An Electronic Parts Procurement System

by

Ms. Duangporn Rattanatraiphop

A 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
Assumption University

March 2002

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Academic Year	March 17, 2002

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.

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ABSTRACT

This project is an Electronics Parts Procurement System for Xtronics Co., Ltd. Eventhough procurement plays a minor role in the organization, it also effects the performance of the company. The effectiveness and efficiency in procuring will help reduce costs and increase profits. This project is consequently researched to implement a computerized system for procurement section.

The system will cover typical purchase sequences, which are purchase requisition, supplier records, purchase order. The project makes use of System Development Life Cycle methodology (SDLC) that consists of analysis, design and implementation phase.

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I. INTRODUCTION

1.1 Background of the Project

The Xtronics Co., Ltd. is an electronics manufacturing company which produces PCB assembly for both local and overseas customers. Their reputation for reliability is built upon their customer' satisfaction with their high quality products, various services, and on-time deliveries. Materials procurement then is very significant for them to supply components at competitive prices. The significance of quality considerations in procurement varies from one organization to another. So does the quality of a total product reflects the quality of its purchased components. The good quality of the purchasing department ensures customer' satisfaction and increases sales volume in market share.

The major responsibilities of this system, An Electronic Parts Procurement System, are inquiry part from database and generate purchase order to multiple suppliers. Moreover this system can be making decisions about the best way for an organization to acquire a system and on how to choose supplier(s) for that system.

Database parts is the heart of the company, which is interrelated to other departments. There are many files in this database such as which supplier supplies what part, detail of part, supplier, customer, customer order and so on. Most data is filed in this database can be shared by other departments but each department owns and develops their data on a Microsoft excel format. So it wasted time and data can be duplicated.

The processes to find part from parts database begins when customer orders were received, original parts and/or alternative parts quantity of each service order are checked and recorded. If all original parts of a service order are available, then confirm

back to customer. In case that one or more original parts are not available, a parts checker will search for alternative parts. If the alternative part numbers exist in a part checker's record, then the part checker can immediately report back to customer. This process wastes much of time for checking alternative parts by looking from the spreadsheet.

Currently, Xtronics Co., Ltd. realized that they must enhance the performance of their process by focusing on data centralizing, reducing cost, and paperwork, because other companies have jumped into this business. Data centralizing will be developed to be used by all departments to reduce data redundancy, and increase the information accuracy. The database part will be stored in the secured area and will also perform daily backup. The alternative part which is based on daily update basis will also be included in the database. It will be easier than before to find the alternative part because the new database system can provide the information immediately. The part request form and the visited report will be automatically printed out and ready for procurement section to confirm back to customer and make order to supplier, which saves time. This will increase the average of customer service a day. Therefore, the existing system should be analyzed and designed to improve system processes and the database system will be designed and developed to enhance the performance of process in order to be competitive in today market.

1.2 Objective

This system aims at developing a computerized information system to support Electronic Parts Procurement System. After the study of the existing system, this project is suggested as a system that can enhance the business function in terms of capability and control by using a computerized database containing all necessary

information related to procurement and to keep a history of the information. The objectives of this project are as follows:

(1) To study the existing system and identify problem and user requirements.

(2) To design a computerized An Electronic Parts Procurement System to improve the process of finding the alternative parts. This means that the information of possible and available alternative parts are integrated. All information is kept updated since alternative parts always keep changing.

(3) To improve the data controlling and data sharing among related units.

(4) To reduce the processing time and paper cost by increasing the efficiency and effectiveness of the workflow, shortening the work process , and let computer do all routine jobs.

(5) To reduce data redundancy by developing a good database system that supports well for both current and future changes as well as avoid possible problems.

(6) To improve company's performance by using computer based information system.

(7) To select the best suppliers in the market.

(8) To protect the company's cost structure.

(9) To negotiate effectively in order to work with suppliers who will seek mutual benefit through economically supervised performance.

1.3 Scope

The scope of study project is based on the functional areas concerned with collecting and retrieving information on An Electronics Parts database. Management inquiry for information and preparation of a statistic report are also included. Analyzing the existing system, interviewing executives, studying current problems and

requirements and reviewing existing forms and documents identifies these functions. The scope of this project is specified in Electronic Parts Procurement System as follows:

(1) Analyze the problems and find solution to solve problems.

(2) Compare cost expense between the manual system and computerized system.

(3) To analyze and design parts database.

(4) To design the user interface that is easy to use even to those who are not familiar with computers.

(5) To teach the user in the organization, of how to use this new information system.

(6) To design the report that provides the highest benefit to the organization in all aspects such as operation, management and decision making etc.

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II. THE EXISTING SYSTEM

2.1 Background of the Organization

The Xtronics Co., Ltd. has been in the PCB Assembly since 1992. They are a Thai company which has 100 employees. The technology of manufacturing is through hole SMT technology, Flexible circuit board assembly, In-circuit/ Function testing, and Electromechanical assembly. The company's goal is to increase market shares and produce good quality products to satisfy customers. The company has established a good relationship with various customers and suppliers. The company brings new and high technology into the system in order to complete with competitors. The organization chart is show in Figure 2.1.

The company has five departments as follows:

(1) Human Resource Department

This department is responsible for human resources of the company.

(2) Accounting Department

This department is responsible for making general accounting standards, prepare trial balance and income statement, producing payroll for all employees.

(3) Production Department

This department is responsible for producing the company's products.

(4) Marketing Department

This department is responsible for handling all orders from customer and selling the company's product to the customer.

(5) Purchasing Department

This department is responsible for purchasing electronic parts form various Suppliers.

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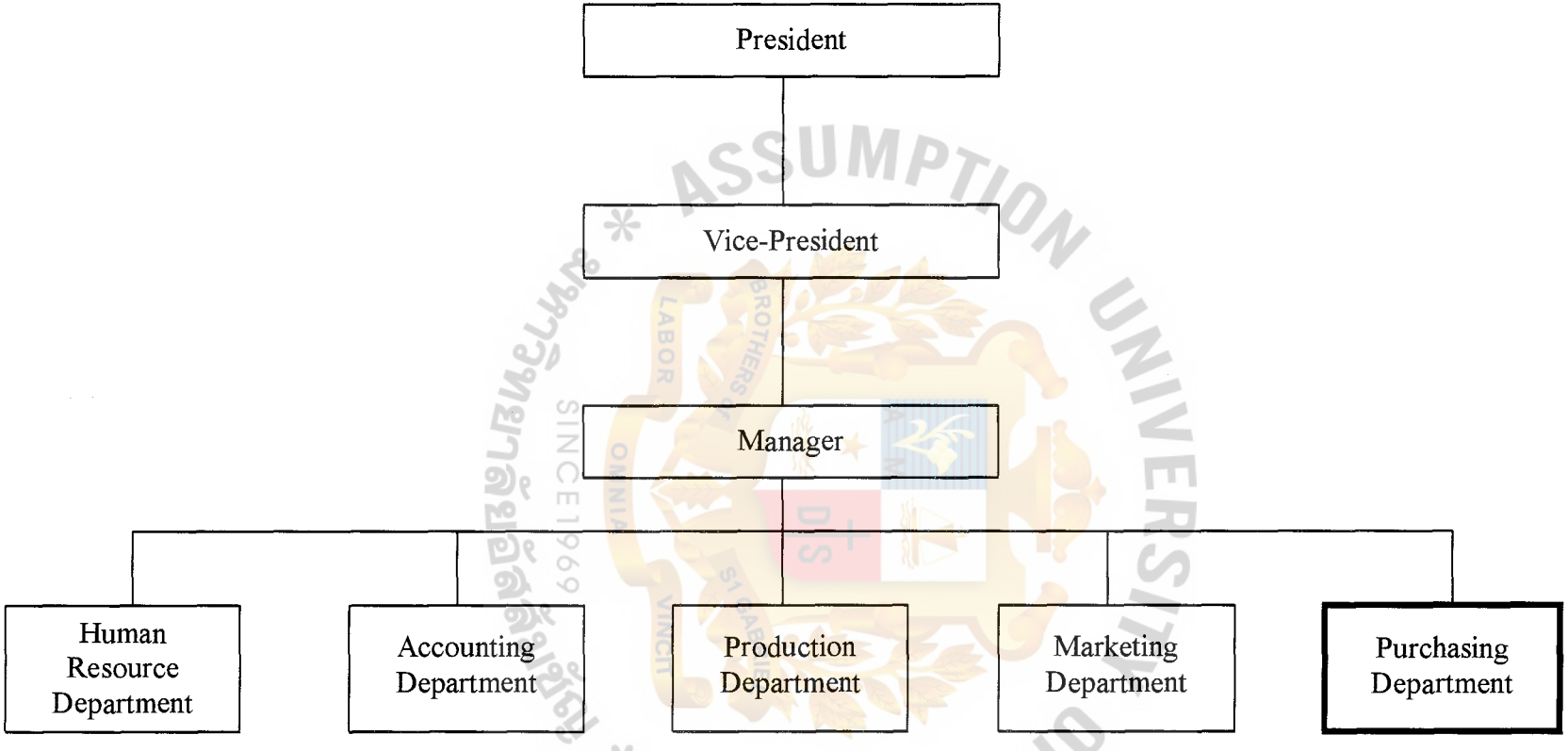

Figure 2.1. The Organization Chart of Xtronics Co., Ltd.

