and system activity, is placed with the at information servers, which is totally maintained by the including Technology department which will be is responsible for managing and maintaining servers for all terminals.

Recently, P&G had to upgrade SAP/3 to 4.5 for all departments but the operation system software could not support the new application therefore, new PCs were purchased, and both operating system software and new application programs were installed and implemented. The Information Technology department is responsible for this project as well.

The existing computer hardware and software specifications of the Credit Control Department and CBD are Intel Pentium IV processors 1.5 G.5 GHz with 256 MB SDRAM and a 40 GB hard Drive, which run on Windows 2000 and office 2000 as the application program.

Referring to the present promotion payment process (the manual system with partial computerization), the existing personal computers use only MS Excel, which is a stand-alone program, to process and payment and budget information. This is not connected to any centralized server; therefore, it does not make use of the Client/Server technology.

III. THE PROPOSED SYSTEM

3.1 System Specifications

Based on the information in the previous chapter, the Credit control and CBD department requires an effective information system, which can accommodate the various processes of promotion payment, and solve the problems occurring in the existing manual system which is quite ineffective..

To achieve the specified objectives, the proposed Promotion System should have the following components:

- (1) A Database server serving as a web server using client/server technology and the World Wide Web to send files in the form of web pages to users, and apply an Intranet concept with the existing LAN to share company information and computing resources among departments.
- (2) Customer promotion payment database redesigned, developed and converted into a high performance database server, available for all responsible departments.
- (3) Promotion budget and payment database to be converted from unstructured spreadsheet application file (MS Excel) to an effective database format designed and developed on a database server, which is integrated with the Customer Information database.
- (4) A customer budget and promotion payment database replacing the existing manual system to facilitate processes and, to provide on-line inquiry and verification reimbursement information on a new graphical user interface with a even powerful database.

3.2 Requirement Analysis

The study of the existing system reveals many problems, such as a high operating cost and human errors, which ask for the newly computerized system to handle work more efficiently. After all problems are identified and evaluated, the business requirement for the new system can be summarized as follows.

- (1) The proposed system should facilitate to search their respective reimbursement information, and should result in decreasing the response time for requested information.
- (2) To calculate the promotion payments and budget, the new system should provide an embedded arithmetic function within the system to generate calculations and results automatically.
- (3) The developed system should enhance the existing system of promotion payments, where many human errors, are made through the use of an electronic form by providing a verification mechanism for any input from users.
- (4) The new system should provide an on-line verification screen to shorten the current verification process, which is done through a mailing channel.
- (5) To encourage a paperless office, the proposed system should provide the requested reports or documents to the users though a on-line information display screen.

To gain better understanding of the new system requirements, a logical model is drawn to depict the system this is independent of any technical implementations. In this project, data modeling and process modeling techniques are used to document business requirements, and to serve as a logical design for of the proposed system. The details of each technique are explained as below:

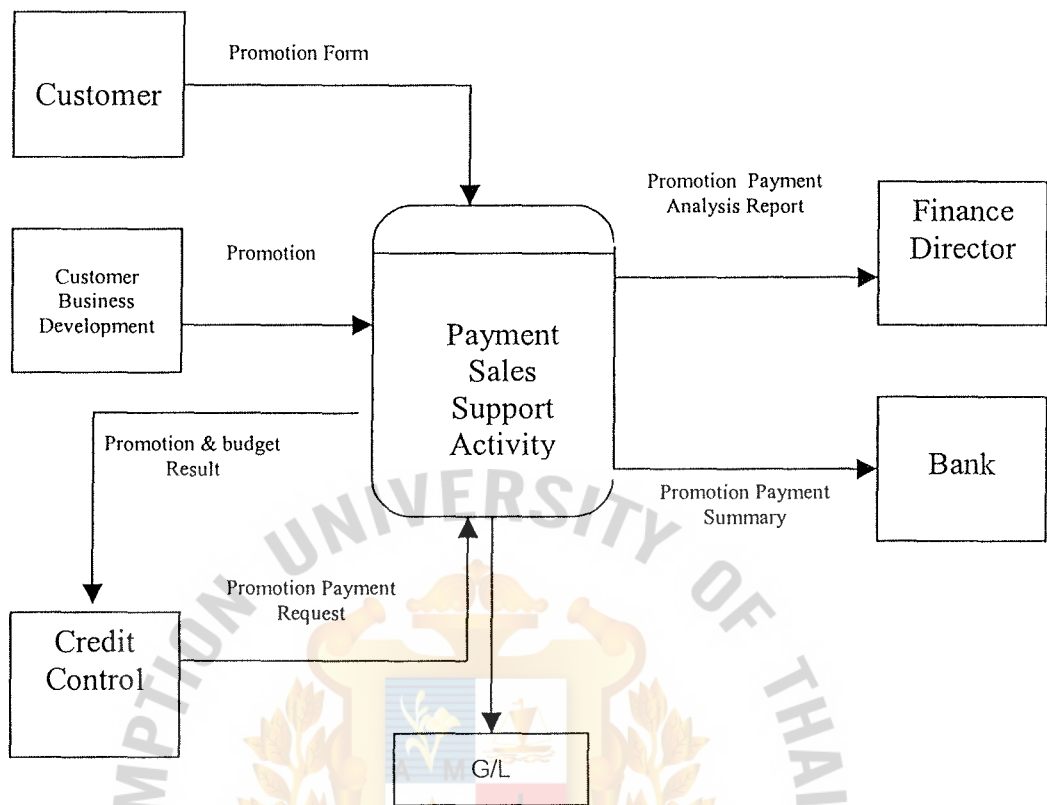


Figure 3.1. The Context Diagram of Proposed System.

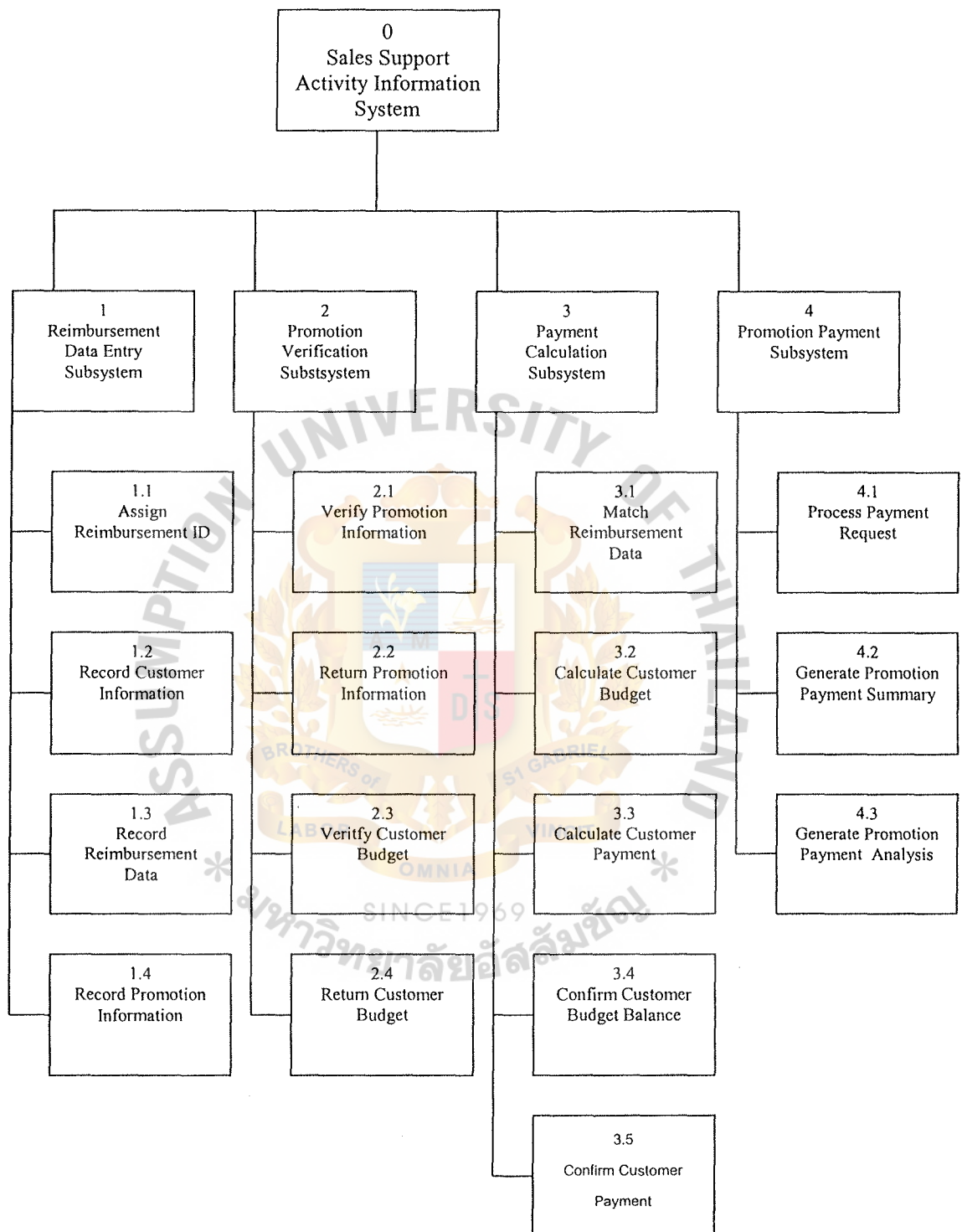


Figure 3.2. Function Decomposition of Proposed System.

By regarding the figures 3.1 and 3.2, a data flow diagram (DFD) can be drawn to depict the flow of data to, from and within the system. A data flow diagram has many levels of detail. The lower the level of data flow diagram, more details of the process as within the system would be present. The details of each process are explained as below:

(1) Reimbursement Data Entry

The Sales support activity Payment system starts with a Promotion Form from the customer, new the promotion administrator records the customer and reimbursement information through an electronic form, which is through a web interface. The recorded information is stored on the Customer reimbursement and Promotion reimbursement Database.

(2) Promotion Verification Process

The promotion administrator verifies the reimbursement transaction, which comes from the Customer's budget and Promotion reimbursement Database, and ensures that both of them are up to the required promotion standards, and that promotions have been done as per plan. Customer reimbursement is firstly verified by checking the customers budget balance with the total reimbursement allocated for the promotion and the customer. Thus all information is updated and the customer budget is also verified with budget balance available in the Customer Budget Database.

(3) Payment Calculation Process

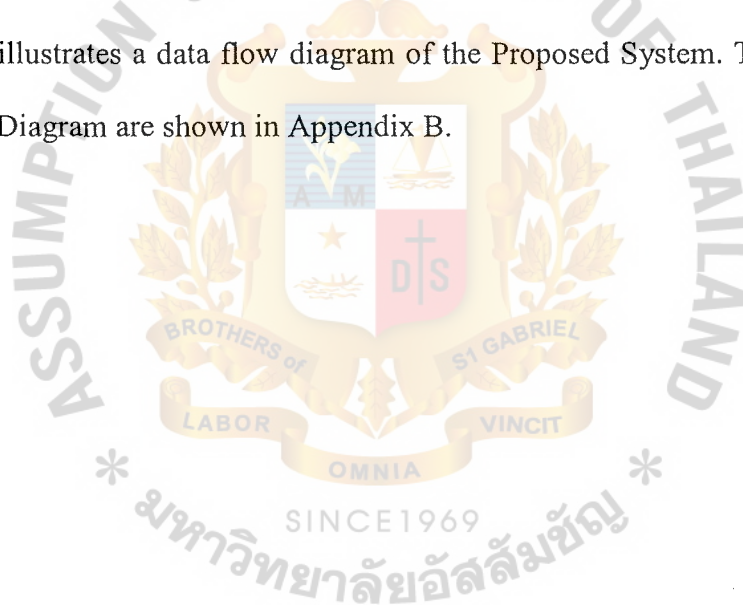
After reimbursement transactions are recorded and verified, Promotion Reimbursement Information is checked to match with the Customers Budget Information stored in the Customer Budget database. The results are used for calculation. Both budget and reimbursement require the

confirmation of calculationed results before storing results in the Customer Payment Database and sending them to the Credit Control Department.

(4) Promotion Payment

The Customer Payment data from Payment Database to prepare the payments to customer by Bank transfer. The Promotion Payment Summary Report that the Bank uses for transferring the payments to the customer is generated by the Credit Control Department and Customer Payment Information. The Promotion Payment Analysis is issued after the Bank transfer is done and is passed to Finance Director.

Figure 3.3 illustrates a data flow diagram of the Proposed System. The lower levels of Data Flow Diagram are shown in Appendix B.



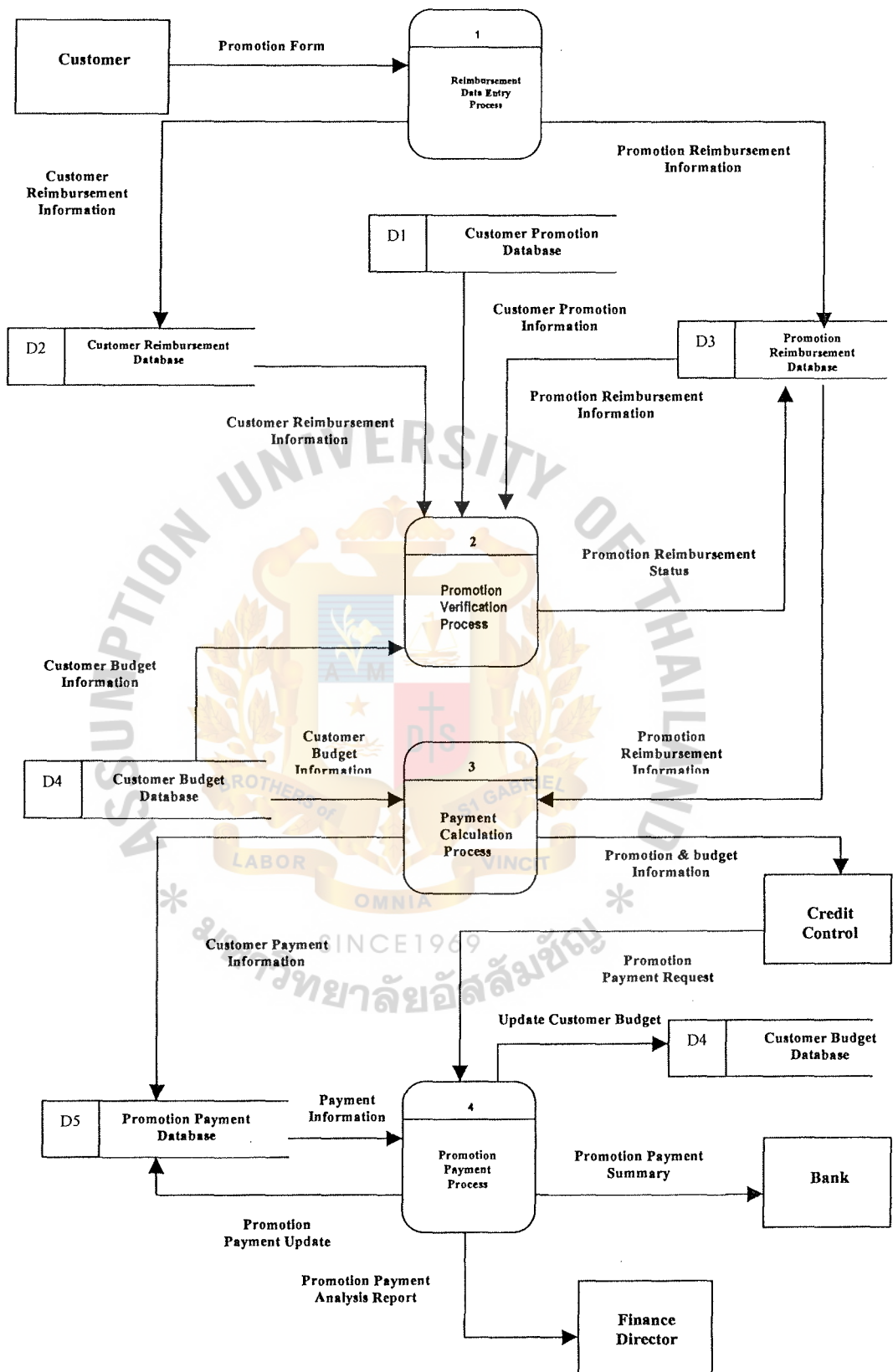


Figure 3.3. Data Flow Diagram of Proposed System.

3.3 System Design

The requirement analysis section primarily focuses on the logical aspects of the system, and secondly on system design work with emphasis on physical implementation aspects of the system. Various design techniques are applied to construct the system to accomplish the objectives of the project. The details of each design technique can be explained as follows:

Candidate Solutions

Given that the business requirements are established as mentioned in the previous section, alternative candidate solutions can be identified from the idea and opinion of the development team and user. Along with reviewing of system specification, the three candidate solutions can be defined as follows.

(1) Candidate 1: Resources Sharing LAN-File Server

Microsoft visual Basic 6.0 is a very popular development tool.

The existing programmers can use it without any technical assistance.

As a front end Microsoft product, it facilitates the programmer to develop the new applications quicker. The network architecture, in this file server will be used in this “candidate” to store data in the database, and the Client PC executes all database instructions. This implies that the entire database and tables may be transferred to and from the entire network. The database system, Microsoft Access 2000, is used in this system.

This “candidate” is easy to implement because Microsoft Visual Basic 6 is easily available for the programmer to use, and the current network architecture (Local Area Network (LAN).) also supports this

kind of configuration. Thus, this candidate takes less time to design and implement in the current environment.

(2) Candidate 2: Two Client/Server computing-Database Server

Linux and SQL are used as a Development Tool and Database Software respectively. This solution supports the multi-user environment and relative database technology. A Database Server is used to follow the concept of two-tier Client/Server Computing.

As the existing programmers have little experience about oracle, a training course is required to guide them in developing the new application with a powerful database server. However, this “candidate” provides the best way of developing the new system by introducing an effective development tool and a database software.

(3) Candidate 3: Two-Tier Client/Server Computing – Web Database

Active Server Page 3.0 and Microsoft SQL Server 2000 are used in this “candidate” to develop web-based Applications. The network architecture for this solution is similar to Candidate 2, which is base on Two Tier Client/Server Computing. The database servers not only as a system database, but also as a web server for the developed programs. This kind of architecture is called Corporate Intranet.