2.2 Existing Electronic Parts Procurement System

As the writer already mentioned that the existing procurement system is done manually, all files are kept manually in paper form. This paper-oriented system generates problems that impact the firm's business marketing strategies. Therefore, studying the existing procurement system can make us better understand the rationale of the problem and find ways to solve them.

Procurement System Process

(1) Customer issues requirement for raw material (BOM – Bill of Material) in terms of fax.

(2) Staff of purchasing department need to fulfill BOM by finding Customer's part document, suppliers part document and other documents related with user's requirement.

(3) After fulfillment of BOM, staff will create Request for Supplier Quotation by keying all requirement that are needed to know price from supplier. Staff will send Request by FAX to suppliers.

(4) After receiving Suppliers Quotation from supplier, Staff will update price and choose best price that matches with customer's requirement.

(5) Create Customer Quotation and sent back to customer by FAX.

2.3 Current Problems and Area for Improvements

Since the whole system of electronic part procurement system are not integrated and mostly manual, some unnecessary works have been performed repeatedly and caused many problems which can be concluded as follows:

2.3.1 Redundant Works for Records Keeping

Many redundant data entries are processed for the order details starting from receiving purchase requisitions, checking supplier data and preparing customer quotation.

With the proposed system, data will be processed and entered only once for the purchase requisitions. Purchasing officer can easily retrieve the BOM requisition data from the database with no need to reenter again.

2.3.2 Too Many Paper Works

The existing system depends on paper works. Supplier and purchase order data are recorded on paper which is the cause of the data loss. It takes a long time to access the data when management wants to use the data.

With the computerized system, purchase requisition, supplier and customer quotation data are kept in the database in the computer. There is back up of the data that will be used when the original data are lost or destroyed.

2.3.3 Difficulties in Retrieval Process

Data is an important asset of the company. It will be used to produce useful information that will be used in the decision making process. In the existing system, all data are recorded on paper. Retrieval process takes a long time to bring the data into data processing system so management has to wait for information for a long time when they want to make a decision.

With the computerized system, data are kept and maintained in the computer. Retrieval process takes a short time to bring vast volumes of the data into the data processing system so the information can be produced on time.

2.3.4 Inconsistent and Incorrect Data

In the manual system, data are record on paper. Data is recorded many times so it causes inconsistent data. Sometimes data is not recorded correctly. Inconsistent and incorrect data are serious problems because management can not make effective and efficient decisions by using these data.

The computerized system can eliminate or reduce the inconsistent data by recording and keeping data only once in the computer. With the proposed system, data can be maintained and updated easily. Data will be checked and verified before recording the data into the computer. This can eliminate or reduce the incorrect data problem. Database is developed to keep the data in the computer.

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III. THE PROPOSED SYSTEM

3.1 User Requirements

In order to get stabilization of the computerized system, user requirements are a vital source of information, which we should analyze. The user requirements will generate the idea of how to design the system and how to appropriate the system to enhance efficiency.

3.1.1 Functions needed to be improved in the proposed system

(1) Reduce time and difficulties in searching for the required information

(2) Increase efficiency in management control

(3) Increase efficiency in company ordering process

(4) Provide all data accurately and effectively

3.1.2 Requirement for the Proposed System

(1) Data security

Data must be ensured to be secure from the hacker or the intruder. Since, the proposed system is a computerized system, the user is required to log-in and log-out when he/she accessed and exits the system.

(2) Accuracy and effectiveness of the data processing

In order to make the data processing work properly, the data given such as product information, price list, details of customers and suppliers should be precisely corrected.

(3) Speed of data

The proposed system must provide the short time output to the user or any particular query with better performance.

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(4) Systematic system

The system should have linkage and smooth exchange process between each department in perfection.

(5) Data integration

Data must be centralized and kept in one sharable database without any redundancy problems.

After analyzing the problems of the existing system and knowing the requirements form the users, the proposed system has been designed. In order to make the system runs systematically and cover all functions of manual system. The flow of data and processing system must be planned.

3.2 System Design

3.2.1 Database Design

A database is a collection of interrelated files, having the ability to share the same data across multiple applications and system. A good database design should fulfil the following objectives:

(1) Data must be simple and easy to use.

(2) Data must be independent.

(3) Data must be flexible, scalable, and adaptable for future requirements and applications.

(4) Data must be reliable.

(5) Data must provide for efficient storage, update and retrieval.

All of these features are necessary in order for a database to support user's queries and reports.

A relational database design has been used in this project, which provides all the above listed features and follows the Integrity rules given below:

(1) Key Integrity: Primary key must not contain null value.

(2) Domain Integrity: Appropriate controls must be designed to ensure that no field takes on the value that is outside the range of legal values.

(3) Referential Integrity: A foreign key which is a Primary key in any other table and which must match that Primary key or be null. The foreign key implements the relationship between records in the tables. Its use increases the flexibility and scalability of any database.

3.2.2 Software Design

This system has been developed using the popular design strategy, that is the modular design. This technique deals with the size and complexity of the program by breaking up the program into a hierarchy of modules.

A module is a group of executable instructions with a single point of entry and a single point of exit which results in a computer program that is easy to implement and maintain.

The system is based on the top-down approach. As the system progresses, it is decomposed into its subsystem. It provides an orderly and systematic framework for the system.

3.2.3 Input Design

Input design is very important for any system success. It must be made in a simple and easy to use format. Correct data entry is very important to generate a correct output. Hence, human factors play a significant role in the input design.

The following features must be considered while designing the input:

(1) The volume of input data should be minimized.

(2) Input is only variable data capture.

(3) Derived attribute is never captured as input.

(4) User friendliness must be consider.

(5) User must be involved.

All of these factors are taken into consideration while designing the inputs.

3.2.4 Output Design

Output can be considered as the proof of the correct and successful system. This is the visible component of the working information system. Output design should also be made simple and easy to understand. Users are actively involved in the output design as well.

The following factors were taken into consideration while designing the outputs of An Electronics Part Procurement System:

(1) Every report must have a title.

(2) Report and screens should include section headings to segment the large amount of information.

(3) Legends are used where necessary to formally define the fields on the reports and screens.

(4) Outputs should be easy to read and interpret.

3.3 Hardware and Software Requirements

3.3.1 Hardware Requirements

(1) Server

Windows 2000 server

(a) Processor Pentium III 733 MHz

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(b)	RAM	256 MB
(c)	Cache Memory	512 KB second level ECC cache
(d)	Hard disk drive	40 GB
(e)	Floppy disk	1.44 MB
(f)	Network Controller	TX 10/100 X(3com-1100)
(g)	CD Drive	50X Philips
(h)	Backup Drive	Seagate (Tape backup)
(i)	UPS	APC-4000 (4,000 VA)

(2) Clients

(a)	Processor	Intel Celeron 1 GHz
(b)	System bus	66 MHz
(c)	Memory	64 SDRAM
(d)	HDD	2.1 AND 3.2 GB
(e)	Port Serial	2 ports
(f)	Port parallel	1 port
(g)	Operating system	Ms windows 98

(3) Mail System

(a) Microsoft Exchange server

(b) Microsoft Exchange client

(4) Backup Drive

(a) Seagate

(5) Printer

HP LaserJet 4050

(a)	Technology	Laser (Dry Electrophotography)

(b) Microprocessor Motorola ColdFire 5202, 35 MHz

(c) Speed 16 ppm

(d) Resolution 1200*1200 dpi plus HP resolution Enhancement technology

(e) Printer language HP PLC 5e

(6) Networking Product

(a) D-Link Dual Speed Managed hub

(b) Ethernet Network Interface card for PCI bus

3.3.2 Software Requirements

(1) Server

(a) Operating system Windows 2000

(b) Mail System Ms Exchange Server/Clients Version5.0

(c) Database MS SQL Server

(2) Clients

(a) Operating system MS Windows 98

(b) Mail System MS Exchange Client version 5.0

(c) Application software Microsoft Access 97

(d) Programming language Microsoft Visual Basic 6.0

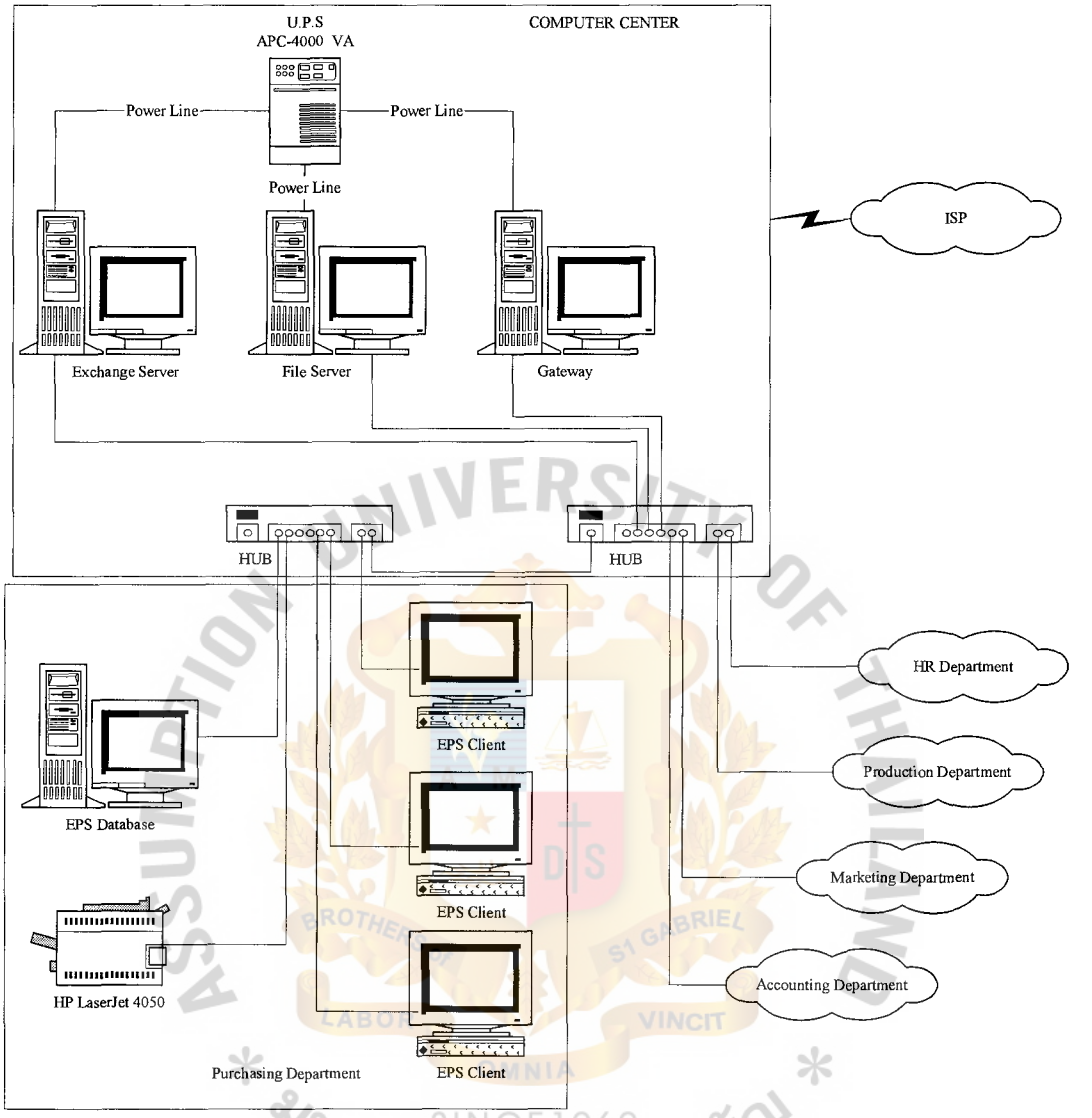

Figure 3.1. Network Design for the Proposed System.

3.4 Security and Control

Security and Control features are very important in today's environment for any information system. Proper security and control should be maintained by every company to prevent from any unauthorized access of data. Data is the most important resource of an information system. Any theft or vandalism could cost the company a lot of money and it should be avoided.

The following steps should be followed by the company to prevent any unauthorized access of information:

(1) Multilevel ID and password is assigned to the DBMS and the application package Procurement system to prevent from any unauthorized access.

(2) Passwords should be frequently changed.

(3) Authorized persons should be required to sign the source document.

(4) Volume backup of data should be made and updated every week

(5) Training should be provided to every employee concerned for proper use of data.

3.5 System Cost Evaluation and Comparison

3.5.1 Cost-Benefit Analysis

Cost-benefit analysis describes the economic feasibility of the proposed system. Costs and benefits are estimated and compared against each other to justify that the proposed system is economically feasible.

(1) System Cost

Costs fall into two categories. Development Costs, Which are associated with the development of the system, and Operational costs, which are associated with operating a system. System development costs are usually one time costs that will not recur after the project has been

completed. These are estimated from the outset of the project and should be defined at the end of each phase of the project. On the other hand operating costs tend to recur throughout the lifetime of the system. These can be estimated only once specific computer solution has been defined. These can be further categorized into Fixed and Variable. Fixed costs occur at regular intervals but at relatively fixed rates, for example: Lease payments and software license payments. Variable costs occur in proportion to some usage factor, for instance: Cost of computer usage, which varies with the workload.

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Table 3.1. Estimated Project Cost, Baht.

Cost Items	Description	Amount	Unit Price	Price
1.Development cost	1.1 Personnel Cost:			
	- Systems Analysis (160 hours/ea)	1	250.00	40,000.00
	- Systems Designer (160 hours/ea)	1	250.00	40,000.00
	- Programmer (120 hours/ea)	1	250.00	30,600.00
	- Database Specialist (120 hours/ea)	1	150.00	18,000.00
	- Telecommunications - Specialist (80 hours/ea)	1	150.00	12,000.00
	Subtotal 1:			140,600.00
	1.2 New Hardware			
	- Windows 2000	1	82,000.00	82,000.00
	- Clients	8	28,125.00	225,000.00
	- HP 128MB 100 MHz ECC SDRAM	1	22,500.00	22,500.00
	- HP 4.2 GB Hot Swap Wide Ultra 2 SCSI	6	28,333.00	170,000.00
	Subtotal 2:			549,500.00
	1.3 New Software			
	- Server Software (Operating System)	1	70,000.00	70,000.00
	- DBMS Server Software	1	89,000.00	89,000.00
	- Ms Exchange Server/Clients V.5.0	1	70,000.00	70,000.00
	Subtotal 3:			229,000.00
	Total Development Costs:			919,100.00
2. Operation cost	2.1 Personnel:			
	- MRP Manager	1	240,000.00	240,000.00
	- Technician	1	96,000.00	96,000.00
	Subtotal 1:			336,000.00
	2.2 Maintenance:			
	- Hardware Maintenance			45,500.00
	- Software Maintenance			36,000.00
	Subtotal 2:			81,500.00
	Total Projected Annual Cost:			417,500.00

(2) System Benefits

Benefits normally increase profits or decrease cost, both highly desirable characteristics of a new information system. As much as possible, benefits should be quantified in dollars and cents.

Benefits are categorized into Tangible and Intangible benefits. Tangible benefits are those that can be easily quantified. These are usually measured in terms of monthly or annual savings or profit to the firm. Intangible benefits are those benefits believed to be difficult or impossible to quantify. If a benefit cannot be quantified, it is difficult to accept the validity of the cost-benefit analysis that is based on incomplete data.

Hence both kinds of benefits are considered while doing the feasibility analysis of this project.

Estimated Tangible benefits: (per annum)		Baht
(a)	Cost reduction of employee salaries	150,000
(b)	Cost reduction of paper	20,000
(c)	Reduction of transaction costs	50,000
(d)	Reduction of inventory carrying costs	125,000
(e)	Reduction of processing errors	50,000
(f)	Increased throughput	50,000
(g)	Decreased response time	50,000
(h)	Elimination of job steps	80,000
(i)	Reduced expenses	25,000
(j)	Increased sales	250,000

Intangible benefits:

(a) Better decision making

(b) Improved work performance, efficiency and productivity

(c) Improved customer goodwill

(d) Significant reduction in errors

(e) Effective time and resource management

(f) Intra-organization cooperation

(g) Computer based information system

(h) Competitive advantage

(3) Payback Analysis

The payback analysis is a technique for determining if and when an investment will pay for itself. Payback analysis determines how much time will lapse before accrued benefits overtake accrued costs. This period of time is called the payback period.

Costs and benefits are adjusted for the time value of money. That is, these are adjusted to current dollar values with the help of discount rates. The discount rate is a percentage similar to interest rates that you earn on savings account. It can be considered as an acceptable return on its investments. Using the discount rate (taken 12%) the present value of a dollar at any time in future is calculated.

(4) Return On Investment Analysis

This technique compares the lifetime profitability of the project. The ROI of a project is a percentage rate that measures the relationship between the amount the business gets back from an investment and the amount invested.

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(5) Net Present Value Analysis

After discounting all costs and benefits, subtract the sum of discounted costs from the sum of the discounted benefits to determine the net present value.