This “candidate” can be implemented very quickly because it just requires a web browser to run the developed application. No additional software is installed in the Clients PC. Active Sever Page (ASP) 3.0 is the best solution in developing an application, and Internet Information System (IIS) 5.0 serves as a web server to respond to any requests from the Client’s PC.

Table 3.1 illustrates the candidate system matrix of proposed system, which explores the characteristics of each candidate in more details.



Table 3.1 Candidate System Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
<p>Portion of System Computerized</p> <p>Brief description of the portions of the system that would be computerized in this candidate.</p>	Fully supported all relevant departments involved in redemption process.	Same as candidate 1	Same as candidate 1
<p>Benefits</p> <p>Brief description of the business benefits that would be realized for this candidate.</p>	Easy to develop with the existing tools.	Powerful DBMS and application enable user performing their tasks more efficiently and effectively.	Quickly implemented on client PC and easy application development.
<p>Servers and Workstations</p> <p>A description of the server and workstations need to support this candidate.</p>	Pentium IV, MS Window 2000 servers, and MS Window 2000.	Linux	Same as candidate 1
<p>Software tools needed</p> <p>Software tools needed to design and build the candidate (e.g., database management system, emulators, operating systems, languages etc.) Not generally applicable as applications software packages are to be purchased.</p>	Microsoft Visual Basic 6.0 MS Access 2000	PHP 4 SQL	MS ASP 3.0 MS Internet information System 5.0 MS SQL Server 2000
<p>Application software</p> <p>A description of the software to be purchased, built, accessed, or some combination of these techniques.</p>	Custom Solution	Same as candidate 1	Same as candidate 1
<p>Method of data processing</p> <p>Generally some combination of: on-line, batch, deferred batch, remote batch, and real-time.</p>	Database stored on server and processed on workstation.	Oracle uses a two-tier Client/Server architecture with a powerful database server.	Database stored and process on MS SQL Server and GUI on Workstation.
<p>Output Devices and Implications</p> <p>A description of output devices that would be used, input devices (e.g., network, preprinted form, etc.), and output considerations (e.g., timing constraints)</p>	Display Monitor HP laser printer	Same as candidate 1	Same as candidate 1
<p>Input Devices and Implications</p> <p>A description of input methods to be used, input devices (e.g. keyboard, mouse, etc.), special input requirements (e.g., new or revised forms from which data would be input), and input considerations (e.g. timing of actual inputs)</p>	Key board and mouse.	Same as candidate 1	Same as candidate 1
<p>Storage Devices and Implications</p> <p>Brief description of what data would be stored, what data would be accessed from exiting stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized.</p>	File Server with 10 GB storage capacity	Oracle SQL Server DBMS with 50 GB storage capacity.	MS SQL Server DBMS with 20 GB storage capacity.

Feasibility Analysis

After the candidate solutions are identified, a feasibility analysis can be done for each of the candidates. The following feasibility criteria should be taken into consideration when the development team selects the best solution to be implemented in the production environment.

(1) Operational feasibility

It is a measure of how well a solution for problems will work in an organization. It is also a measure of how people feel about the system/project. All candidates support the current business process but candidate 3 is the most feasible as it can be implemented very quickly with no additional software installations and hardware upgrades.

(2) Technical feasibility

It is a measure of the practicality of a specific technical solution and the availability of technical resources and expertise to support it. Candidate 2 is most difficult to implement in this regard because the current staff have little experience about its development tool, whereas Candidates 1 and 3 are easy to design and implement as the current programmers are fully experienced with Microsoft visual Basic 6.0 and Active Page Server 3.0.

(3) Economic feasibility

It is a measure of the cost-effectiveness of a project or solution. Candidate 2 is the cheapest because it is a free application for both the system software and the database application, however it is difficult to implement and maintain it. In contrast, Candidates 1 and 3 require only a moderate quantum of hardware and one system analyst to implement and operate the developed system.

(4) Schedule feasibility

It is a measure of how reasonable the project timetable is. Candidate 1 takes the least time to implement because the development tool, Microsoft Visual Basic 6.0, is already present the company and hence proves to be a rapid application development solution. Candidate 3 as well is a quick application development solution, however candidate 3 takes slightly more time to be designed and implemented for the proposed system, this is because the Linux and PHP are very complicated and hard to learn without any technical assistance.

After all four feasibility criteria assessments are applied for each of the candidates. A score is assigned to each feasibility criteria for the candidates, and multiplied by a weight, which is expressed in percentage terms, distributed to all four- feasibility criteria according to their degree of importance. The weighted scores of each feasibility criteria are summed up for each candidate to rank the best candidate solution for the proposed system.

The feasibility analysis shows that Candidate 3 has the highest scores in Operational, Technical and Economic Feasibility excepting the in Schedule Feasibility, which is topped by Candidate 1. Thus, Candidate 3 has the highest total score, and ranks as the best solution for the proposed system.

Table 3.2 displays the completed feasibility analysis matrix for each candidate. In addition, the full details of cost-benefit calculations (Economic Feasibility) are shown in Appendix C, which are all candidate Cost Table, Payback table and graph, and Net Present Value (NPV) table.

Table 3.2 Feasibility Analysis Matrix.

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
<p>Operational Feasibility Functionality. A description of the degree the candidate would benefit the organization and how well the system would work. Political. A description of how well received this solution would be by user management, user, and organization perspective.</p>	30%	<p>Full support to the user requirements in terms of functionality and business process.</p> <p>Score: 75</p>	<p>Same as Candidate 2</p> <p>Score: 75</p>	<p>Fully support to the user requirements with quick implementation because it does not require the additional software installation on client PC.</p> <p>Score: 95</p>
<p>Technical feasibility Technology. An assessment of the maturity, availability (or ability to acquire), and desirability of the computer technology needed to support this candidate. Expertise. An assessment of the technical expertise needs to develop, operate, and maintain the candidate system.</p>	20%	<p>Current technical staff has full experience with MS product therefore; the development process can be done easily and smoothly.</p> <p>MS Visual Basic 6.0 is a company standard and mature technology based on version number.</p> <p>Score: 80</p>	<p>Although current technical staff has a little experience with Linux software, the management fully supports training and using Linux software.</p> <p>Linux is a free software but requires continuous training courses for operating and maintaining the system because it has no guarantee of its future version.</p> <p>Score: 60</p>	<p>MS SQL Server is the simplest way to develop a database, and Internet Explorer is available in all PC's. It can be proved that it is suitable for a system with a large number of users. ASP is a generally accepted technology in developing Intranet application with Microsoft product.</p> <p>Score: 95</p>
<p>Economic feasibility Cost to develop: Payback period: Net present value: Detailed calculations:</p>	30%	<p>Approximately 407,000 Baht</p> <p>Approximately 2.5 Years</p> <p>Approximately 466,822 Baht</p> <p>See Appendix C: Score: 80</p>	<p>Approximately 631,500 Baht</p> <p>Approximately 1.5 Years</p> <p>Approximately 494,627 Baht</p> <p>See Appendix C: Score: 90</p>	<p>Approximately 542,500 Baht</p> <p>Approximately 2.4 Years</p> <p>Approximately 450,139 Baht</p> <p>See Appendix C: Score: 85</p>
<p>Schedule feasibility An assessment of how long the solution will take to design and implement.</p>	20%	<p>Approximately 3 months</p> <p>Score: 90</p>	<p>Approximately 6 months</p> <p>Score: 60</p>	<p>Approximately 5 months</p> <p>Score: 80</p>
Ranking	100 %	82.5	81	89

Structure Design

To facilitate development of the computerized system, a structure design technique is used to break up programs by hierarchical modules that result in a program which is easier to implement and maintain.

Data Flow Diagram (DFD) from requirement analysis section is used as an input of structure design. The logical DFD, which depicts the business requirement of the proposed system, is converted into a Program DFD, which illustrates the technical aspects of the proposed system. The output of the structure design is a partitioned data flow diagram and a structure chart, which is illustrated in Appendix D.

Process Specification

The purpose of a process specification is to define what the system does to transform inputs into outputs. It provides the details of a system process in a tabular format, this is easier to look at with respect to all related inputs, outputs, and relevant processes than in a diagram. All specified tables, which are processed from the logical data flow diagram, are shown on Appendix E.

Data Dictionary

To support system the design, data dictionary provides a list of terms and definitions for all data items and data stores within the developed system. The data dictionary for both entity relationship diagram and data flow diagram is shown on Appendix F.

Database Design

Referring to the data model (ERD) in the previous section, it requires some additional processes called data analysis to convert the designed logical data model into an implemented database. In data analysis, a normalization technique is used to

transform all data in ERD into an applicable database. The result of database designing is the database structure in tabular format, which is shown on Appendix G.

Input Design

To design a system input, it is important that we have information from a data flow diagram. These system inputs are represented as the data flows that connect external entities to process, and process to external entities. The selected attributes are reviewed to define the appropriate caption or label that clearly identifies these attributes appearing on the input screen. Input control is applied to ensure that the data input to the computer is accurate and that the system is protected against accidental and intentional errors and abuse, including fraud.

After reviewing input requirement, the reimbursement form is designed to accept the reimbursement data entry from system users. This form various is divided into two main parts, which are customer reimbursement and customer budget. The customer reimbursement data entry form captures the customer reimbursement information, whereas the promotion calculation form records information about the customer reimbursement and Budget Balance. The other input forms, such as Promotion Verification, inquiry and report generation, are also designed to serve the redemption tasks for users.

Output Design

Like system input, output requirements also come from a data flow diagram. These system outputs are easily identified and examined through the data flows that are connected to external entities. More details of the output design can be gathered by interviewing system users about their output requirements.

As shown on Data Flow Diagram of the proposed system, there are 3 reports that are designed to support system users and management. The system reports are 1.)

Promotion Payment Summary Report and 2.) Promotion Payment Analysis Report. The examples of the report design are in Appendix I.

3.4 Hardware/Software Requirements

In the existing operating system, the Customer Business Development Department and Credit Control Departments have only 2 PCs for promotion payment tasks, which are not connected to any servers. To develop a new system, it requires that the new hardware is a Database server, and one more backup server that can be used which the existing server located at the Information Technology Department. The new server should have a hardware specification, which can run on the existing servers software as it can be easily in stalled with little additional license fee. The hardware and software specification for a Database server are shown in Tables 3.3 and 3.4 respectively.

Table 3.3. Database Server Specifications.

Device	Specification
Processor Type and Speed	INTEL Pentium IV 1.8 A GHz or higher
Cache Memory	256 KB
Primary Memory	SDRAM 512 MB or higher
Hard Drive Capacity	50 GB or higher
CD-ROM Drive (X)	56 X
Floppy Drive	3.5" 1.44 MB
Display Monitor	Sony E230 17"
UPS	UPS, 500 VA Power Line

Table 3.4. Server Software Specifications.

Software	Specification
Operation System	Microsoft Window 2000 Server
Web Server	Microsoft Internet Information System 5.0
Application Server	Microsoft Active Server Pages
Database Server	Microsoft SQL server 7.0

With the current Lease line and intranet, the existing two personal computers (PCs) can be used as clients as they can support a web browser, Internet Explorer, to run the developed application, and few application programs, and Microsoft Office, to perform the general functions. The hardware and software specification for each client machine are shown in the Tables 3.5 and 3.6 respectively.

Table 3.5. Client Machine Specifications.

Device	Specification
Processor Type and Speed	INTEL Pentium III 1GHz or higher
Cache Memory	256 KB
Primary Memory	SDRAM 64 MB or higher
Hard Drive Capacity	6.4 GB or higher
Floppy Drive	3.5" 1.44 MB
CD-ROM Drive (X)	40x2x8x
Display Monitor	IBM SVGA 14"

Table 3.6. Client Software Specifications.

Software	Specification
Operating System	Microsoft Window 2000
Web Browser	Microsoft Internet Explorer
Application Software	Microsoft Office 2000

In addition, the connection between the Database server and client machine can be established through the existing LAN with hardly any configurations. Thus, there are no more investments in network peripherals. The network peripheral specification of the proposed system is shown on the Table 3.7.

Table 3.7. Network Peripheral Specification.

Device	Specification
Network topology	Star topology
Hub	100 Base-T Hub
Card	Network interface card
Interconnection	3 Com 12 100 Mbps
Wiring and cable	UTP 4 Pair CAT5

Moreover, users do not need to install the new application when the developed system is implemented. With the existing LAN and Intranet, the users can access the developed software application and execute the new application stored on the database server by using a web browser. The network architecture of the proposed system is shown on Figure 3.4.

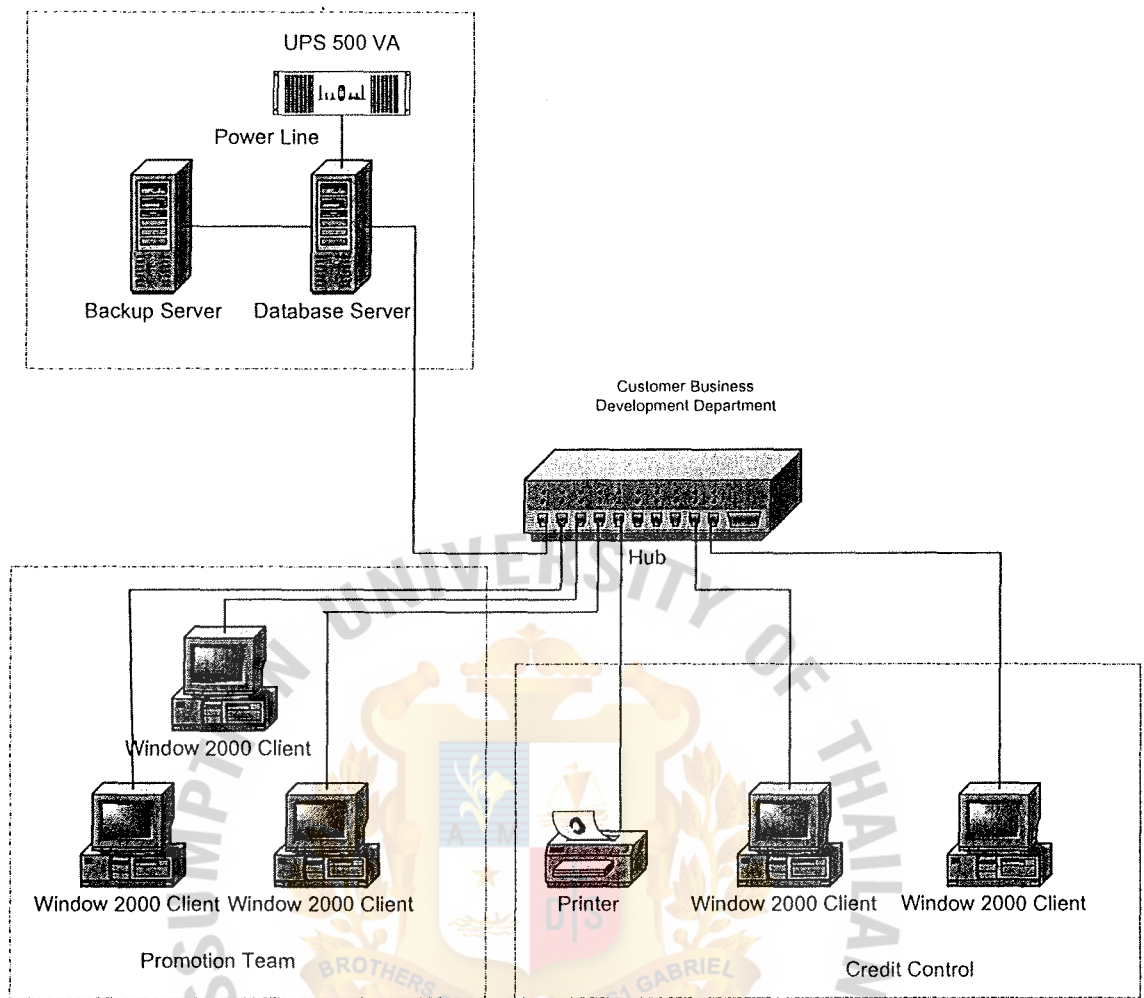


Figure 3.4. Network Configuration of the Proposed System.

3.5 Security and Controls

According to IT companies security policy; setting security as few company standards will be applied to every network to prevent hackers and alterations to the system.

(1) Implement strong password policies

The system has to implement user names and a password as primary step for the network system and requires a balance between strong and easily remembers passwords. Also, the practice indicates that these passwords must be changed every 60 days so as to reach a balance between changing them in a repetitive or predictable manner (for example, by assign a digit to the end of a password).

The password should also be made up of alpha and numeric characters to increase the possible combinations of password compositions.

(2) Configure firewalls

An open port is an open door. For a start, all ports would be closed and then open only those that are more critical are open. By performing penetration tests, IT department would be able to determine the vulnerabilities that a certain firewall configuration presents. Also, by performing independent assessments of the rule sets, their vulnerabilities can be determined.

(3) Update intrusion detection and anti-virus software

To keep up with hackers, it is imperative that intrusion detection system and anti-virus software are updated regularly, preferably on a daily basis. As analysts always claim “detection systems are only as good as the last update”

(4) Perform “Discover and Scan” Tests

The purpose of this test is to highlight all entry points from the Internet in to the internal network. A firewall is merely a door to the network; there may be many holes and entry points that the IT departments are unaware of. These supposedly “unknown” points are targets for hackers. The first step in securing these weak entry points is to identify them. This is not an easy task, and requires skilled “attack and penetration” experts to perform the discovery successfully.

3.6 Cost/Benefit Analysis

Before the proposed system is developed to replace the existing system, the detail of both costs and benefits of the new system compared with the old system must be illustrated. Therefore, the tables and the figures of the cost information are constructed to provide a clear picture of the comparison. Furthermore, the benefits of the new system are presented in both tangible and intangible terms. Finally, the analysis techniques, such as break-even analysis and payback period, will be applied to show the benefits over the cost after implementation of the proposed system.

(1) Cost of the existing system

The details of the existing system’s cost are calculated manually, and incur both fixed costs and annual operating costs. To operate the existing system, the Customer Business Developments and Credit Control Department requires a Promotion Support Manager to manage and control the promotion team operations, 2 Promotion Officers to prepare the promotion payment reports, and 2 Promotion Administrators to process the promotion form data, into Microsoft Excel and hard copies as well. Then the office supplies and miscellaneous expenses are very high in the manual system when

compared with the computerized system. The office equipment that the promotion uses in its operation is one laser printer for printing the promotion reports, and 4 calculators to calculate the promotion and budget data. The details of the existing system cost are summarized on Table 3.8.