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Table 3.2. Payback Analysis, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Deveploment Cost	919,100.00					
Operation and Maintainence cost		417,500.00	438,375.00	460,293.00	483,307.00	507,472.00
Discount Factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Present Value of annual cost	919,100.00	372,827.00	349,384.00	327,728.00	307,383.00	287,736.82
Cumulative time-adjusted over life-time	919,100.00	1,291,927.00	1,641,311.00	1,969,039.00	2,276,422.00	256,158.82
Benefits derived from operation of the new system	0	850,000.00	935,000.00	1,028,000.00	1,131,350.00	1,244,485.00
Discount Factor for 12%	1	0.893	0.797	0.715	0.636	0.567
Time adjusted benefits (adjusted to present value)	0	759,050.00	745,195.00	731,936.00	719,539.00	705,623.00
Cumulative time-adjusted over life-time	0	759,050.00	1,504,245.00	2,236,181.00	2,955,720.00	3,661,343.00
Cumulative lifetime time-adjusted costs+benefits	-919,100.00	-532,877.00	-137,066.00	267,142.00	679,298.00	1,097,184.00

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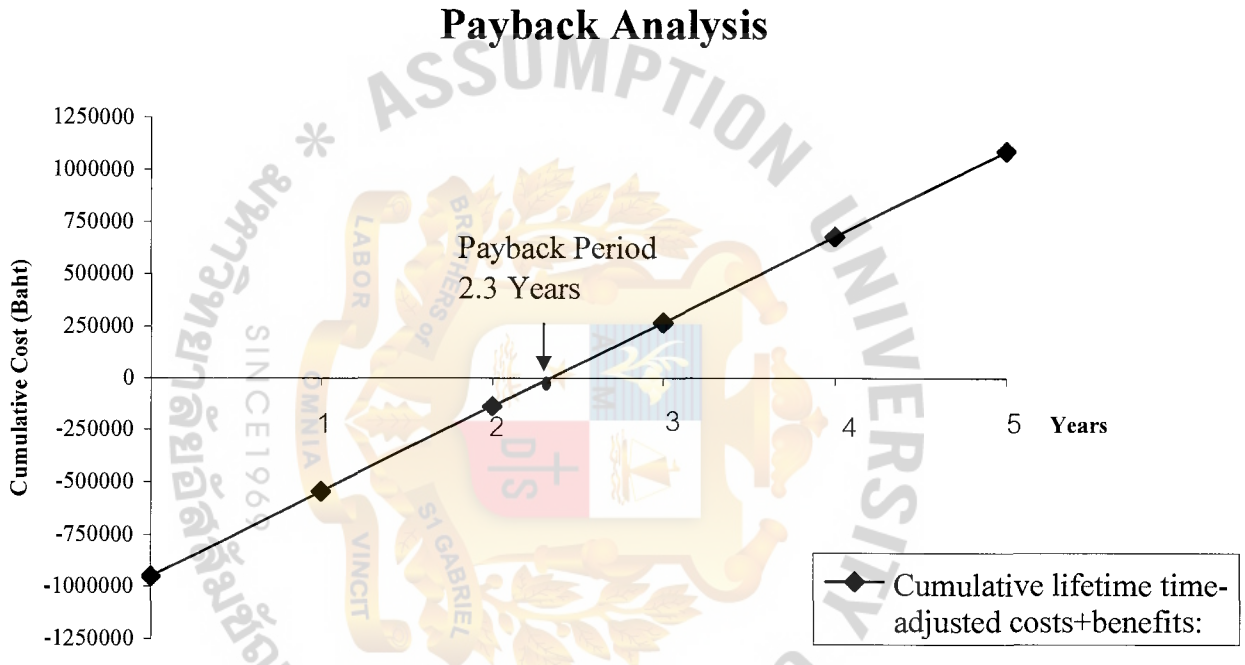

Figure 3.2. Payback Analysis.

Table 3.3. Net Present Value Analysis, Baht.

Cost Items	Years						
	0	1	2	3	4	5	Total
Deveploment Cost:	919,100.00						
Operation and Maintainence cost:		417,500.00	438,375.00	460,293.00	483,307.00	507,472.00	
Discount Factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present Value of annual cost:	919,100.00	372,827.00	349,384.00	327,728.00	307,383.00	287,736.82	
Cumulative time-adjusted cost over life-time:	919,100.00	1,291,927.00	1,641,311.00	1,969,039.00	2,276,422.00	256,158.82	
Benefits derived from operation of the new system:	0	850,000.00	935,000.00	1,028,000.00	1,131,350.00	1,244,485.00	
Discount Factor for 12%	1	0.893	0.797	0.715	0.636	0.567	
Time adjusted benefits: (adjusted to present value)	0	759,050.00	745,195.00	731,936.00	719,539.00	705,623.00	
Cumulative time-adjusted cost over life-time:	0	759,050.00	1,504,245.00	2,236,181.00	2,955,720.00	3,661,343.00	
NET PRESENT VALUE							1,097,184.00

Table 3.4. Return On Investment Analysis, Baht.

Cost Items	Years						
	0	1	2	3	4	5	Total
Deveploment Cost:	919,100.00						
Operation and Maintainence cost:		417,500.00	438,375.00	460,293.00	483,307.00	507,472.00	
Discount Factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present Value of annual cost:	919,100.00	372,827.00	349,384.00	327,728.00	307,383.00	287,736.82	
Cumulative time-adjusted cost over life-time:	919,100.00	1,291,927.00	1,641,311.00	1,969,039.00	2,276,422.00	256,158.82	
Benefits derived from operation of the new system:	0	850,000.00	935,000.00	1,028,000.00	1,131,350.00	1,244,485.00	
Discount Factor for 12%	1	0.893	0.797	0.715	0.636	0.567	
Time adjusted benefits: (adjusted to present value)	0	759,050.00	745,195.00	731,936.00	719,539.00	705,623.00	
Cumulative time-adjusted cost over life-time:	0	759,050.00	1,504,245.00	2,236,181.00	2,955,720.00	3,661,343.00	
NET PRESENT VALUE							1,097,184.00
RETURN ON INVESTMENT:					1097184/2564159 = 0.43		43%

Table 3.5. Cost Comparison between Computerized System and Existing System.

Cost Items	Years				
	1	2	3	4	5
Existing System					
1. Hardware Cost:	16,000	16,000	16,000	16,000	16,000
2. Software Cost:	8,000	8,000	8,000	8,000	8,000
3. Maintenance Cost:	10,000	11,500	13,225	15,209	17,490
4. Personnel Cost:	600,000	690,000	793,500	912,525	1,049,404
5. Stationary Cost:	60,000	69,000	79,350	91,253	104,940
6. Office Equipment Cost	10,000	10,000	10,000	10,000	10,000
7. Utitlity Cost	60,000	69,000	79,350	91,253	104,940
Total Cost	764,000	873,500	999,425	1,144,240	1,310,774
Cumulative Cost	764,000	1,637,500	2,636,925	3,781,165	5,091,939
Computerized System					
1. Development Cost	140,600				
2. Hardware Cost	109,900	109,900	109,900	109,900	109,900
3. Software Cost	45,800	45,800	45,800	45,800	45,800
4. Personnel Cost	336,000	369,600	406,560	447,216	491,938
5. Maintenance Cost	81,500	89,650	98,615	108,477	119,324
6. Stationary Cost	70,000	73,500	77,175	81,034	85,085
7. Office Equipment Cost	14,000	14,000	14,000	14,000	14,000
8. Utitlity Cost	80,000	84,000	88,200	92,610	97,241
Total Cost	877,800	786,450	840,250	899,037	963,288
Cumulative Cost	877800	1,664,250	2,504,500	3,403,537	4,366,825

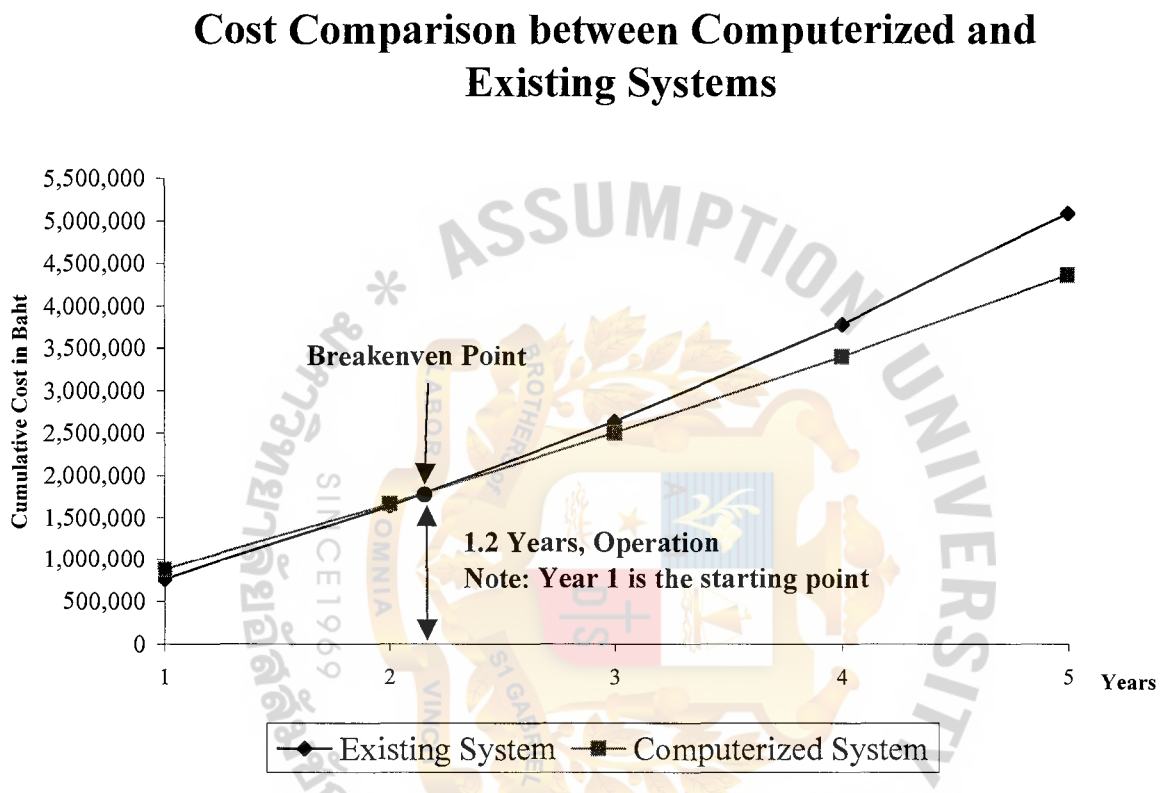

Figure 3.3. Cost Comparison between Computerized System and Existing System.

IV. PROJECT IMPLEMENTATION

4.1 Project Management

A project is considered as a sequence of unique, complex, and connected activities having one goal or purpose that must be completed by a specific time, within budget and according to specification. Hence for any system development project, effective project management is necessary to ensure that the project meets the deadline, is developed within an acceptable budget, and fulfills expectations and specifications.

For this reason, the project management techniques and project modeling techniques are very helpful in implementing the project successfully. A Gantt chart is being used here to effectively present the milestones of this project. It also presents the definition, direction, monitoring, and controlling the development of this information system with a specified time frame.

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

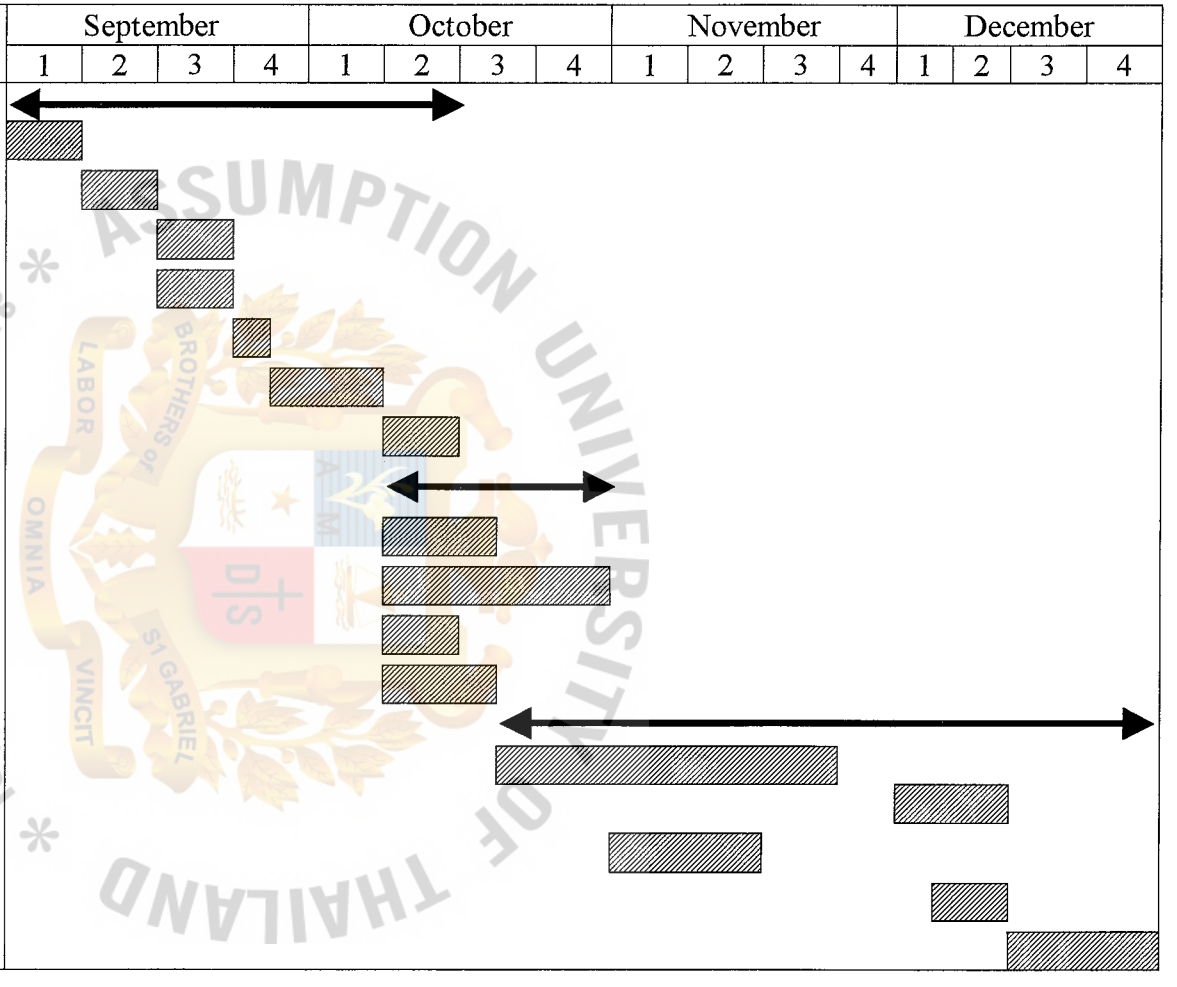

Figure 4.1. Project Plan of An Electronics Part Procurement System.

4.2 Overview of System Implementation

System implementation is the construction of the system and the delivery of that system into production. System implementation consists of two phases, namely: Construction and Delivery.

The purpose of the construction phase is twofold:

(1) To build and test a functional system that fulfils business and design requirements

(2) To implement the interfaces between the new system and existing production systems.

After the approval of the technical design statement and prototypes, the construction of the new system begins. During the construction, we construct and test the system components. First activity in the construction phase is to build and test the networks. The second activity is to build and test the database. This task must immediately precede other programming activities because database are the resources shared by the computer programs to be written. After completion of this activity, the installation and testing of the Software package is done. This activity is followed by the writing and testing of the new programs.

4.2.1 Testing

Testing is a very important skill in computer programming. Modules and programs are tested and debugged as they are written. Testing should not be deferred until after the entire program has been written.

Following types of testing are performed:

(1) Stub testing: A test performed on individual modules, whether they be main program, subroutine, subprogram, block, or paragraph.

(2) Unit of Program testing: A test whereby all the modules that have been coded and stub tested are tested as an integrated unit. Unit testing uses the test data created during the design phase. All modules are then implemented and that unit equals the program itself.

(3) System testing: A test that ensures that application programs written in isolation work properly when they are integrated into the new system.

(4) Peak load testing: A test that determines whether the system can handle the volume activities in the peak period of processing demand.

(5) Storage testing: A test that determines the storage capacity of the system to store transaction data on a disk or in other files.

(6) Backup and recovery testing: It tests that all backup and recovery procedures are working properly and with consistency.

(7) Performance or Response time testing: A test that determines how long it will take the system to process one instruction.

(8) Human factors testing: It determines how users will react when they use the system, such as input, output, and interface design.

4.2.2 Prepare Conversion Plan

The purpose of this activity is to prepare a detailed conversion plan to provide a smooth transition from the old system to the new system. Following steps are required to complete this activity:

(1) Collect and review design specifications for the new system to identify database to be installed and user training needs.

(2) Establish a schedule for installation of databases.

(3) Identify a training program and schedule for the system users.

(4) Develop a detailed installation strategy to follow for converting from the existing to the new production information system.

The development team agreed upon the Parallel conversion approach for the conversion. Under this approach, both the old and the new systems are operated for some period of time. This is done to ensure that all major problems in the new system have been solved before the old system is discarded. This strategy minimizes the risk of major flaws in the new system causing irreparable harm to the business.