Table 3.8. Cost of Manual System, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Laser Printer 1 unit @12,000	2,400	2,400	2,400	2,400	2,400
Calculator 4 unit @1,200	4,800	-	-	-	-
Total Fixed Cost	7,200	2,400	2,400	2,400	2,400
Operating Cost					
Salary Cost:					
Promotion Support Manger 1 person @ 22,000	22,000	24,200	26,620	29,282	32,210
Promotion Officer 2 person @ 12,000	24,000	26,400	29,040	31,944	35,138
Promotion Administator 2 person @ 10,000	20,000	22,000	24,200	26,620	29,282
Accountant 3 person @ 13,000	39,000	42,900	47,190	51,909	57,100
Total monthly salary Cost	105,000	115,500	127,050	139,755	153,731
Total Annual salary Cost	1,260,000	1,386,000	1,524,600	1,677,060	1,844,766
Office Supplies & Miscellaneous Cost:					
Stationary 36,000 Per Annum	36,000	39,600	43,560	47,916	52,708
Paper 42,000 Per Annum	42,000	46,200	50,820	55,902	61,492
Utility 36,000 Per Annum	36,000	39,600	43,560	47,916	52,708
Miscellaneous 24,000 Per Annum	24,000	26,400	29,040	31,944	35,138
Total Annual Office Supplies & Miscellaneous Cost:	138,000	151,800	166,980	183,678	202,046
Total Annual Operating Cost:	1,398,000	1,537,800	1,691,580	1,860,738	2,046,812
Total Annual System Cost:	1,405,200	1,540,200	1,693,980	1,863,138	2,049,212

Table 3.9. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	1,405,200.00	1,405,200.00
2	1,540,200.00	2,945,400.00
3	1,693,980.00	4,639,380.00
4	1,863,138.00	6,502,518.00
5	2,049,212.00	8,551,729.80
Total	8,551,729.80	-

(2) Cost of the proposed system

The detail of the proposed system cost will be calculated manually, and this incurs both fixed cost and annual operating costs. To operate the computerized system, the Customer Business Development and Credit Control Department requires new IT specialists to implement and maintain the computerized system, 1 Promotion Support Manager to manage and control the promotion team operations, and 2 Promotion Administrators to process the promotion form data, promotion payment data into Ms Excel and hard copies. The system reduces the number of promotion officers and accountants. Also the office supplies and miscellaneous expenses are lower with the newly computerized system when compared with the manual system.

Promotion teams can use the existing of office equipments but the computerized system requires some investment in new computer hardware and software. The maintenance fee for new hardware and software will increase and the salary of the IT specialists is paid in the initial implementation of the proposed system.

The details of the proposed system costs are summarized on Table 3.10.

Table 3.10. Cost of Proposed System, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Database Server 1 unit @60,000 Baht	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
Clients Machine	-	-	-	-	-
UPS 1 unit @6,000 Baht	1,200.00	1,200.00	1,200.00	1,200.00	1,200.00
Total Hardware Cost:	3,200.00	13,200.00	13,200.00	13,200.00	13,200.00
Software Cost:					
Server Software 1 unit @20,000	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00
Client Software	-	-	-	-	-
Total Software Cost:	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00
People-Ware Cost:					
System Analyst (6 months @ 18,000.00 Baht)	108,000.00	-	-	-	-
Database Administrator (2 months @ 25,000.00 Baht)	50,000.00	-	-	-	-
Network Administrator (1 month @ 20,000.00 Baht)	20,000.00	-	-	-	-
Total People-Ware Cost:	178,000.00	-	-	-	-
Maintenance Cost:					
Hardware Maintenance Cost	-	5,000.00	5,000.00	5,000.00	5,000.00
Software Maintenance Cost	-	3,000.00	3,000.00	3,000.00	3,000.00
Total Maintenance Cost	-	8,000.00	8,000.00	8,000.00	8,000.00
Implementation Cost:					
Training Cost:	20,000.00	-	-	-	-
Installation Cost:	5,000.00	-	-	-	-
Total Implementation Cost:	25,000.00	-	-	-	-
Total Fixed Cost	220,200.00	25,200.00	25,200.00	25,200.00	25,200.00
Operating Cost					
Salary Cost:					
Promotion Support Manger 1 person @ 22,000	22,000.00	24,200.00	26,620.00	29,282.00	32,210.20
Promotion Administrator 2 person @ 10,000	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
Accountant 1 person @ 15,000	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
System Administration:					
System Analyst (1 person @ 18,000.00 Baht)	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Network Administrator (1 person @ 20,000 Baht)	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
Total monthly salary Cost	95,000.00	104,500.00	114,950.00	126,445.00	139,089.50
Total Annual salary Cost	1,140,000.00	1,254,000.00	1,379,400.00	1,517,340.00	1,669,074.00
Office Supplies & Miscellaneous Cost:					
Stationary 30,000 Per Annum	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
Paper 18,000 Per Annum	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Utility 35,000 Per Annum	35,000.00	38,500.00	42,350.00	46,585.00	51,243.50
Miscellaneous 20,000 Per Annum	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
Annual Office Supplies & Miscellaneous Cost:	103,000.00	113,300.00	124,630.00	137,093.00	150,802.30
Total Annual Operating Cost:	1,243,000.00	1,367,300.00	1,504,030.00	1,654,433.00	1,819,876.30
Total Annual System Cost:	1,463,200.00	1,392,500.00	1,529,230.00	1,679,633.00	1,845,076.30

Table 3.11. Five Years Accumulated Computerized Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	1,463,200.00	1,463,200.00
2	1,392,500.00	2,855,700.00
3	1,529,230.00	4,384,930.00
4	1,679,633.00	6,064,563.00
5	1,845,076.30	7,909,639.30
Total	7,909,639.30	-

(3) Comparison of System Cost

After both exiting system cost and proposed system cost are considered, a comparison table is constructed to reveal the cost savings by implementing the proposed system. The figures after comparison of the system costs are summarized on Table 3.12.

Table 3.12 The Comparison of the Accumulated Manual Cost and Accumulated Proposed Costs, Baht.

Year	Accumulated Manual Cost	Accumulated Proposed Cost
1	1,405,200.00	1,463,200.00
2	2,945,400.00	2,855,700.00
3	4,639,380.00	4,384,930.00
4	6,502,518.00	6,064,563.00
5	8,551,729.80	7,909,639.30

(4) Benefit Analysis

The benefit of the proposed system can be classified into tangible and intangible benefits. The Tangible can be expressed in monetary terms, whereas the intangible benefits are qualitative, and difficult to measure. The details of these benefits can be summarized as follows:

Tangible Benefits

The tangible benefit of the proposed system is shown on Tale 3.13, and grouped into three main categories as follows:

(a) Cost Saving

The proposed system requires lesser salary expenses, office supplies expenses, and miscellaneous expenses compared with the manual system. The paperwork is reduced because the databases of new system are stored in a web base.

(b) Operating Time Improvement

The newly computerized system improves the operating time as the promotion team can key in reimbursement data in to the system and get all the promotion and budget information for promotion payments within a minute. In addition customers receive payment transfers to their Bank accounts by a Payment Summary Report which is sent to the Bank by E-mail.

(c) Elimination of the possible long run cost

The proposed system provides faster promotion payment and handles higher volumes of data in the future due to expansion to department stores.

Table 3.13. Tangible Benefit of Proposed System, Baht.

Benefit	Price
Cost Saving	
<u>Salary Cost:</u>	
2 Promotion Officer (12,000 Baht per month)	288,000.00
2 Accountant (13,000 Baht per month)	312,000.00
Total salary Cost	600,000.00
<u>Office Supplies Cost:</u>	
Stationary (500 Baht per month)	6,000.00
Paper (2,000 Baht per month)	24,000.00
Utility (83.34 Baht per month)	1,000.00
Total Office Supplies Cost:	31,000.00
<u>Miscellaneous Expenses:</u>	
Miscellaneous (333.33 Baht per month)	4,000.00
Total Miscellaneous Expenses:	4,000.00
Total Cost Saving:	635,000.00
<u>Operation Time Improvement:</u>	
2 Promotion Officer (7,000 Baht per month)	96,000.00
2 Accountant (9,000 Baht per month)	108,000.00
Total Operation Time Improvement	204,000.00
<u>Elimination of the possible long run cost</u>	
2 Promotion Administrative (10,000 Baht per month)	240,000.00
2 Promotion Officer (12,000 Baht per month)	288,000.00
1 Accountant (13,000 Baht per month)	156,000.00
Total long run cost Elimination	684,000.00
Total tangible Benefit:	* 1,523,000.00

Intangible Benefit

The intangible benefits of the proposed system are customer satisfactions, better decision making through accuracy in promotion and budget information and improvement in work performance.

(5) Break-Even Analysis

Break-even Analysis shows the point where the accumulative cost of the existing system is equal to the accumulative costs of the proposed system. At the beginning, the cost of the proposed system is higher than the cost of the existing system. This difference comes from the development cost incurred during the first year of the new system implementation. But, in the long run, the proposed system can reduce the annual operating costs, especially salary and office supplies.

The break-even point of the proposed system is depicted on Figure 3.5. The proposed system cost is less than existing system cost after 2 years. Thus, it can be concluded that the break-even point will occur approximately 1 year after the system has been operated. This result is satisfactory for investing and implementing the proposed system because it will incur lesser operating costs than the existing system in the long run.

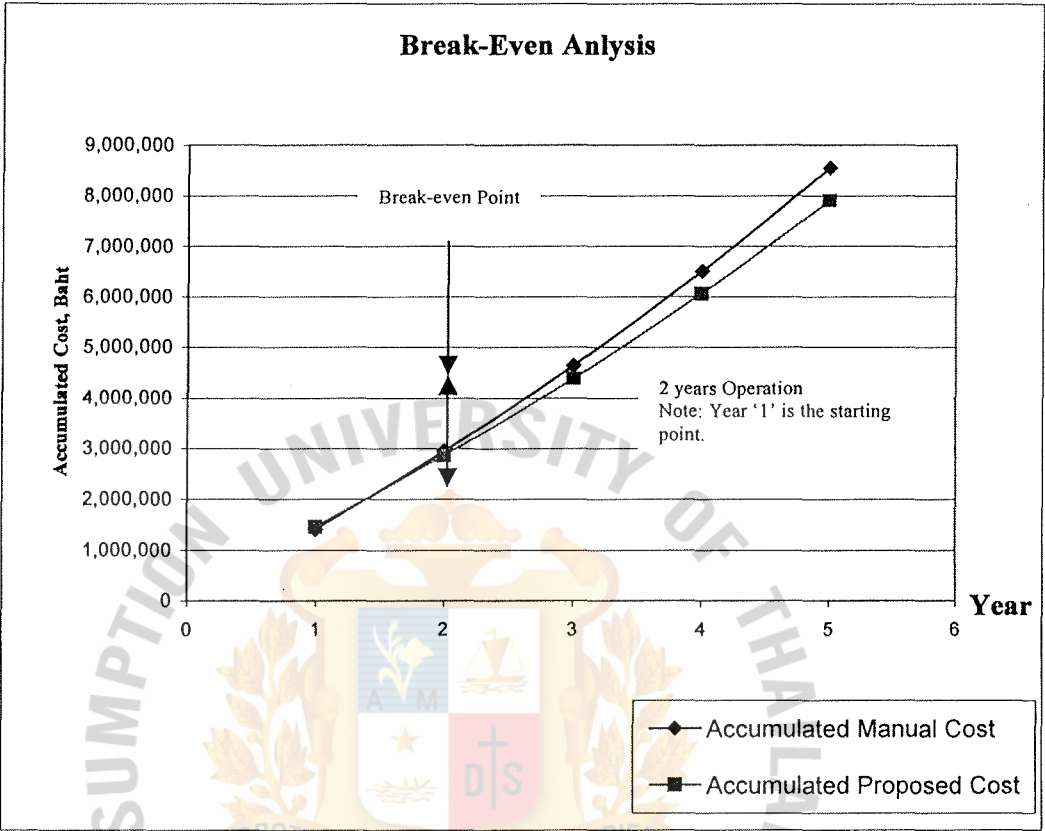


Figure 3.5. Break-even Analysis

(6) Payback Period

Payback period is a commonly used technique to assess the value of investment. Generally, the payback period is the period that cash inflow covers the initial investment. To reflect the real value of money, the time value of money concept is also applied in this analysis. A discount rate is required to calculate the value of all costs and benefits after two years compared to present value at the present time period. If the payback period is performed without time adjusted the costs and benefits (time value of money), non-time-adjusted paybacks tend to over-optimistic and misleading.

After the lifetime cost and benefits are discounted, payback period can be computed. The acceptance of the project occurs only when the project's payback period is less than or equal to the predefined payback period guideline, which is generally 3 years.

Figure 3.6 shows the payback period of the proposed system that has already been calculated to evaluate the candidate solution (See the full details of payback calculation in Table C.6 on Appendix C). The lifetime costs are gradually increasing over the five-year periods as operating costs are being incurred at a much faster pace. The result of payback period is 2.6 years, which is less than the predefined maximum desired payback period (3 years). Thus, this project is acceptable to be implemented with the return on investment to recover the initial investment within two years.

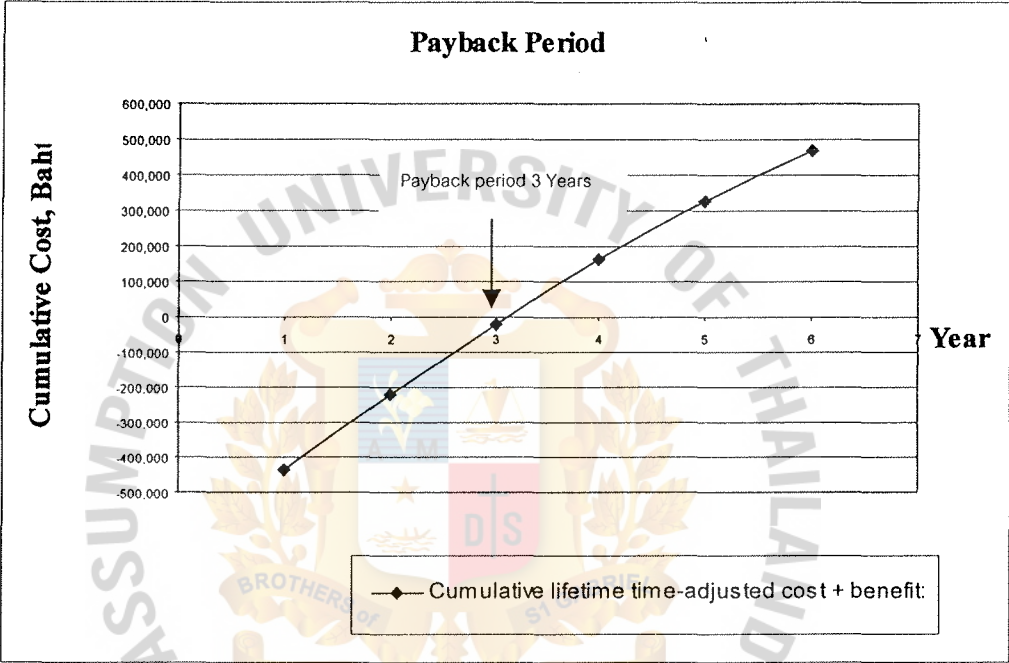


Figure 3.6 Payback Period Analysis of the Proposed System.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

Once a system is designed, its implementation should naturally follow. Perhaps the most important factor leading to a successful system application lies with the training and educating of personnel in the system environment. The best-designed system may fail if the users are unfamiliar or unable to properly operate it. The system should be tested to verify its feasibility, accuracy, and reliability. Should any problems arise, the system may require conversion and therefore a flexible system design is preferred. An ongoing maintenance and auditing of the system components serves to provide continual feedback on the status of successful implementation and operation of the system.

This part describes the construction and implementation phases of system development. System construction is the development new system, installation Hardware and Software Acquisition, Personnel Training, Site and Data Preparation, testing of web interface system components and conversion plan. System implementation is the delivery of that system into production (meaning day-to-day operation).

4.2 The Construction Phase

The purpose of the construction phase is to develop and test a functional system that fulfills business and design requirements and to implement the interfaces between the new system and existing production systems. The construction phase consists of four tasks as follows:

(1) Hardware and Software Installation

The new database server and software must be installed with the existing PCs in Credit Control Department and Promotion Team.

(2) Personnel Training

Training is arranged for Promotion Team and accountants of Credit Control Department. The user must know how to add, update, enquire, and deleting the Promotion Reimbursement Data.

(3) Site and Data Preparation

The IT Department is responsible for connect as the new Database Sever with the existing Promotion Team and Credit Control PCs. LAN connection and other facilities are ready for the implementation of the newly computerized system.

(4) System Testing

Testing is conducted to ensure that the newly computerized system is working properly. Unit Testing, System Testing, and Integration Testing are done to fulfill this objective.

4.3 The Implementation Phase

The purpose of the implementation phase is to smoothly convert the existing system to the new system. Thus, the implementation phase delivers the production system to operation. The functional system from the construction phase is the key input to the implementation phase. The system implementation consists of the following tasks:

(1) Conduct System Test

The primary input to this task is the program comprising of the new system to make sure that everything works together properly. The system test is done using the test data. The system test results in required modifications to programs, thus, once again prompting the return to a construction phase

task. This iteration would continue until a successful system test was experienced.

(2) Prepare Conversion Plan

The conversion plan is developed using the design specifications for the new system. This task is triggered by the completion of a system test. The principal deliverable is the conversion plan that will identify the database to be installed, end-user training and documentation that need to be developed, and strategy for converting from the existing system to the new system.

The conversion plan may include one of the strategies: abrupt cut-over, parallel conversion, location conversion and staged conversion. The existing front office management information system is the legacy-computerized system that runs on windows 2000 but the end-users are more familiar with the Microsoft Platform however the promotion team does not have enough knowledge of the new web interface system and database management system. The abrupt cut-over is suitable because as the end-user is familiar with the Windows Platform. Thus, the appropriate conversion plan should be a parallel conversion in which the existing system is operated at the same period. This ensures that all major problems in the new system have been solved before the existing system is discarded.