4.2.3 Training

Converting to a new system necessitates that system users be trained and provided with documentation that guides them through using the new system. Training is performed on the group basis because it is a better use of time and it encourages group learning possibilities. Simple and clear user manuals are given to the users. The user manuals contain a detailed explanation of people's jobs for the new system. It also shows how the new system fits into the overall workflow. Training needs of the system users is reviewed by referring to the conversion plan. Schedule training sessions are then established and conducted on the group basis.

4.2.4 System Support

System support is the ongoing maintenance of a system after it has been placed into operation. This includes program maintenance and system improvements. It consists of four ongoing activities, namely:

(1) System maintenance

(2) System recovery

(3) End-user assistance

(4) System-enhancement and reengineering

System maintenance is actually the corrective action taken when some error or bugs are identified in the system. These bugs may be caused by the miscommunication of the requirements or the design flaws. Some are even caused by the unanticipated situations, which were therefore not tested.

The fundamental objectives of the system maintenance are:

(1) To make predictable change to existing programs to correct errors that were made during systems design and implementation.

(2) To preserve those aspects of the programs that were already corrected.

System recovery can be defined as the overcoming from crash. From time to time, system failure is inevitable. It generally results in an aborted or "hung" program and possible loss of data. Hence during system recovery, we fix the system.

System support also asks for the End-user assistance. User always require additional assistance, no matter how well they have been trained. Hence, we should routinely observe the use of the system, conduct user satisfaction surveys and meetings, changing business procedures and clarifications, provide additional training, and logging additional ideas and requests in the repository.

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V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The Xtronics Co., Ltd. is an electronics manufacturing company which produces PCB assembly for both local and overseas customers. As the demand forecast for the electronic parts is continuously growing, this company is expected to grow with it. The company has been continuously utilizing various means to fulfil the demands of the market and stand ahead in its competition.

The development of An Electronic Parts Procurement System is also a step into its development. All the work was done manually before this system was developed utilizing more resources and giving poor results. This system will provide the Purchase department with the automatic generation of all the Procurement reports as well as any ad-hoc queries and exception reports.

5.1.1 Intangible Benefits

Despite the various tangible benefits that are already show and compared with the costs, there are also intangible benefits of this project. Although these benefits are difficult to quantify, a project would be incomplete without identifying these. Here are some of the intangible benefits provided by this project:

(1) Better decision making

(2) Improved work performance, efficiency and productivity.

(3) Improved customer goodwill

(4) Significant reduction in errors

(5) Effective time and resource management

(6) Intra-organization cooperation

(7) Computer based information system

(8) Competitive advantage

5.1.2 Degree of Achievements

Table 5.1 shows the degree of achievements of this project. It shows the time spent on each process of the proposed system compared to the existing system.

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

Process	Sub-Process	Existing System	Proposed System
Register Processing	Create New Customer	30 mins.	15 mins.
	Create New Project	30 mins.	15 mins.
Process BOM Requisition	Prepare BOM requisition	1 hr.	30 mins.
	fulfillment BOM requisition	1.5 hr.	45 mins.
Process Supplier Quotation	Create Supplier Quotation	45 mins.	15 mins.
	Update Price	30 mins.	15 mins.
Process Customer Quotation	Create Customer Quotation	45 mins.	15 mins.
	update confirm BOM	30 mins.	15 mins.
Generate Report	generate report	1 hr.	30 mins.

The proposed system will directly benefit workers that it can reduce workload. Managers will get better report in a more timely manner that can better facilitate their decision making and provide them with a more through looks at the operation and control. Additionally, customers will get better and faster services from the workers.

(1) Register Process.

(a) Create New Customer.

Paper document will be less since customer information is kept in electronic form. Customer will receive quick response from the company.

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(b) Create New Project.

Workers need less time to accept customer's order since they can check product available and customer or supplier member quickly.

(2) Process BOM Requisition.

(a) Prepare BOM requisition.

Worker don't need much of time to check real stock. Customer will receive quick response from the company.

(b) Fulfillment BOM requisition.

Part information does not need to be repeatedly written each time when it needs to be issued or corrected. BOM details can be retrieved from database.

(3) Process Supplier Quotation.

(a) Create Supplier Quotation

Workers don't need much of time to create supplier quotation because all of data can be retrieved from database.

(b) Update Price.

Workers need less time to update price because part detail and old price can be retrieved from database.

(4) Process Customer Quotation.

(a) Create Customer Quotation.

Customer satisfaction will be improved since workers can create customer quotation quickly and get the lowest price.

(b) Update confirm BOM.

Workers need less time to update confirm BOM and also can sent order to production department immediately.

(5) Generate Report.

Manager can be easy to retrieved information from database and generate report as they request.

5.2 Recommendations

An Electronic Parts Procurement System is essential to the strategic mission and plan of purchasing department of Xtronics Co., Ltd. Unless old legacy system was dramatically improved, it was unlikely that business would be able to realize any of its Strategic vision. It is recommended that the same strategy be applied to other areas of the business, which will further enhance the growth prospects of the company.

The company can also utilize the benefits of internet to reach their customers and suppliers making an enterprise network.

In the end, I would say that world is going towards computerization and automation. It is recommended that the new and upcoming technologies should be utilized for better efficiency and performance in the company, such as the Bar-code technology, which will eliminate the need of keying data, either by data entry clerks or end-users.

APPENDIX A

CONTEXT DIAGRAM

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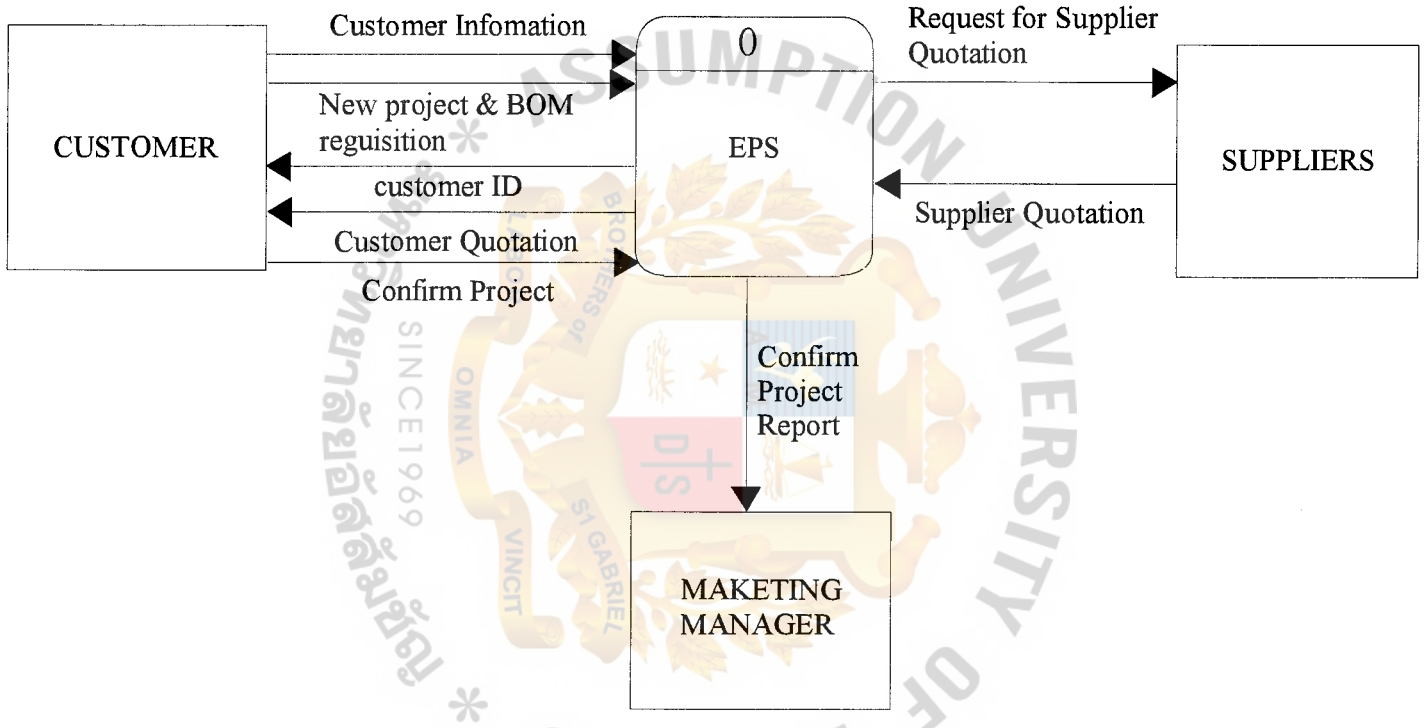

Figure A.1. Context Diagram of the Existing System.

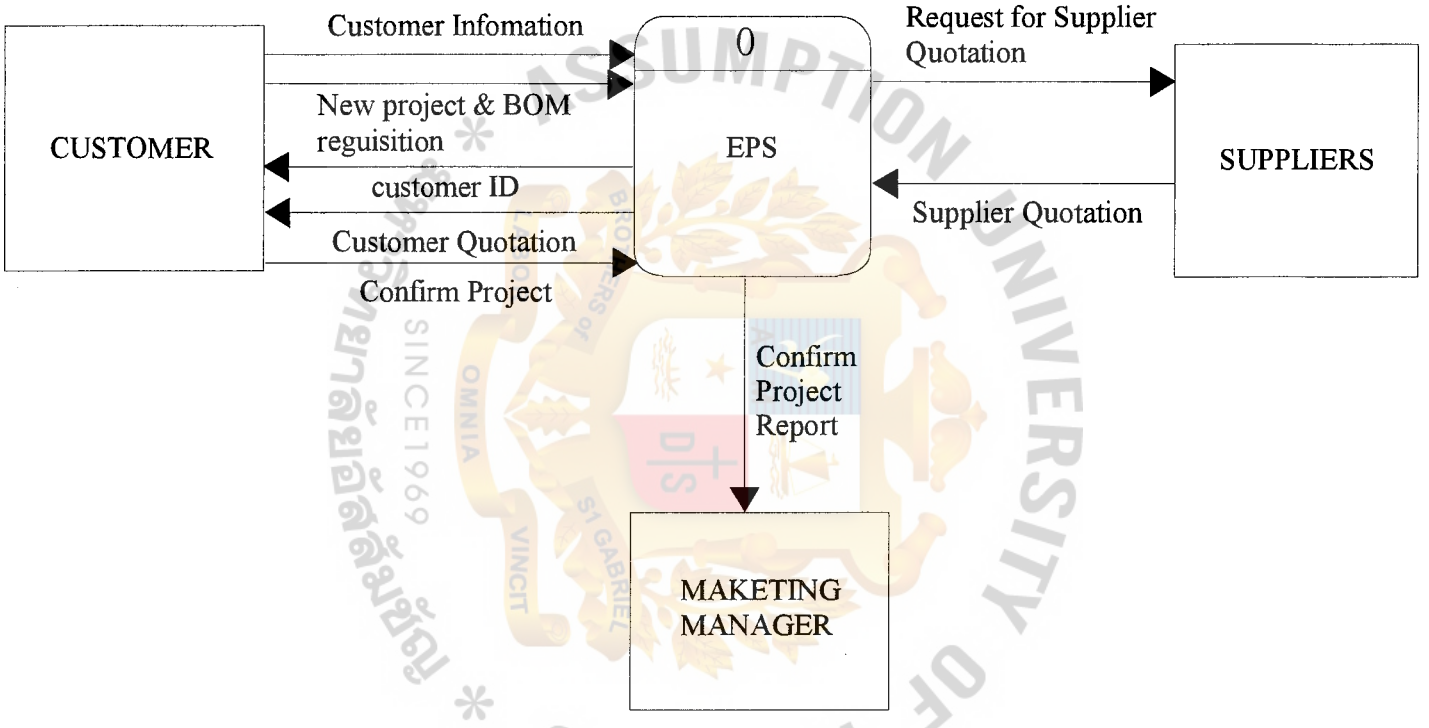

Figure A.2 Context Diagram of the Proposed System.

APPENDIX B

EVENT DECOMPOSITION DIAGRAM & STRUCTURE CHART

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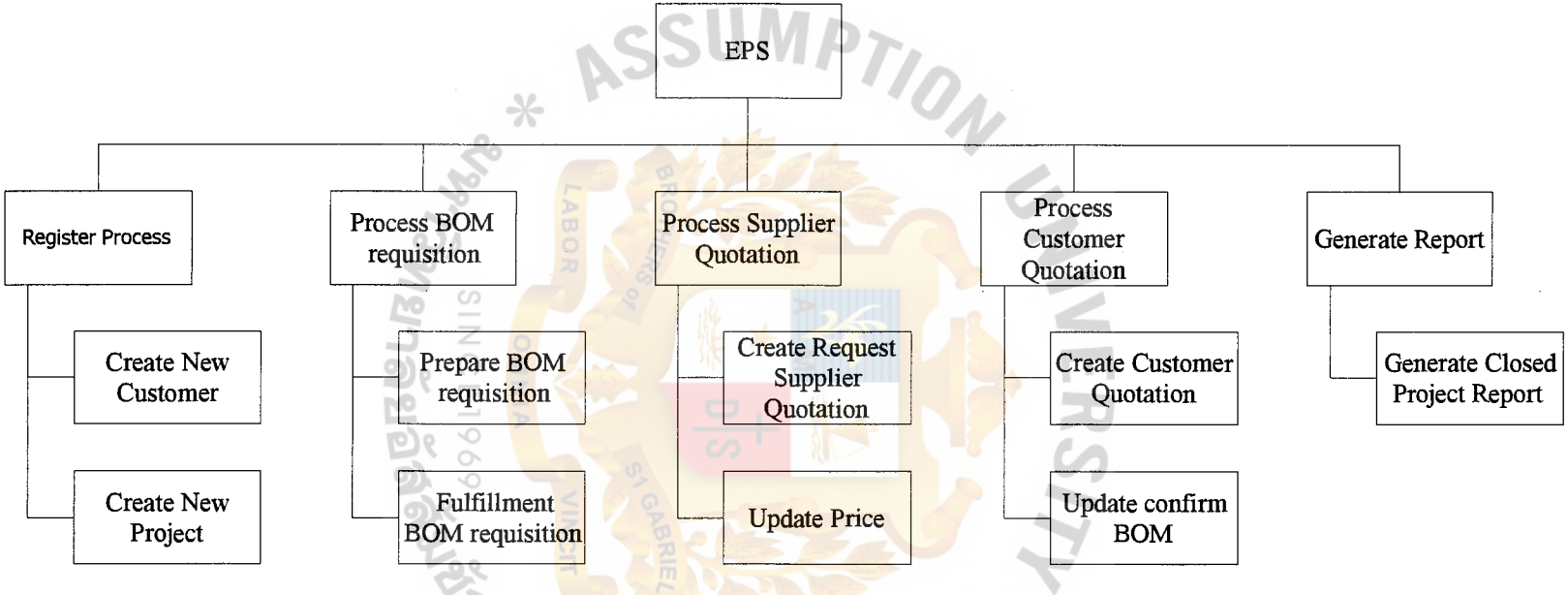

Figure B.1. Electronic Parts Procurement System Event Decomposition Diagram.

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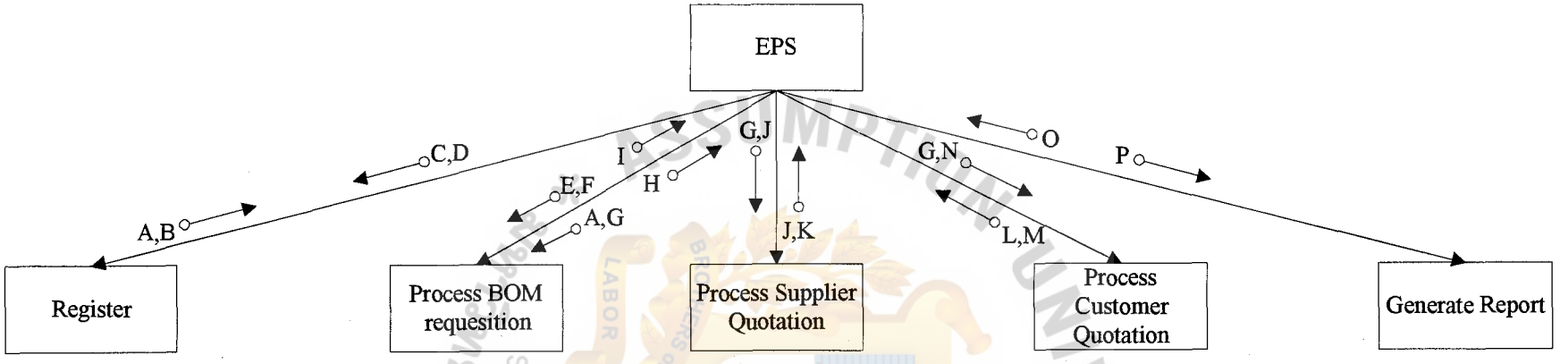

A = Customer information
B = Project Information
C = Project ID
D = Customer ID
E = Supplier Parts
F = Customer Parts
G = BOM
H = Customer Parts
I = Enquiry Parts
J = Supplier Quotation
K = Update Price
L = Mark confirm
M = Customer Quotation
N = Confirm BOM
O = Confirm project Report
P = Confirm project

Figure B.2. Structure Chart.