The conversion plan also typically includes a systems acceptance test, which is the final opportunity for end-users, management and information systems operation management to accept or reject the system. The proposed system acceptance test is performed by the end-users using real data over an extended period. The system acceptance test consists of three levels which are as follows:

- (a) Verification testing runs the system in a simulated environment using test data.
- (b) Validation testing runs the system in a live environment using real data.
- (c) Audit testing certifies that the system is free of errors and is ready to be placed into operation.

(3) Installing Databases

The purpose of this task is to replace the new system databases from the existing system. The principal deliverable of this task is the restructuring of existing data that has been populated in the databases for the Sales Support Activity information system.

(4) Training Users

Converting to a new system necessitates that the system users be trained and provided with documents (user manuals) that guide them through using the new system. The end-users must be trained to use equipment and to follow the procedures required in the new system. The principal deliverable of this task is user training and documentation. Every possible situation and proper procedures must be documented and explored.

(5) Convert to New System

The key input to this task is the conversion plan which is created in the implementation phase task. The principal deliverable is the operational system that is placed into the production business. This task also involves a system audit. The system users are the source of majority of the feedback used to measure the system's acceptance. Regardless, the feedback which is will be used to help us to implement the new system project.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The existing Sales Support Activity System of P&G is the legacy system. The purpose of this project is to develop and improve the existing promotion payment system to a newly computerized system, which is more effective and well designed. The new computerized system provides a lot of tangible and intangible benefits, such as data accuracy, efficiency and control of the customer promotion budget. In order to develop the proposed system, P&G has to invest some money to support the changes in both software and hardware. Although, the initial cost is high, the cost and benefit analysis shows that by considering the cumulative lifetime time-adjusted Costs + Benefits, we can estimate that the break-even point will occur approximately 1.5 years after the proposed system begins to operate. The payback period for the investment by P&G in the proposed system would lapse within 2.6 years, after this that accrued benefits will overtake the accrued and continuing costs.

The proposed system will be able to solve the previous enumerated problems and improve the sequence of the customer reimbursement workflow for input, data processing and output including report process. Authorized users will be able to access data, which is more accurate, no redundancy and consistency and also ability to operate with the system effectively and efficiently is possible. The proposed system can reduce a lot of time for processing such as Reimbursement data Entry, Promotion Verification, Payment Calculation and Promotion Reports. Table 3.12 shows the estimated time spent on each process which the proposed system compared to the existing system.

Table 5.1. Break-even Analysis.

Process	Existing System	Proposed System
Reimbursement Data Entry Process	8 Minutes	2 Minutes
Promotion Verification Process	1 Hour	5 Minutes
Payment Calculation Process	12 Minutes	5 Minutes
Promotion Payment Process	4 Days	1 Day

The details of operation time improvement can be summarized as follows:

- (3) Reimbursement Data Entry Process: The existing system spends 8 minutes to input reimbursement data in to MS Excel; the proposed system provides the graphical user interface to ease the input process of reimbursement data through a web interface form.
- (4) Promotion Verification Process: The existing system consumes 1 hour to verify the Customer Reimbursement with Customer Promotion and Customer Budget. With the new system, the on-line verification screen is introduced to verify the customer reimbursement and customer budget information through a web base database.
- (5) Payment Calculation Process: This process is also a time-consuming task to accomplish for the existing system. The time spent to search the budget and payment information of the incoming reimbursement transaction from database, manual calculation of reimbursement and budget, and checking the calculations and results before recording into MS Excel.
- (6) Promotion Payment Process: The existing system uses MS Excel to prepare payment reports, issue cheques and mailing to customers. It consumes too much time to finish the reports and the result must be checked with the raw data for preparing the cheques and mailing to customers. This process can

be improved through the report generation feature embedded in the proposed system. The payment summary report can be generated and sent automatically through the Bank. The Bank responds to by transferring payments to the customers.

5.2) Recommendations

At present, Sales Support Activity Information System is dealing with customers. It will be faster if the customer database and customer budget are interfaced with SAP and customer master information by using SAP as well. When new customer is created in the customer master data of Sales Support Activity Information System can update data immediately.

Another enhancement possible is the improvement through an on-line reimbursement form. At the moment the Customer Business Development Department is responsible for the on-line reimbursement for customers who can log in to the Sales Support Activity Information System, then fill the reimbursement information form on the web. This practice must be considered for security reason as the information is vulnerable to be misused by unauthorized persons or hackers.



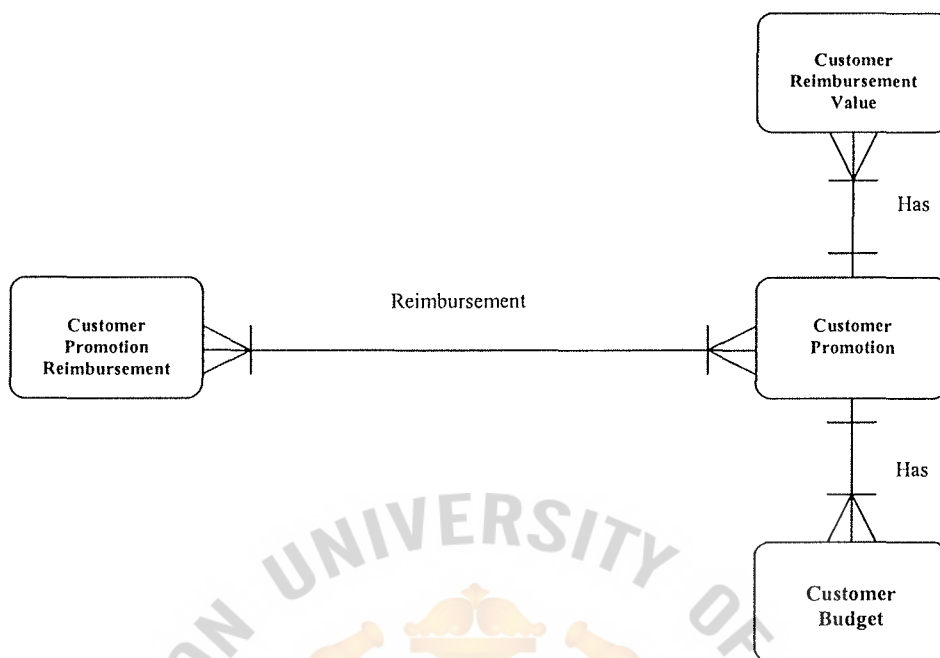


Figure A.1. Context Data Model of the Proposed System.

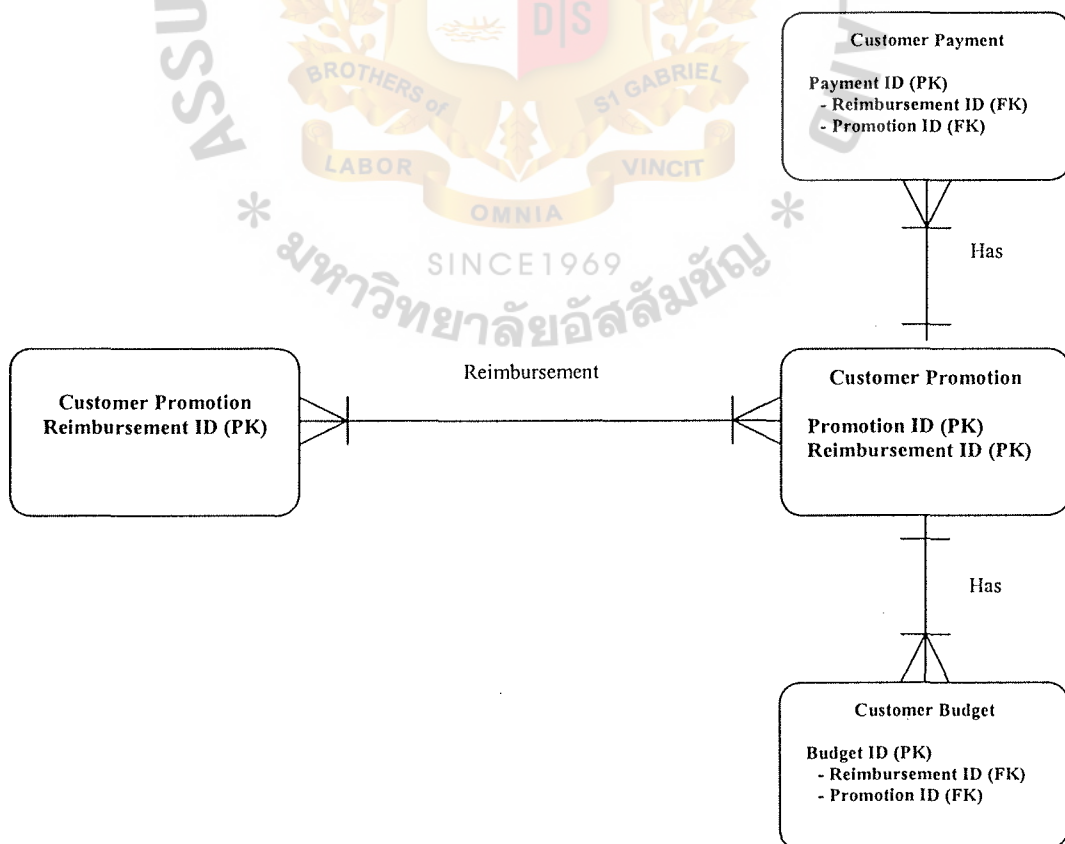


Figure A.2. Key-Based Data Model of the Proposed System.

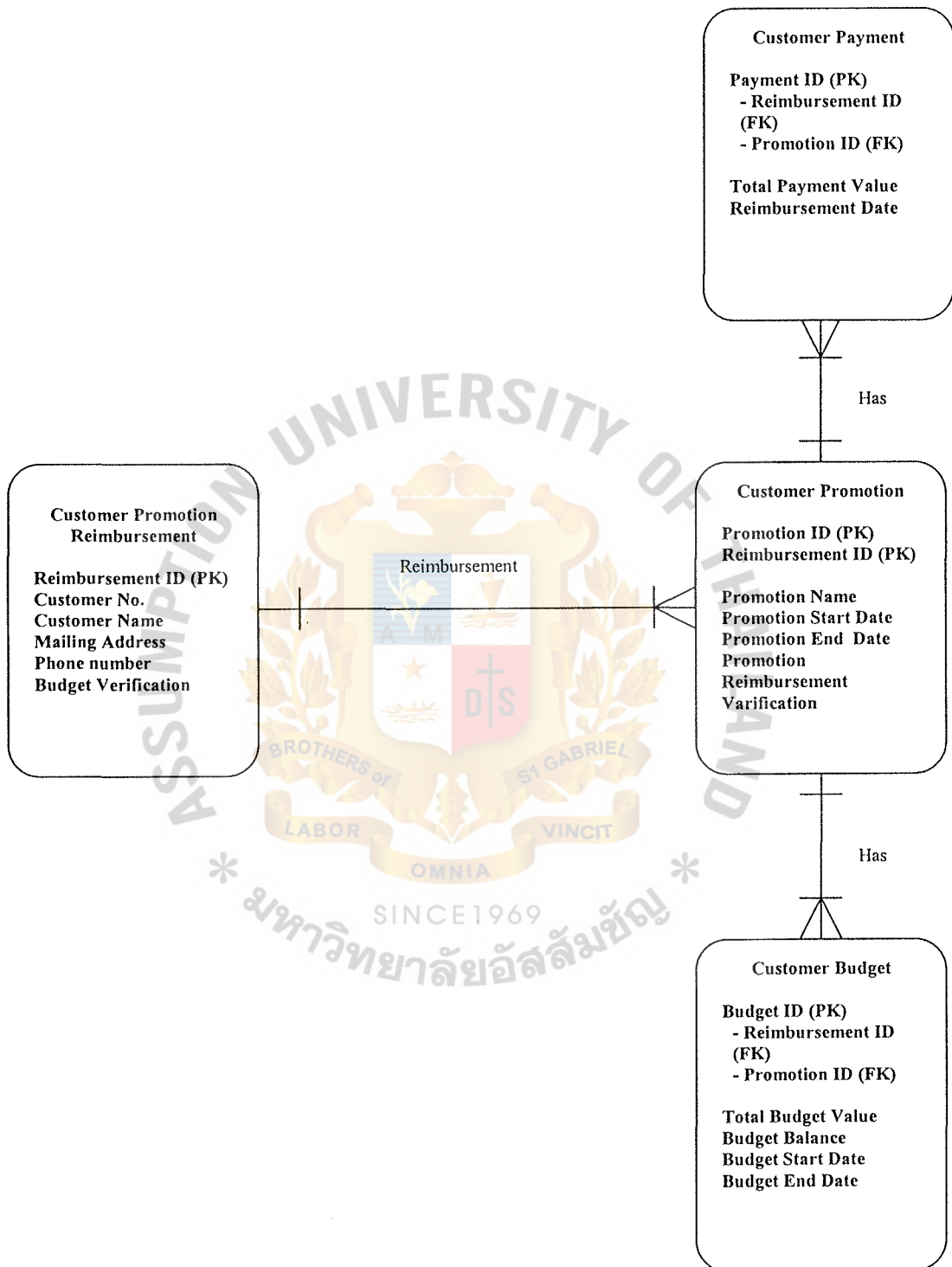


Figure A.3. Fully- Attributed Data Model of the Proposed System.



APPENDIX B

DATA FLOW DIAGRAM

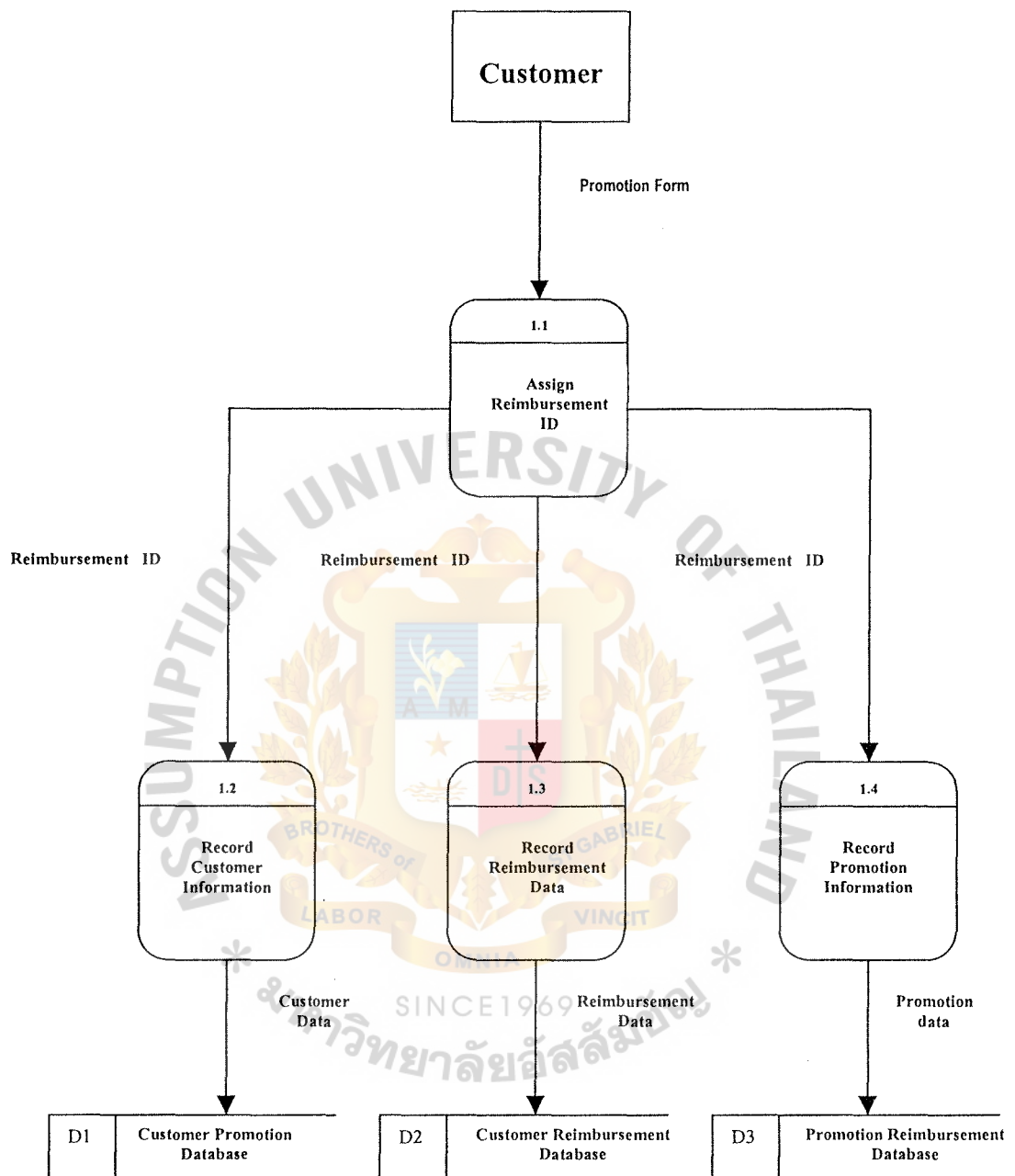


Figure B.1. Data Flow Diagram Reimbursement Data Entry Process.

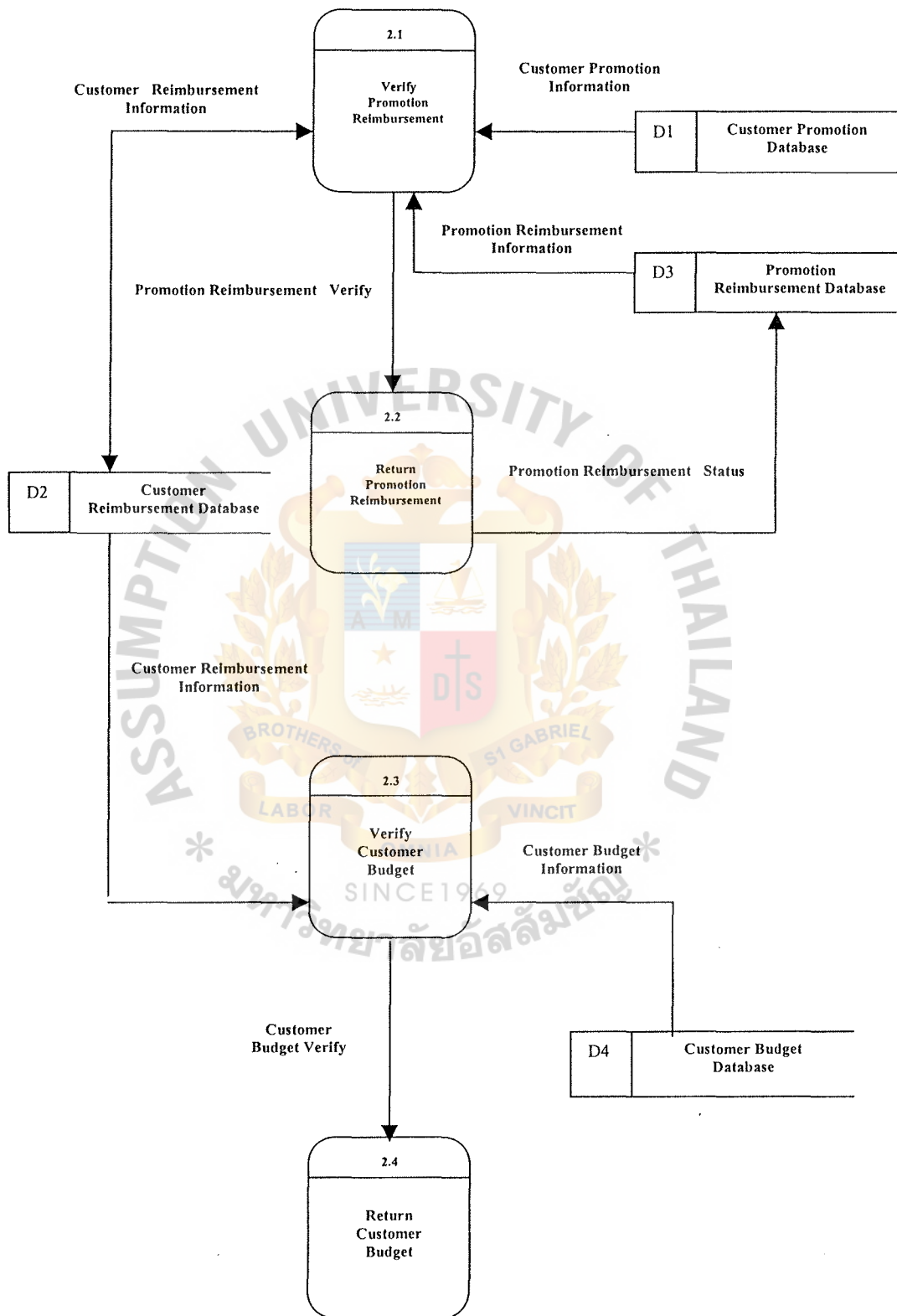


Figure B.2. Data Flow Diagram Promotion Verification Process.

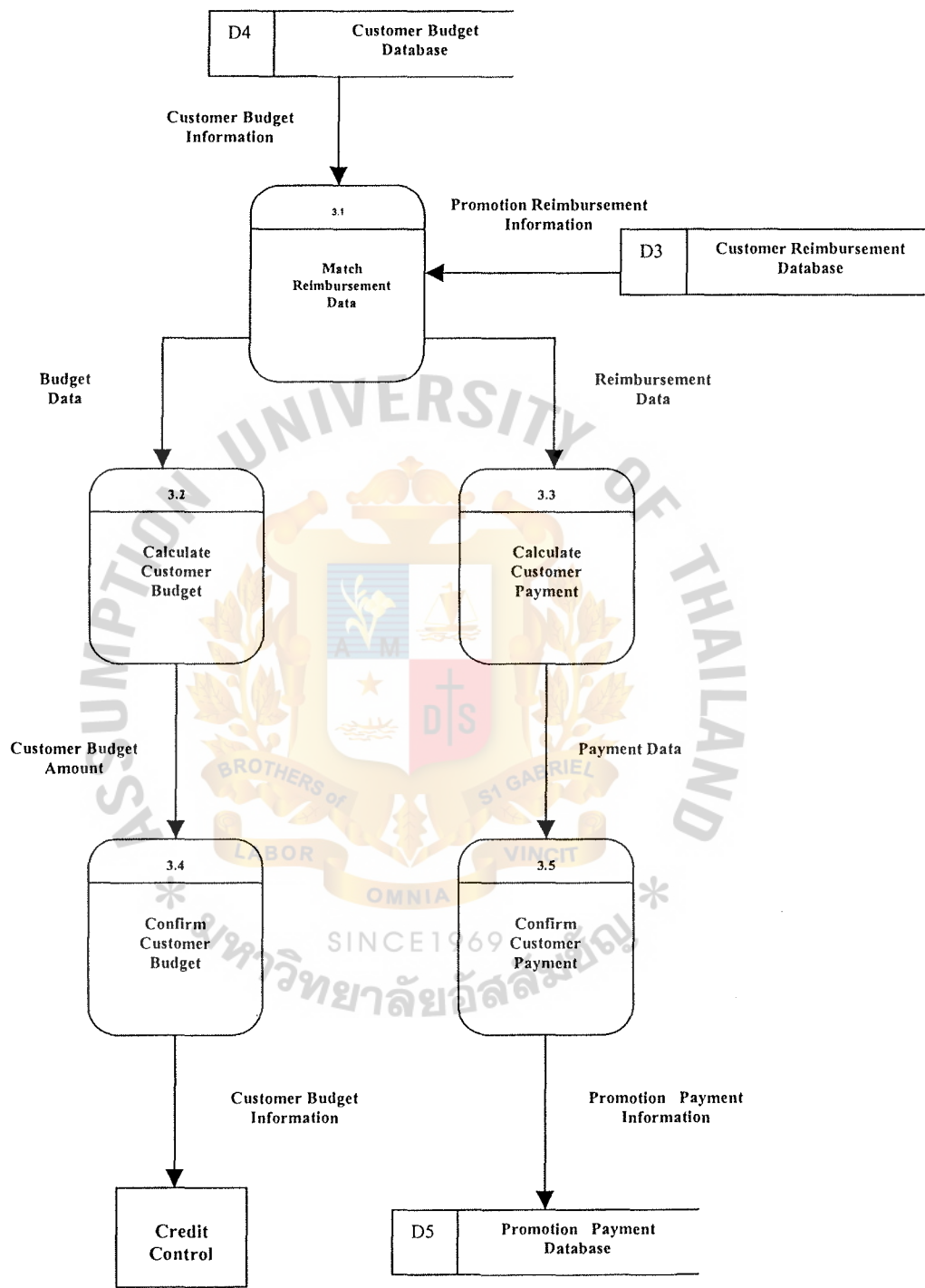


Figure B.3. Data Flow Diagram Payment Calculation Process.

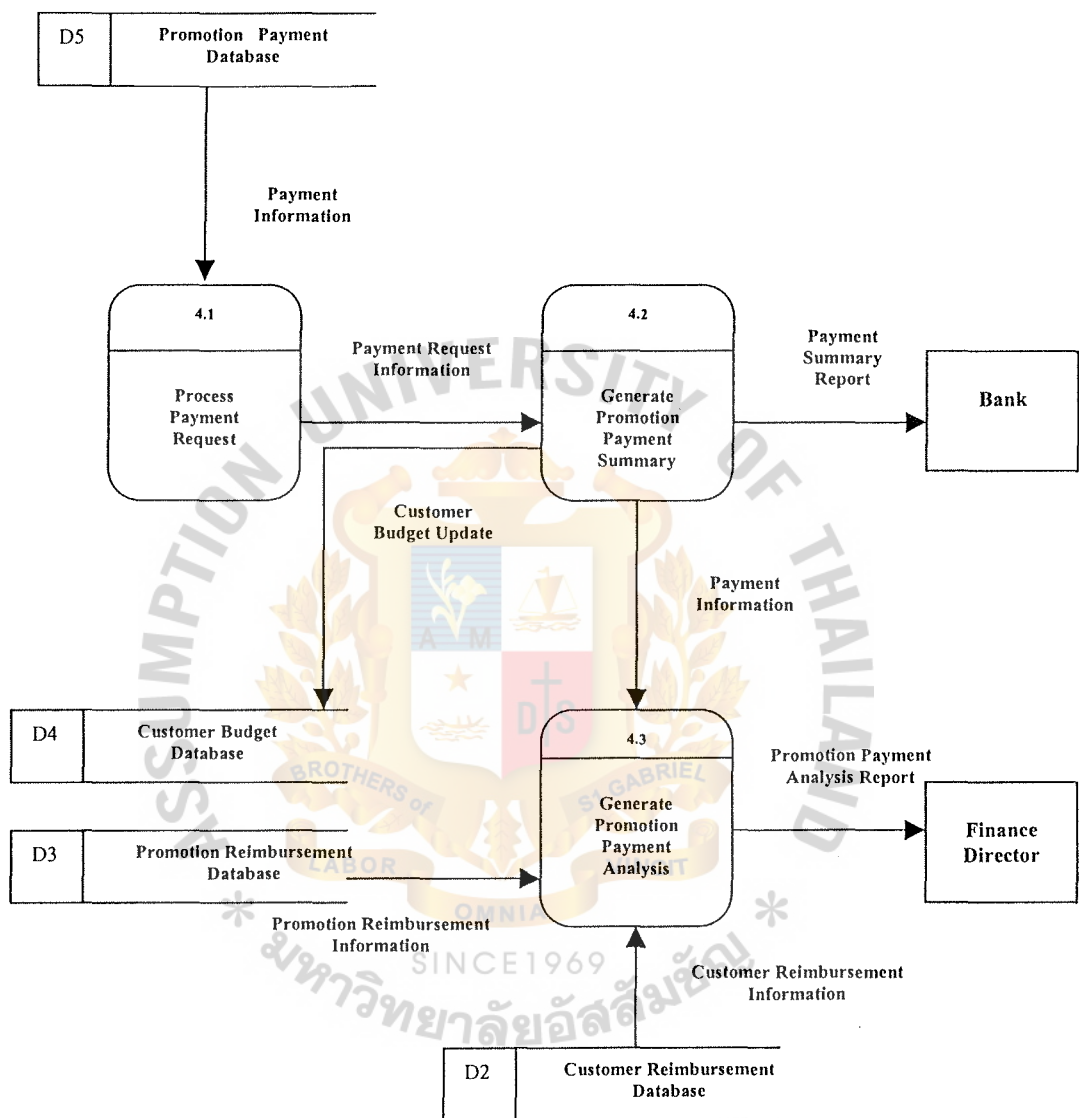


Figure B.4. Data Flow Diagram Promotion Payment Process.



APPENDIX C
FEASIBILITY ANALYSIS

Table C.1. Estimated Cost of Candidate 1, Baht.

Cost Items	Price
Development Cost:	
Hardware:	
1 Server	65,000.00
- Clients	0.00
1 UPS 500 VA Power Line	7,000.00
Total Hardware Cost:	72,000.00
Software	
1 Server Software	20,000.00
- Client Software	0.00
Total Software Cost:	20,000.00
Personnel:	
2 System Analyst (4 @ 18,000 Baht/month)	144,000.00
2 Programmer (3 @ 12,500 Baht/month)	75,000.00
- Database Specialist	0.00
1 Network Specialist (2 @ 19,000 Baht/month)	38,000.00
Total Personnel Cost:	257,000.00
Implementation Cost;	
Training Cost	40,000.00
Installation Cost	18,000.00
Total Implementation Cost:	58,000.00
Total Development Cost:	407,000.00
Project Annual Operating Cost:	
User:	
1 Promotion Support Manger (22,000 Baht/month)	264,000.00
1 Accountant (15,000 Baht/month)	180,000.00
2 Promotion Administrative (12,000 Baht/month)	288,000.00
System Support:	
1 System Analyst (18,000 Baht/month)	216,000.00
- Database Administrator	0.00
1 Network Administrator (20,000 Baht/month)	240,000.00
Office Supplies & Miscellaneous Cost:	
Stationary (2,500 Baht/month)	30,000.00
Paper (1,500 Baht/month)	18,000.00
Utility (3,000 Baht/month)	36,000.00
Miscellaneous (1,500 Baht/month)	18,000.00
Maintenance Cost:	
Hardware Maintenance Cost (8,000 Baht/ 5 years)	8,000.00
Software Maintenance Cost (5,000 Baht/ 5 years)	5,000.00
Project Annual Operating Cost	1,303,000.00
Total Project Annual Cost:	2,059,000.00

Table C.2. Estimated Cost of Candidate 2, Baht.

Cost Items	Price
Development Cost:	
Hardware:	
2 Server	130,000.00
- Clients	0.00
1 UPS 500 VA Power Line	7,000.00
Total Hardware Cost:	137,000.00
Software	
1 Server Software	
- Client Software	0.00
Total Software Cost:	0.00
Personnel:	
3 System Analyst (4 moths@ 18,000.00 Baht/month)	216,000.00
3 Programmer (3 moths@ 12,500.00 Baht/month)	112,500.00
2 Database Specialist (2 moths@ 16,000.00 Baht/month)	48,000.00
1 Network Specialist (2 moths@ 19,000.00 Baht/month)	38,000.00
Total Personnel Cost:	414,500.00
Implementation Cost;	
Training Cost	60,000.00
Installation Cost	20,000.00
Total Implementation Cost:	80,000.00
Total Development Cost:	631,500.00
Project Annual Operating Cost:	
User:	
1 Promotion Support Manger (22,000.00 Baht/month)	264,000.00
1 Accountant (15,000.00 Baht/month)	180,000.00
2 Promotion Administrative (12,000.00 Baht/month)	288,000.00
System Support:	
1 System Analyst (18,000.00 Baht/month)	216,000.00
1 Database Administrator (15,000.00 Baht/month)	180,000.00
1 Network Administrator (20,000.00 Baht/month)	0.00
Office Supplies & Miscellaneous Cost:	
Stationary (2,500 Baht/month)	30,000.00
Paper (1,500 Baht/month)	18,000.00
Utility (3,000 Baht/month)	36,000.00
Miscellaneous (1,500 Baht/month)	18,000.00
Maintenance Cost:	
Hardware Maintenance Cost (8,000 Baht/ 5 year)	5,000.00
Software Maintenance Cost	0.00
Project Annual Operating Cost	1,235,000.00
Total Project Annual Cost:	2,418,000.00

Table C.3. Estimated Cost of Candidate 3, Baht.

Cost Items	Price
Development Cost:	
Hardware:	
2 Server	130,000.00
- Clients	0.00
1 UPS	7,000.00
Total Hardware Cost:	137,000.00
Software	
1 Server Software	70,000.00
- Client Software	0.00
Total Software Cost:	70,000.00
Personnel:	
2 System Analyst (3 moths@ 18,000.00 Baht/month)	108,000.00
3 Programmer (3 moths@ 12,500.00 Baht/month)	112,500.00
1 Database Specialist (2 moths@ 16,000.00 Baht/month)	32,000.00
1 Network Specialist (2 moths@ 19,000.00 Baht/month)	38,000.00
Total Personnel Cost:	290,500.00
Implementation Cost;	
Training Cost	30,000.00
Installation Cost	15,000.00
Total Implementation Cost:	45,000.00
Total Development Cost:	542,500.00
Project Annual Operating Cost:	
User:	
1 Promotion Support Manger (22,000.00 Baht/month)	264,000.00
1 Accountant (15,000.00 Baht/month)	180,000.00
2 Promotion Administrative (12,000.00 Baht/month)	288,000.00
System Support:	
- System Analyst (18,000.00 Baht/month)	0.00
1 Database Administrator (18,000.00 Baht/month)	216,000.00
1 Network Administrator (20,000.00 Baht/month)	240,000.00
Office Supplies & Miscellaneous Cost:	
Stationary (2,500 Baht/month)	30,000.00
Paper (1,500 Baht/month)	18,000.00
Utility (3,000 Baht/month)	36,000.00
Miscellaneous (1,500 Baht/month)	18,000.00
Maintenance Cost:	
Hardware Maintenance Cost (8,000 Baht/ 5 year)	8,000.00
Software Maintenance Cost (8,000 Baht/ 5 year)	8,000.00
Project Annual Operating Cost	1,306,000.00
Total Project Annual Cost:	2,346,000.00

Table C.4. Payback Period for Candidate 1, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	(434,500)					
Annual Operating Cost:		(1,303,000)	(1,433,300)	(1,576,630)	(1,734,293)	(1,907,722)
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	(434,500)	(1,265,215)	(1,351,602)	(1,442,616)	(1,540,952)	(1,646,364)
Cumulative time-adjusted cost over life time:	(434,500)	(1,699,713)	(3,051,315)	(4,493,931)	(6,033,984)	(7,680,348)
Benefit derived from operation of the new system:	0	1,523,000	1,644,840	1,776,427	1,918,541	2,072,025
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	0	1,478,833	1,551,084	1,625,431	1,703,665	1,788,157
Cumulative time-adjusted cost over life time:	0	1,478,833	3,029,917	4,655,348	6,359,013	8,147,170
Cumulative lifetime time-adjusted cost + benefit:	(434,500)	(220,880)	(21,398)	161,417	325,029	466,822

Table C.5. Payback Period for Candidate 2, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	(434,500)					
Annual Operating Cost:		(1,235,000)	(1,358,500)	(1,494,350)	(1,643,785)	(1,808,164)
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	(434,500)	(1,199,185)	(1,281,066)	(1,367,330)	(1,459,681)	(1,560,445)
Cumulative time-adjusted cost over life time:	(434,500)	(1,633,685)	(2,914,751)	(4,282,081)	(5,741,762)	(7,302,207)
Benefit derived from operation of the new system:	0	1,523,000	1,644,840	1,776,427	1,918,541	2,072,025
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	0	1,478,833	1,551,084	1,625,431	1,703,665	1,788,157
Cumulative time-adjusted cost over life time:	0	1,478,833	3,029,917	4,655,348	6,359,013	8,147,170
Cumulative lifetime time-adjusted cost + benefit:	(434,500)	(154,852)	115,167	373,267	617,251	844,963

Table C.6. Payback Period for Candidate 3, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	(434,500)					
Annual Operating Cost:		(1,306,000)	(1,436,600)	(1,580,260)	(1,738,286)	(1,912,115)
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	(434,500)	(1,268,126)	(1,354,714)	(1,445,938)	(1,543,598)	(1,650,155)
Cumulative time-adjusted cost over life time:	(434,500)	(1,702,626)	(3,057,340)	(4,503,278)	(6,046,876)	(7,697,031)
Benefit derived from operation of the new system:	0	1,523,000	1,644,840	1,776,427	1,918,541	2,072,025
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	0	1,478,833	1,551,084	1,625,431	1,703,665	1,788,157
Cumulative time-adjusted cost over life time:	0	1,478,833	3,029,917	4,655,348	6,359,013	8,147,170
Cumulative lifetime time-adjusted cost + benefit:	(434,500)	(223,793)	(27,423)	152,070	312,137	450,139

Table C.7. Net Present Value Candidate 1, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	(434,500)					
Annual Operating Cost:		(1,303,000)	(1,433,300)	(1,576,630)	(1,734,293)	(1,907,722)
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	(434,500)	(1,265,213)	(1,351,602)	(1,442,616)	(1,540,052)	(1,646,364)
Cumulative time-adjusted cost over life time:						(7,680,348)
Benefit derived from operation of the new system:	0	1,523,000	1,644,840	1,776,427	1,918,541	2,072,025
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	0	1,478,833	1,551,084	1,625,431	1,703,665	1,788,157
Cumulative time-adjusted cost over life time:	0	1,478,833	3,029,917	4,655,348	6,359,013	8,147,170
Cumulative lifetime time-adjusted cost + benefit:						466,822

Table C.8. Net Present Value Candidate 2, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	(434,500)					
Annual Operating Cost:		(1,235,000)	(1,358,500)	(1,494,350)	(1,643,785)	(1,808,164)
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	(434,500)	(1,199,185)	(1,281,066)	(1,367,330)	(1,459,681)	(1,560,445)
Cumulative time-adjusted cost over life time:						(7,302,207)
Benefit derived from operation of the new system:	0	1,523,000	1,644,840	1,776,427	1,918,541	2,072,025
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	0	1,478,833	1,551,084	1,625,431	1,703,665	1,788,157
Cumulative time-adjusted cost over life time:	0	1,478,833	3,029,917	4,655,348	6,359,013	8,147,170
Cumulative lifetime time-adjusted cost + benefit:						844,963

Table C.9. Net Present Value Candidate 3, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	(434,500)					
Annual Operating Cost:		(1,306,000)	(1,436,600)	(1,580,260)	(1,738,286)	(1,912,115)
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	(434,500)	(1,268,126)	(1,354,714)	(1,445,938)	(1,543,598)	(1,650,155)
Cumulative time-adjusted cost over life time:						(7,697,031)
Benefit derived from operation of the new system:	0	1,523,000	1,644,840	1,776,427	1,918,541	2,072,025
Discount Factors for 3%	1.000	0.971	0.943	0.915	0.888	0.863
Time Adjusted Costs (Adjusted to Present Value)	0	1,478,833	1,551,084	1,625,431	1,703,665	1,788,157
Cumulative time-adjusted cost over life time:	0	1,478,833	3,029,917	4,655,348	6,359,013	8,147,170
Cumulative lifetime time-adjusted cost + benefit:						450,139

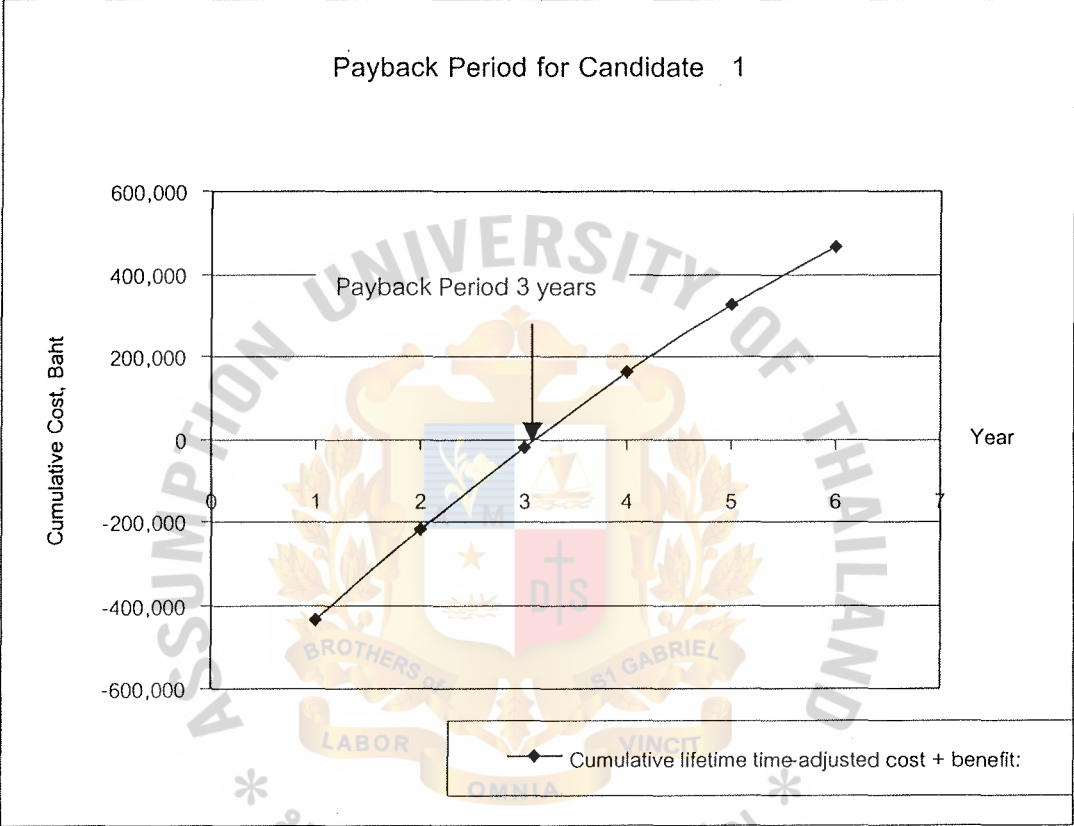


Figure C.1. Payback Period for Candidate 1.

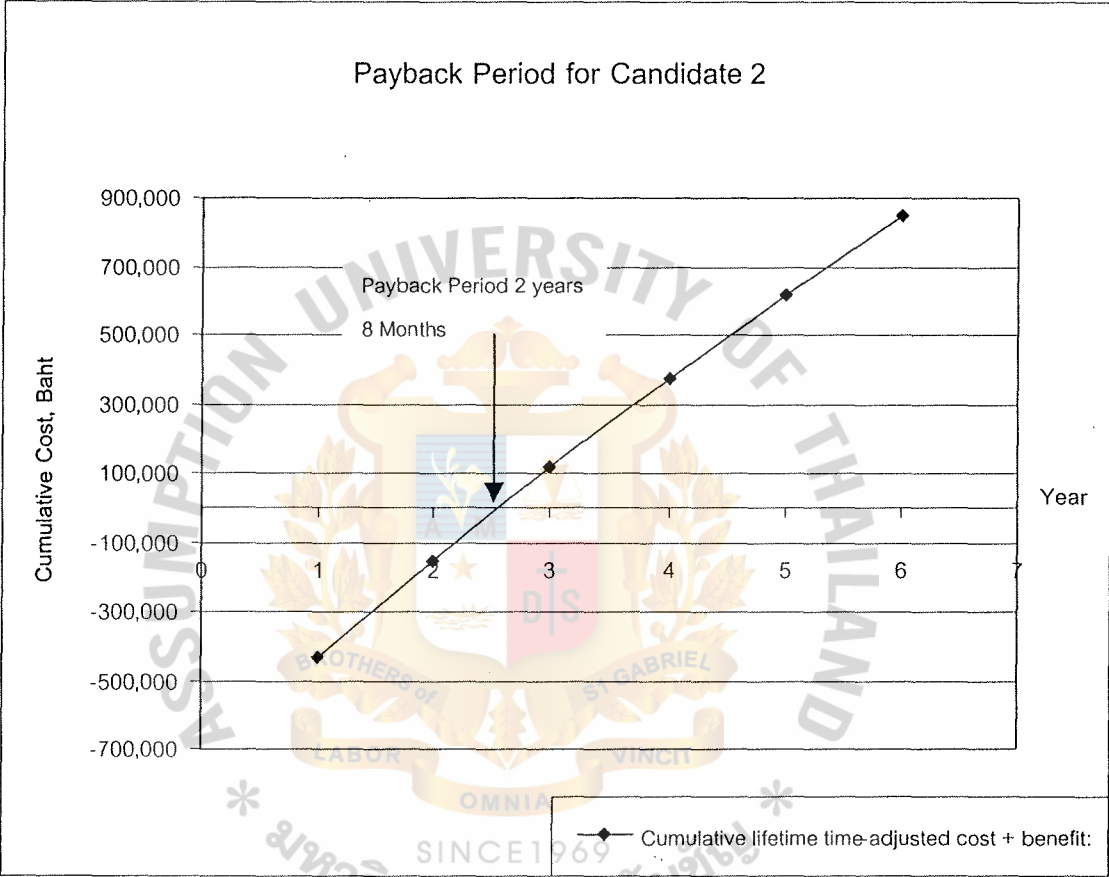


Figure C.2. Payback Period for Candidate 2.

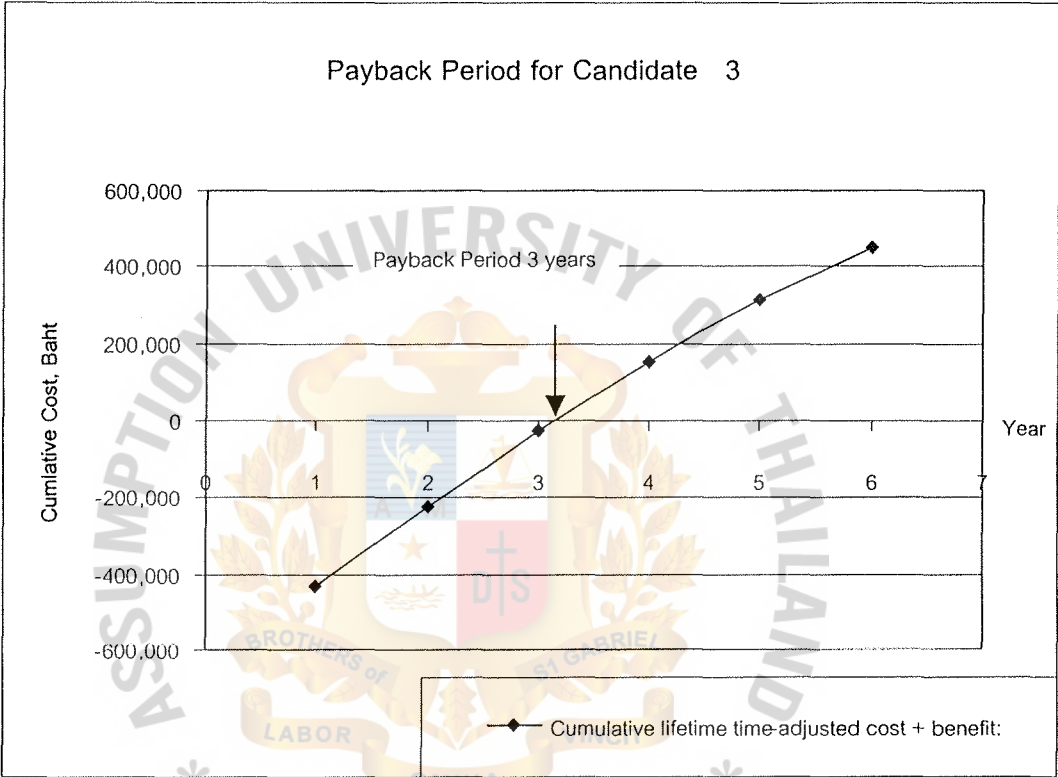


Figure C.3. Payback Period for Candidate 3.



APPENDIX D
STRUCTURE CHART

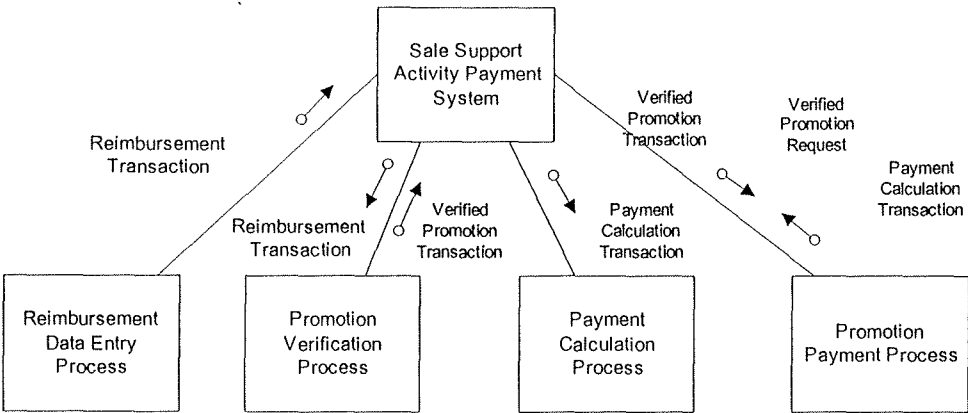


Figure D.1 Structure Chart of Payment Sale Support Activity.

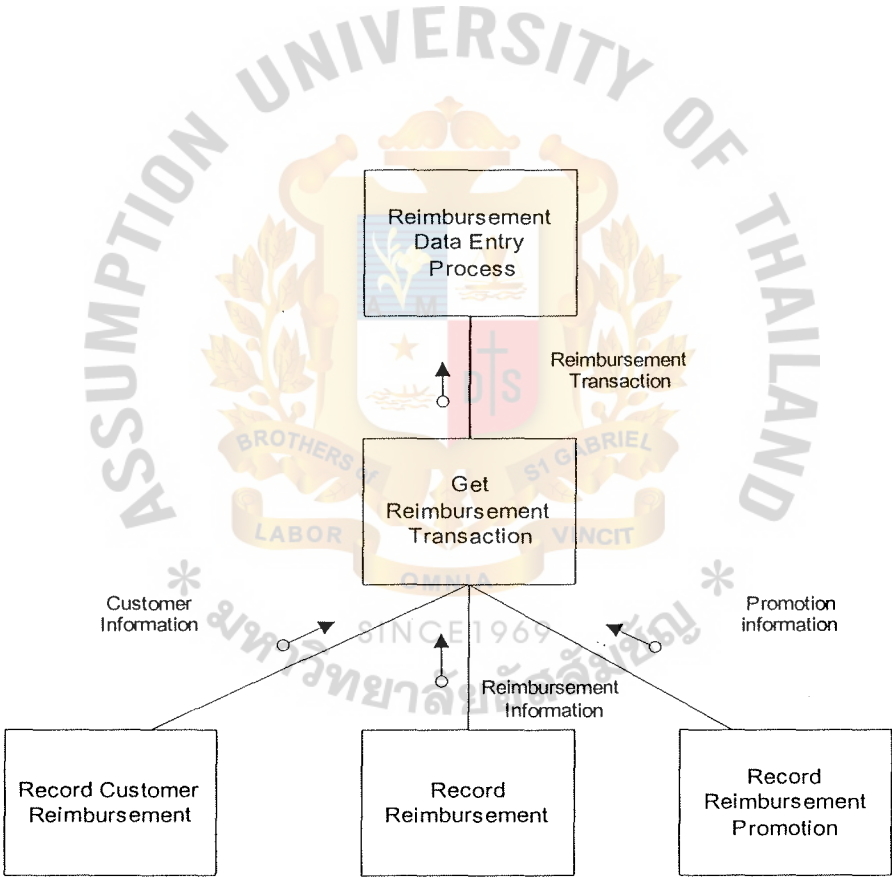


Figure D.2 Structure Chart of Reimbursement Data Entry.

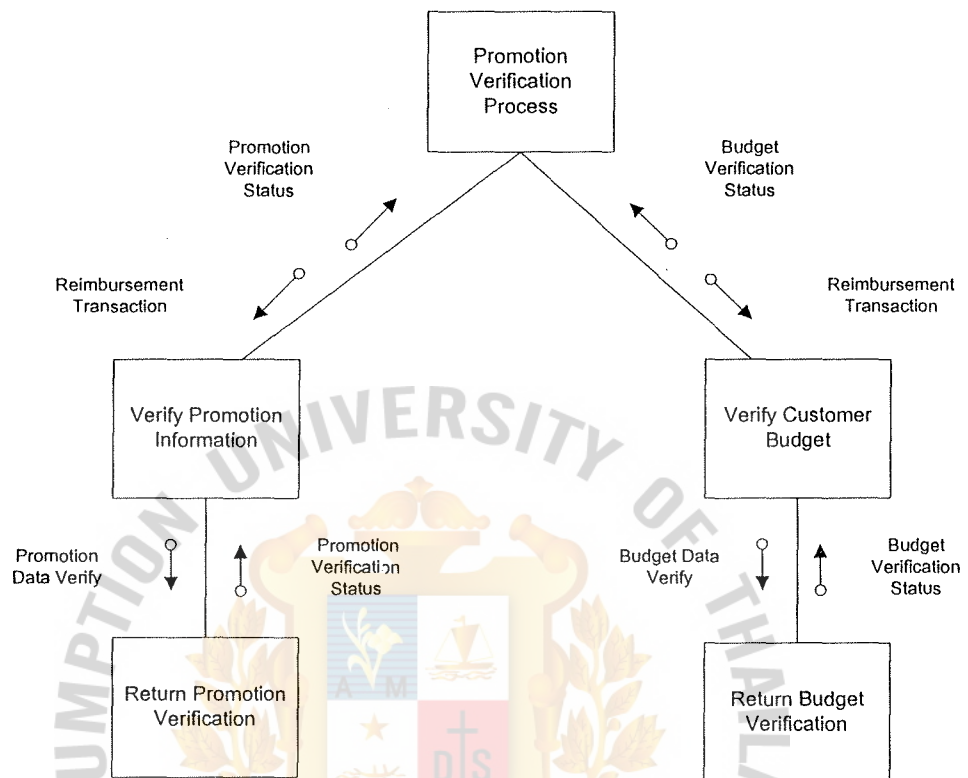


Figure D.3 Structure Chart of Promotion Verification.

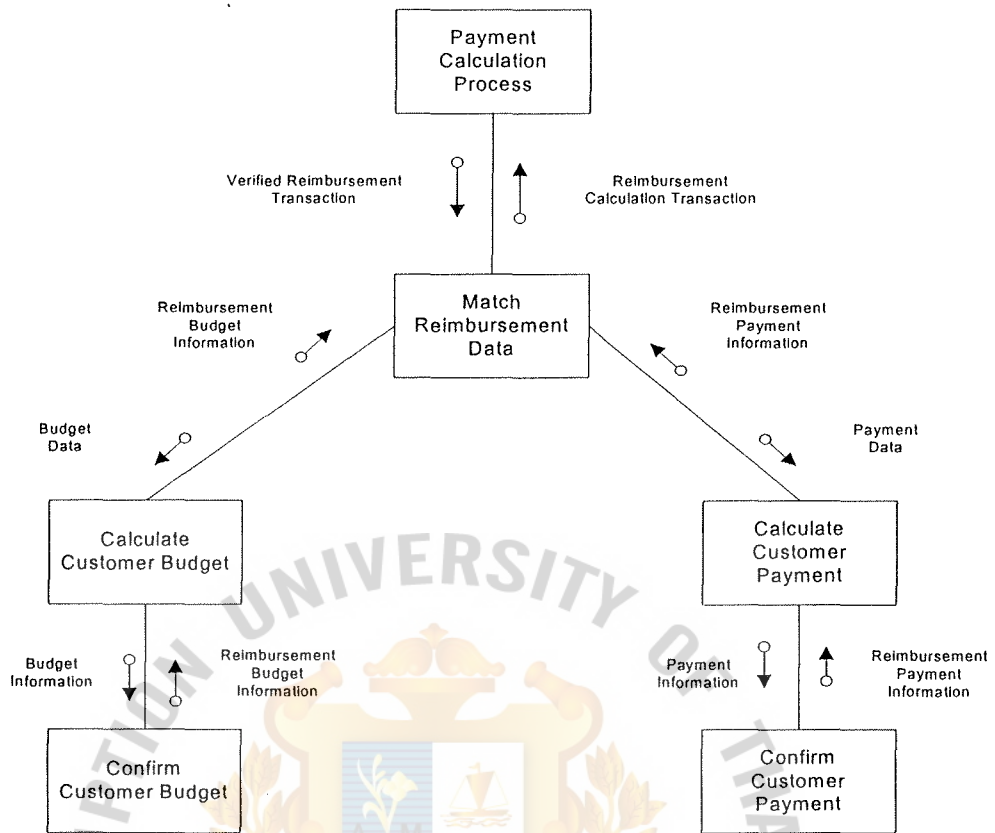


Figure D.4 Structure Chart of Promotion Calculation.

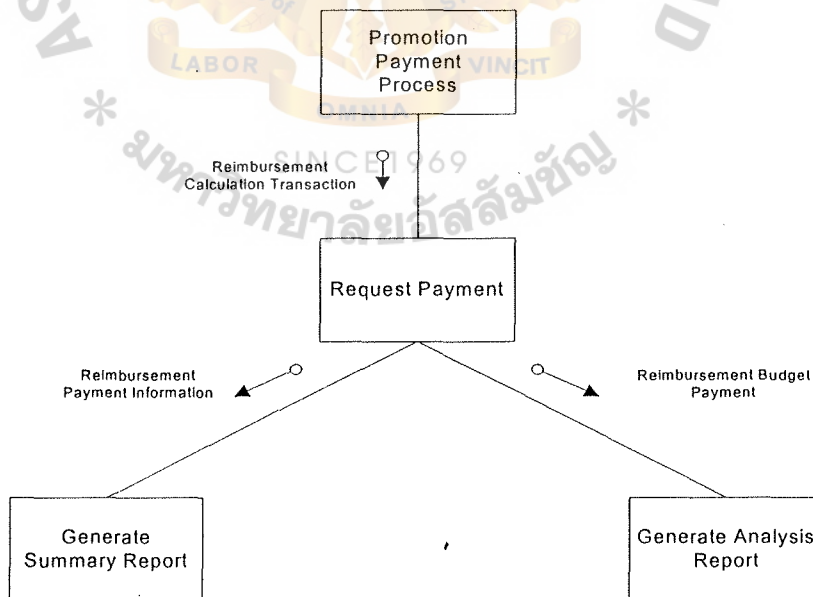


Figure D.5 Structure Chart of Promotion Payment.



APPENDIX E

PROCESS SPECIFICATION

Table E.1. Process Specification of Process Reimbursement Data Entry.

Items	Description
Process Name:	Reimbursement Data Entry
Data In:	Promotion Form (from Customer)
Data Out:	Customer Promotion Reimbursement Information. Promotion Reimbursement Information.
Process:	1) Receive Promotion Form from Customer. 2) Create new Customer Promotion Reimbursement Information in to Customer Promotion Reimbursement Database. 3) Create new Promotion Reimbursement Information in to Promotion Reimbursement Database.
Attachment:	1) Customer. 2) Customer Promotion Reimbursement Database. 3) Promotion Reimbursement Database.

Table E.2. Process Specification of Process Assign Reimbursement ID.

Items	Description
Process Name:	Assign Reimbursement ID
Data In:	Promotion Form (from Customer)
Data Out:	Reimbursement ID
Process:	1) Receive Promotion Form from Customer. 2) Send Reimbursement ID to record in Customer Reimbursement Process. 3) Send Reimbursement ID to record in Promotion Reimbursement Process.
Attachment:	1) Customer. 2) Promotion Reimbursement Database. 3) Customer Reimbursement Database.

Table E.3. Process Specification of Process Record Customer Information.

Items	Description
Process Name:	Record Customer Reimbursement Information.
Data In:	Reimbursement ID
Data Out:	Customer Reimbursement Information.
Process:	1) Receive Reimbursement ID from Assign Reimbursement ID Process. 2) Create new Customer Reimbursement Information into Customer Reimbursement Database.
Attachment:	1) Assign Reimbursement ID Process. 2) Customer Reimbursement Database.

Table E.4. Process Specification of Process Record Promotion Information.

Items	Description
Process Name:	Record Promotion Information.
Data In:	Reimbursement ID
Data Out:	Promotion Reimbursement Information.
Process:	1) Receive Reimbursement ID from Assign Reimbursement ID Process. 2) Create new Promotion Reimbursement Information into Promotion Reimbursement Database.
Attachment:	1) Assign Reimbursement ID Process. 2) Promotion Reimbursement Database.

Table E.5. Process Specification of Process Promotion Reimbursement

Verification.

Items	Description
Process Name:	Promotion Verification.
Data In:	Promotion Information Customer Promotion Information Promotion Reimbursement Information
Data Out:	Promotion Reimbursement Verification Status.
Process:	<ol style="list-style-type: none"> 1) Get Promotion Information from Customer Promotion Database. 2) Get Customer Information from Customer Promotion Database. 3) Get Promotion Reimbursement Information from Promotion Reimbursement Database. 4) Get Customer Reimbursement Information from Customer Reimbursement Database. 5) Update Promotion Reimbursement Verification Status in to Promotion Reimbursement Information.
Attachment:	<ol style="list-style-type: none"> 1) Customer Promotion Database. 2) Promotion Reimbursement Database. 3) Customer Reimbursement Database.

Table E.6. Process Specification of Process Customer Budget Verification.

Items	Description
Process Name:	Customer Budget Verification.
Data In:	Customer Budget Reimbursement Information Customer Reimbursement Information
Data Out:	Budget Data Verify
Process:	<ol style="list-style-type: none"> 1) Get Promotion Information from Customer Budget Database. 2) Get Promotion Reimbursement Information from Promotion Reimbursement Database.
Attachment:	<ol style="list-style-type: none"> 1) Customer Budget Database. 2) Promotion Reimbursement Database.

Table E.7. Process Specification of Process Return Promotion Reimbursement Verification.

Items	Description
Process Name:	Return Promotion Verification.
Data In:	Promotion Reimbursement Verify
Data Out:	Promotion Reimbursement Verification Status.
Process:	1) Receive Promotion Reimbursement Verify Data from Verify Promotion Reimbursement Information process. 2) Update Promotion Reimbursement Status to Promotion Reimbursement Database.
Attachment:	1) Verify Promotion Reimbursement Information Process.

Table E.8. Process Specification of Process Return Customer Budget Verification.

Items	Description
Process Name:	Return Budget Verification.
Data In:	Budget Data Verify
Data Out:	Budget Verification Status
Process:	1) Receive Customer Budget Verify from Verify Budget Information Process. 2) Update Budget Verification Status into Customer Budget Database.
Attachment:	1) Verify Budget Information Process. 2) Customer Budget Database.

Table E.9. Process Specification of Process Payment Calculation.

Items	Description
Process Name:	Payment Calculation.
Data In:	Customer Budget Information Customer Reimbursement information
Data Out:	Customer Budget Information Customer Payment Information
Process:	1) Get Customer Budget Information from Customer Budget Database. 2) Get Customer Reimbursement Information from Customer Reimbursement Database. 3) Create Payment Information into Promotion Payment Database. 4) Create Customer Budget Balance into Promotion Payment Request.
Attachment:	1) Customer Payment Database. 2) Promotion Reimbursement Database. 3) Customer Budget Database.

Table E.10. Process Specification of Process Calculate Customer Budget.

Items	Description
Process Name:	Calculate Customer Budget.
Data In:	Customer Budget Data Customer Reimbursement Data
Data Out:	Customer Budget Information
Process:	1) Receive Customer Budget Information from Customer Budget Database. 2) Receive Customer Reimbursement Information from Customer Reimbursement Database. 3) Send Budget Balance to Confirm Customer Payment Calculation Process.
Attachment:	1) Customer Budget balance 2) Confirm Budget Payment Calculation Process

Table E.11. Process Specification of Process Confirm Customer Budget.

Items	Description
Process Name:	Confirm Customer budget.
Data In:	Customer Budget Information Customer Reimbursement information
Data Out:	Customer Budget Balance
Process:	1) Receive Customer Budget Information from Calculate Customer Budget. 2) Create New Budget Balance into Calculate Customer Payment Process.
Attachment:	1) Customer Budget balance 2) Confirm Budget Payment Calculation Process

Table E.12. Process Specification of Process Confirm Customer Payment.

Items	Description
Process Name:	Confirm Customer Payment.
Data In:	Customer Budget Information Customer Reimbursement information
Data Out:	Customer Payment Information
Process:	1) Receive Customer Budget Information from Customer Budget Database. 2) Receive Customer Reimbursement Information from Customer Reimbursement Database. 3) Send Budget Balance to Confirm Customer Payment Calculation Process.
Attachment:	1) Customer Payment Information 2) Confirm Budget Payment Calculation Process

Table E.13. Process Specification of Process Promotion Payment.

Items	Description
Process Name:	Promotion Payment.
Data In:	Payment Information
Data Out:	Payment Request Information
Process:	1) Receive Promotion Payment Information from Promotion Payment Database. 2) Send Payment information to Generate Promotion Payment Process.
Attachment:	1) Customer Payment Request Information 2) Confirm Payment Process

Table E.14. Process Specification of Process Generate Promotion Payment summary.

Items	Description
Process Name:	Generate Promotion Payment Summary
Data In:	Customer Payment Request Information
Data Out:	Payment Summary Report
Process:	1) Receive Customer Payment Request Information from Promotion Payment process. 2) Send Payment information to Generate Promotion Payment Analysis Process.
Attachment:	1) Customer Budget balance 2) Payment Summary Report

Table E.15. Process Specification of Process Generate Promotion Payment Analysis.

Items	Description
Process Name:	Generate Promotion Payment Analysis
Data In:	1) Payment Information 2) Promotion Reimbursement Information 3) Customer Budget Data
Data Out:	Payment Summary Analysis Report to Finance Director
Process:	1) Receive Payment Information from Promotion Payment Report process. 2) Receive Customer Budget Information from Customer Budget Database. 3) Receive Promotion Reimbursement Information from Promotion Reimbursement Database. 4) Send Promotion Payment Analysis to Finance Director.
Attachment:	1) Customer Budget database 2) Payment Summary Report 3) Promotion Reimbursement Database



APPENDIX F
DATA DICTIONARY

Table F.1. Data Dictionary of Sales Support Activity Database.

Field Name	Meaning
Budget balance	Avaliable budget that can spend for performance the promotion.
Budget End Date	Ending date of reimbursment promotion
Budget ID	Indentification budget for promotion offered to customer.
Budget Start Date	Starting date of reimbursment promotion
Budget Verification	Verification status that indentifies the budget balance.
Customer Name	Name and Surname of customer in master file.
Customer No.	Digital Number to record customer information.
Has	Relationship between customer promotion and customer payment
Mailing Address	Address of Customer
Phone Number	Contact number of customer
Promotion End Date	Ending date of performing promotion
Promotion ID	Indentification promotion offered to customer
Promotion Name	Name of promotion offerd to customer
Promotion Reimbursement Verification	Verification stutus that follow by the promotion value and condition.
Promotion Start Date	Starting date of performing promotion
Reimbursement Date	Date that P&G make a promtion payment to customer.
Reimbursement ID	Assign indentification number to each promotion form.
Total budget value	100% of budget for Promotion.
Total Payment Value	Promotion reimbursement amount to customer

Table F.2. Data Dictionary of Data Flow Diagram.

Customer Name	Type	Description
Assign Reimbursement ID	Process	Assign identification number to each promotion form.
Bank	External Entities	Bank who response the payment transfer to customer.
Budget Data	Data flow	Data after match cutoemr reimbursement with budget.
Calculate Customer Payment	Process	Calculate Customer Payment of each reimbursement transaction.
Calculate Customer Budget	Process	Calculate Customer Budget of each reimbursement transaction.
Confirm Customer Budget Balance	Process	Verify Customer Budget Calculation result beofore inputting into Customer Budget Database.
Confirm Customer Payment	Process	Verify Customer Payment Calculation result beofore inputting into Customer Payment Database.
Credit Control	External Entities	Accountant team who response for promotion payment.
Customer	External Entities	Retailer that buy P& G products
Customer Budget Amount	Data flow	Customer Budget after calculate with customer reimbursement.
Customer Budget Data	Data flow	Total customer budget data from Customer Budget Database.
Customer Budget Database	Data Store	Store information about Customer Budget Balance and total budget.
Customer Budget Information	Data flow	Budget data from Customer Budget Database.
Customer Budget Information	Data flow	Customer Budget data from Customer Budget Database.
Customer Budget Update	Data flow	Budget data balance after deduct the promotion payment.
Customer Budget Verify	Data flow	Customer Budget after verifying whith Customer Budget Database.
Customer Information	Data flow	Data of each Customer
Customer Payment Information	Data flow	Result from the calculation payment process
Customer Promotion Database	Data Store	Store information about Customer Promotion
Customer Promotion Information	Data flow	Customer Promotion Data from Customer Promotion Database.
Customer Reimbursement Database	Data Store	Store information about Customer Reimbursement who ask for promotion payment.
Customer Reimbursement Information	Data flow	Input of Customer Reimbursement to Customer Reimbursement database
Customer Reimbursement Information	Data flow	Customer Reimbursement data from Customer Reimbursement Database.
Finance Director	External Entities	CEO in finance department
Generate Promotion Payment Analysis	Process	Produce Promotion Payment Analysis to Finance Director.
Generate Promotion Payment Summary	Process	Produce Promotion Payment Summary to Bank
Match Reimbursement Data	Process	Match Customer Budget Data and Customer Reimbursement Data.
Payment Data	Data flow	Data from payment calculation process.
Payment Information	Data flow	Customer payment data that use to make a promotion payment.
Payment Information	Data flow	Data of promotion payment from Payment Summary report.
Payment Request Information	Data flow	Payment data use for generate Payment summary.
Payment Summary Report	Data flow	Complete promotion Payment report use by BANK
Process Payment Request	Process	Prepare the payment data to the generate the report.

Table F.2. Data Dictionary of Data Flow Diagram (Continued).

Customer Name	Type	Description
Promotion Payment Information	Data flow	Payment Data use for update in promotion payment database.
Promotion data	Data flow	Data from promotion form of customer.
Promotion Form	Data flow	Form for customer to fill in the Reimbursement Information.
Promotion Payment Database	Data Store	Store information about Promotion Payment about Customer Reimbursement who ask for promotion payment
Promotion Payment Analysis Report	Data flow	Complete promotion Payment and Budget report use by Fianance Director.
Promotion Reimbursement Verify	Data flow	Promotion Reimbursement after verifying whith Promotion Reimbursement database.
Promotion Reimbursement Database	Data Store	Store information about Promotion Reimbursement who ask for promotion payment.
Promotion Reimbursement Information	Data flow	Promotion Reimbursement data from Promotion Reimbursement Database.
Promotion Reimbursement Status	Data flow	Result of Reimbursement verification.
Record Customer Information	Process	Input Customer Data, who perform the Promotion, into Customer Promotion Database.
Record Promotion Information	Process	Input Promotion data, that customer ask for reimbursement, into Promotion Reimbursement Database.
Record Reimbursement Data	Process	Input Reimbursement data, that customer asked after finished promotion, into Customer Reimbursement Database.
Reimbursement ID	Data flow	Indentification number of promotion form
Reimbursement Data	Data flow	Reimbursement Data of each customer from Customer Reimbursement Database.
Return Customer Budget	Process	Update Customer Budget Result to Customer Budget Database.
Return Promotion Information	Process	Update Promotion Reimbursement Information to Promotion Reimbursement Database.
Verify Promotion Information	Process	Verify Promotion and Reimbursement Data to Input Data
Veritfy Customer Budget	Process	Verify Budget and Reimbursement Data to Input Data.



Table G.1. Structure of Customer Promotion Reimbursement Table.

Name	Type	Null	Foreign Key to Table	Check	Key Type
Reimbursement ID	Text (13)	Not	-	-	Primary key
Customer No.	Text (11)	Not	-	-	Attribute
Customer Name	Text (20)	Not	-	-	Attribute
Mailing Address	Text (50)	Not	-	-	Attribute
Phone number	Text (12)	Not	-	-	Attribute
Budget Verification	Text (3)	Not	-	-	Attribute

Table G.2. Structure of Customer Promotion Table.

Name	Type	Null	Foreign Key to Table	Check	Key Type
Promotion ID	Text (12)	Not	-	-	Primary key
Reimbursement ID	Text (13)	Not	-	-	Primary key
Promotion Name	Text (20)	Not	-	-	Attribute
Promotion Start Date	Date (8)	Not	-	-	Attribute
Promotion End Date	Date (8)	Not	-	-	Attribute
Promotion Reimbursement Verification	Text (3)	Not	-	-	Attribute

Table G.3. Structure of Customer Reimbursement Value Table.

Name	Type	Null	Foreign Key to Table	Check	Key Type
Value ID	Text (12)	Not	-	-	Primary key
Reimbursement ID	Text (13)	Not	-	-	Primary key
Total Value	Numer(15)	Not	-	-	Attribute
Reimbursement Date	Date (8)	Not	-	-	Attribute

Table G.3. Structure of Customer Budget Table.

Name	Type	Null	Foreign Key to Table	Check	Key Type
Budget ID	Text (12)	Not	-	-	Primary key
Reimbursement ID	Text (13)	Not	-	-	Primary key
Total Budget Value	Numer(15)	Not	-	-	Attribute
Budget Balance	Numer(15)	Not	-	-	Attribute
Budget Start Date	Date (8)	Not	-	-	Attribute
Budget End Date	Date (8)	Not	-	-	Attribute



APPENDIX H
WEB INTERFACE DESIGN

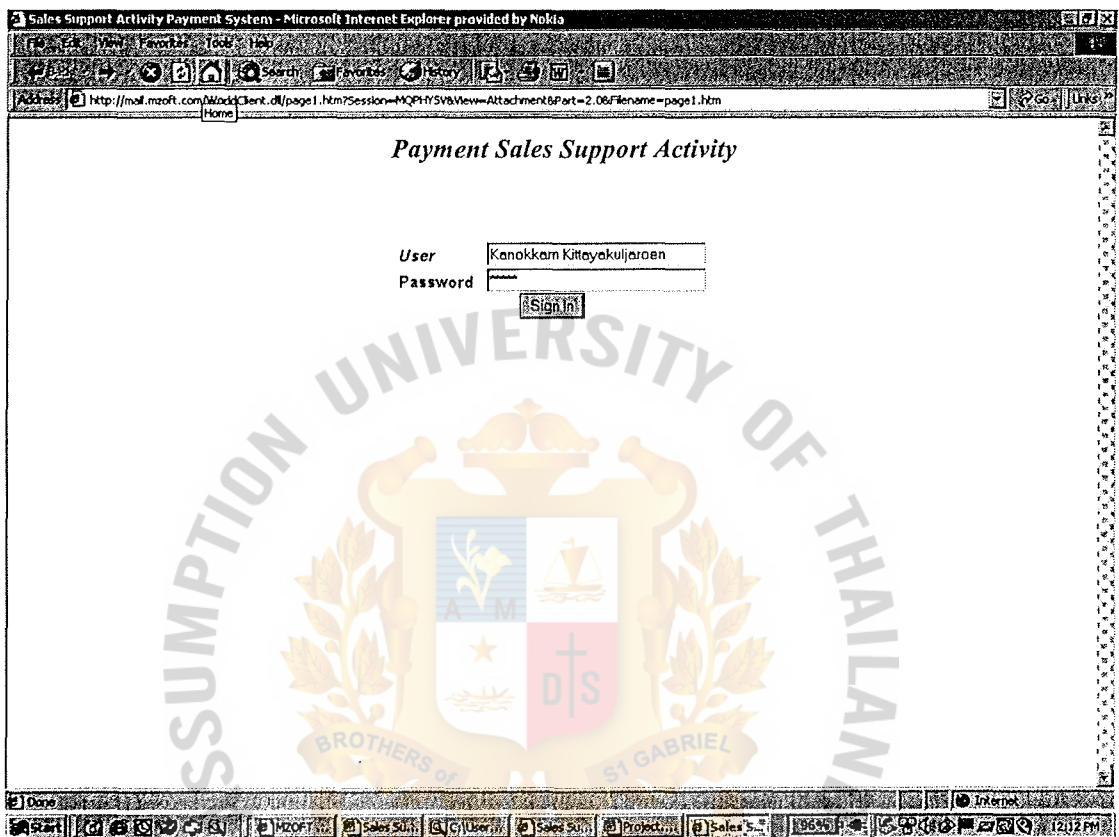


Figure H.1. Web Interface: Login Screen

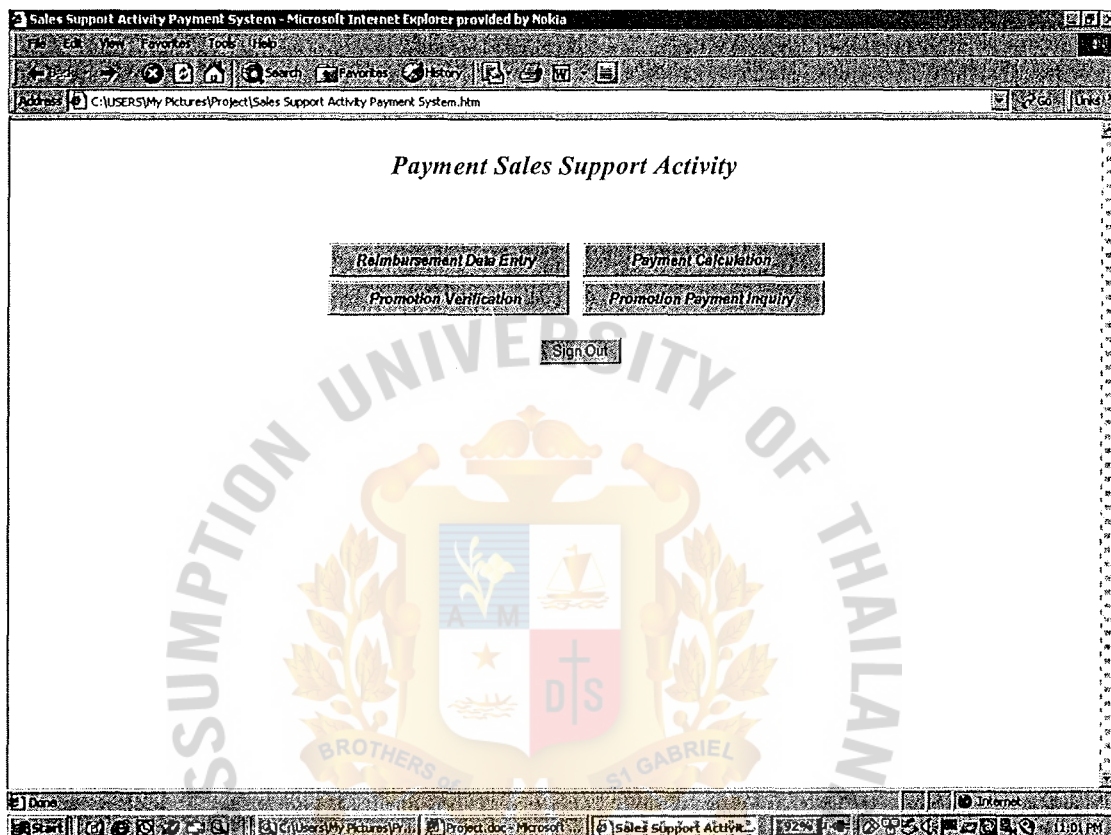


Figure H.2. Web Interface: Main Menu Screen

Sales Support Activity Payment System - Microsoft Internet Explorer provided by Nokia

Address: C:\USERS\My Pictures\Project\Sales Support Activity Payment System\1.htm

Payment Sales Support Activity

Reimbursement Data Entry

Payment Calculation

Promotion Verification

Promotion Payment Inquiry

Reimbursement Data Entry

Reimbursement_ID	9935520030223
Customer_Number	08220000912
Customer_Name	Top Super Market Co.Ltd.
Mailing Address	32/24 Sukumvit Rd. Prakanong BKK 10600
Phone_Number	02-269-8899
Promotion Number	87450
Reimbursement value	287,500.00 baht

Sign Out

Reset

Done Internet

Project Doc: Microsoft Sales Support Activity

Figure H.3. Web Interface: Data Entry Screen



Figure H.4. Web Interface: Promotion Verification

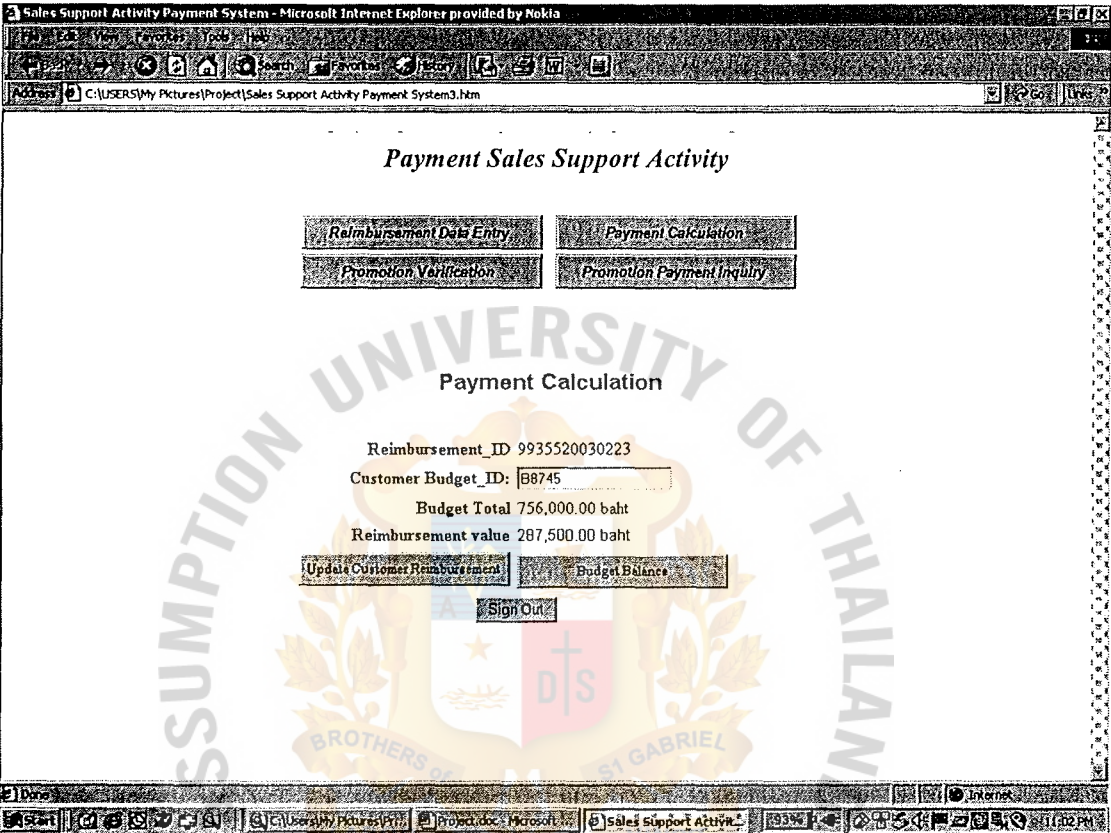


Figure H.5. Web Interface: Payment Calculation

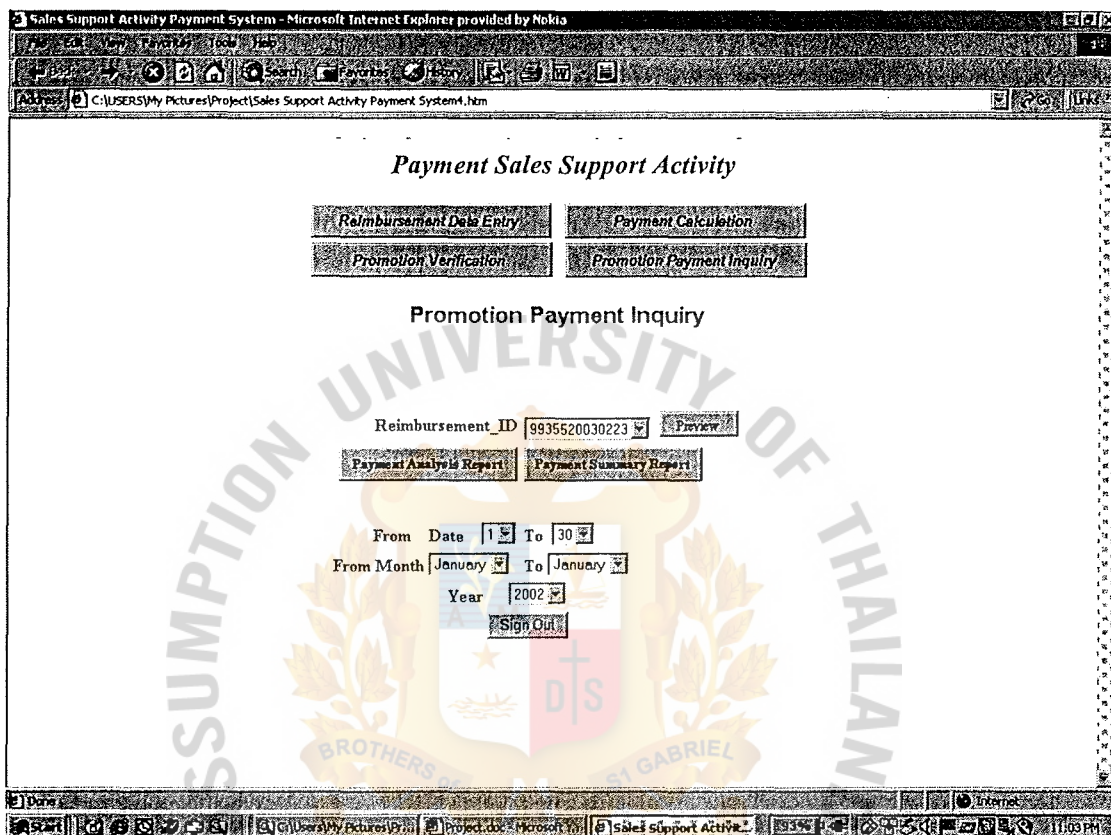


Figure H.6. Web Interface: Payment Inquiry



APPENDIX I
REPORT DESIGN

Microsoft Excel - Reports.xls						
F44						
Procter & Gamble						
Sales Support Activity Information System						
Promotion Payment Summary Report for December'02						
Customer Number	Reimbursement ID	Customer Name	Customer Acc. #	Payment Date	Payment Amount	
882-2000-0912	99355-2003-0223	Top Super Market Co.,Ltd.	BBL 152-4-260906	January 5, 2003	287,500.00	
557-2000-0512	99356-2003-0223	Makro Co.,Ltd.	TMB 027-3-31729	January 5, 2003	440,000.00	
274-2002-1225	99357-2003-0223	SDO BKK East	TFB 709-2-25328-1	January 5, 2003	89,000.00	
832-2001-0912	99358-2003-0223	Lotus Co.,Ltd.	BBL 157-4-268904	January 5, 2003	528,700.00	
259-2000-0912	99359-2003-0223	SDO BKK South	TFB 835-8-25328-1	January 5, 2003	215,700.00	
237-2000-0912	99364-2003-0223	SDO Pethchaburi	TMB 057-3-35727	January 5, 2003	294,000.00	
826-2001-0912	99362-2003-0223	Food Lion Co.,Ltd.	BBL 172-4-262806	January 5, 2003	50,988.00	
281-2000-0912	99353-2003-0223	SDO Chonburi	TFB 723-3-25368-1	January 5, 2003	79,000.00	
882-2002-0912	99361-2003-0223	Top Super Market Co.,Ltd.	BBL 152-4-260906	January 5, 2003	30,000.00	
Total					2,014,888.00	
Prepare by			Approved by			

Figure I.1 Report Design: Payment Summary Report

Procter & Gamble									
Sales Support Activity Information System									
Promotion Payment Analysis (Baht) as of December '02									
No	Customer Number	Reimbursement ID	Customer Name	Total Budget Yr. '02	Balance of Nov.	Payment Value	Budget Balance	Budget Balance %	
1	882-2000-0912	99355-2003-0223	Top Super Market Co.Ltd.	5,000,000.00	756,000.00	287,500.00	468,500.00	0.09	
2	557-2000-0512	99356-2003-0223	Makro Co.Ltd.	7,000,000.00	2,300,000.00	440,000.00	1,880,000.00	0.27	
3	274-2002-1225	99357-2003-0223	SDO BKK East	3,000,000.00	750,000.00	89,000.00	661,000.00	0.22	
4	832-2001-0912	99358-2003-0223	Lotus Co.,Ltd.	7,000,000.00	1,908,780.00	528,700.00	1,378,080.00	0.20	
5	259-2000-0912	99359-2003-0223	SDO BKK South	3,000,000.00	900,000.00	215,700.00	684,300.00	0.23	
6	237-2000-0912	99364-2003-0223	SDO Pethchaburi	3,000,000.00	700,000.00	294,000.00	406,000.00	0.14	
7	828-2001-0912	99362-2003-0223	Food Lion Co.,Ltd.	5,000,000.00	798,000.00	50,988.00	747,012.00	0.15	
8	281-2000-0912	99353-2003-0223	SDO Chonburi	3,000,000.00	900,000.00	79,000.00	821,000.00	0.27	
9	882-2002-0912	99361-2003-0223	Top Super Market Co.Ltd.	5,000,000.00	468,500.00	30,000.00	438,500.00	0.09	
Total:					9,479,280.00	2,014,888.00	7,464,392.00		

Figure I.2 Report Design: Payment Analysis Report

BIBLIOGRAPHY

1. Date, C. J. An Intrtroduction to Database System Volume I, Sixth Edition. Reading, MA: Assison Wesley, 1996.
2. Forouzan, B. A. Introduction to Data Communication and Networking, MA: McGraw Hill International, 1998.
3. Goldman, J. E. Client/Server Information System: A Businness Oriented Approach NY: John Wiley & Sons, Inc., 1999.
4. Greer, Tyson. Understanding Intrsnets. Resmond, WA: Mircrosoft Press, 1998.
5. Kosiur, David. Understanding Electronic Commerce. WA: Mircrosoft Press, 1997.
6. Laudon, Kenneth and Jane P. Laudon. Mangement Information System. NJ: Prentice Hall Interanational Company, 2000.
7. Micorsoft Corporation. The Windows Interface Guidelines for Software Design. USA: Microsoft Press, 1996.
8. Schewalbe, Kathy. Information Technology Project Management. MA; Course Technology, 1999.
9. Trepper, Charles. E-Commerce Strategies. USA: Microsoft Press, 2000.
10. Whitten, Jeffrey L. and Lonnie D. Bentley. System Anlaysia and Design Methods, Fourth Edition. Boston: Irwin McGraw Hill International, 1998.