APPENDIX C

DATA FLOW DIAGRAM

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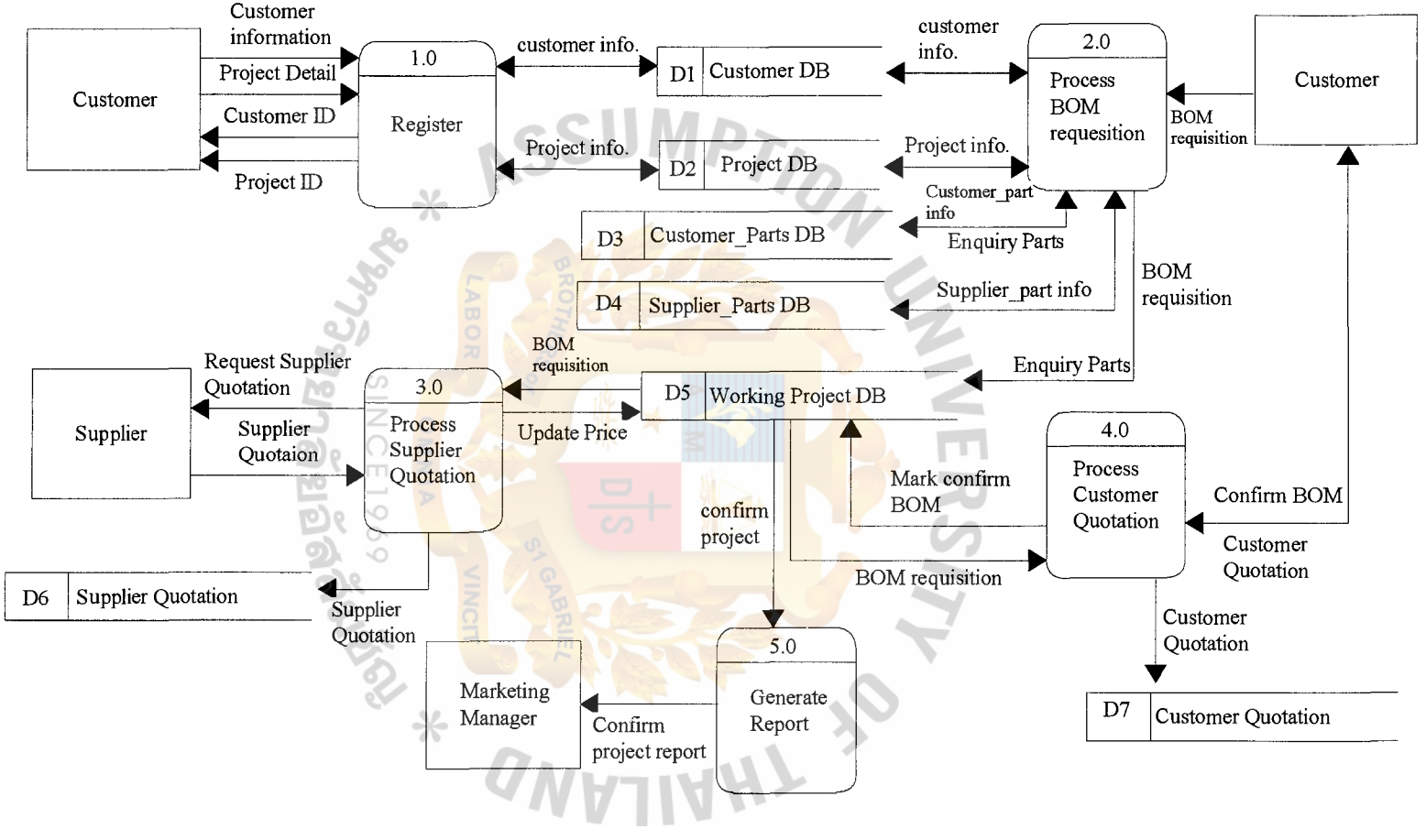

Figure C.1. EPS Data Flow Diagram - level 0.

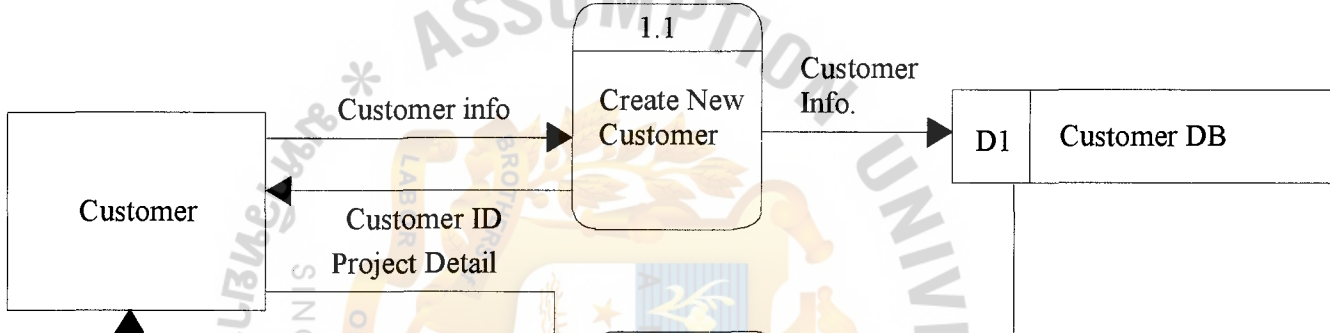

Figure C.2. Data Flow Diagram – Level1 (Process Name : Register).

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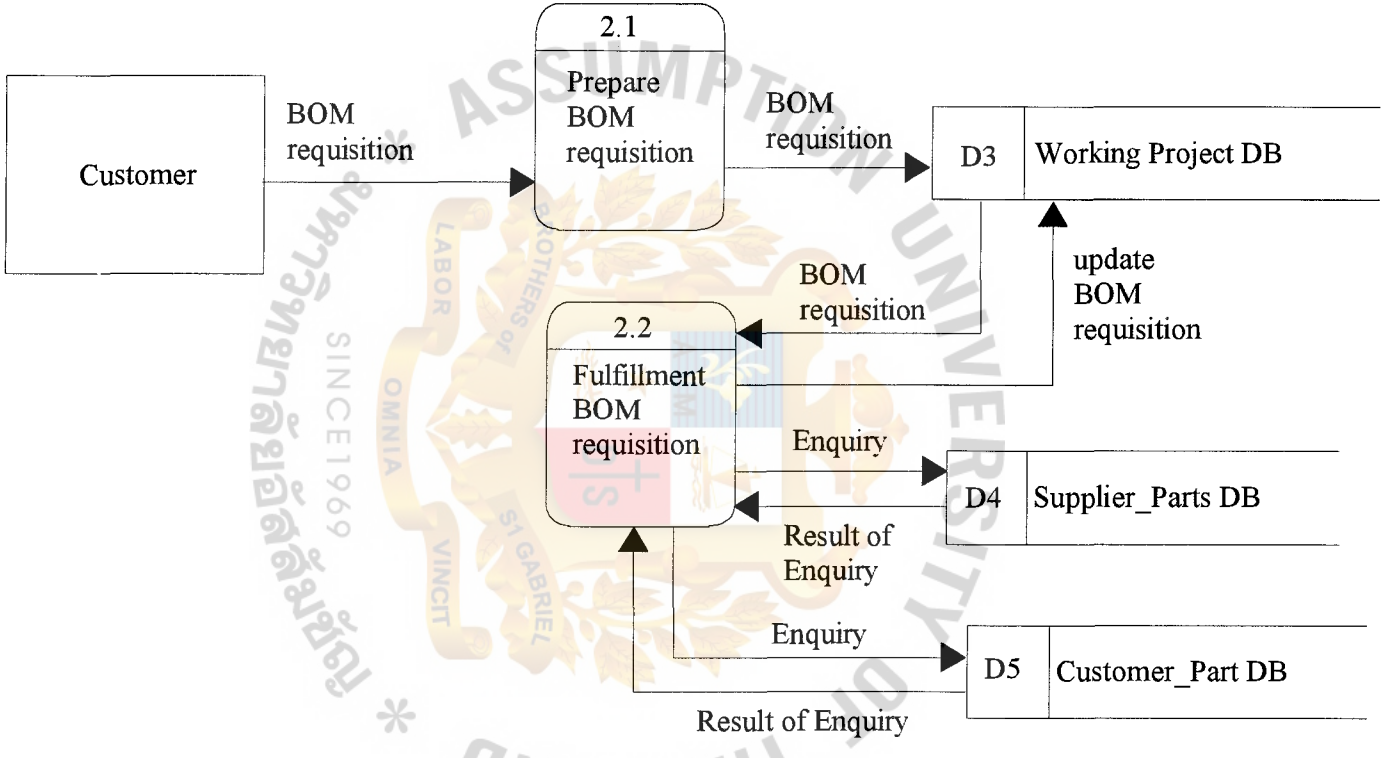

Figure C.3. Data Flow Diagram – Level1 (Process Name: Prepare BOM requisition).

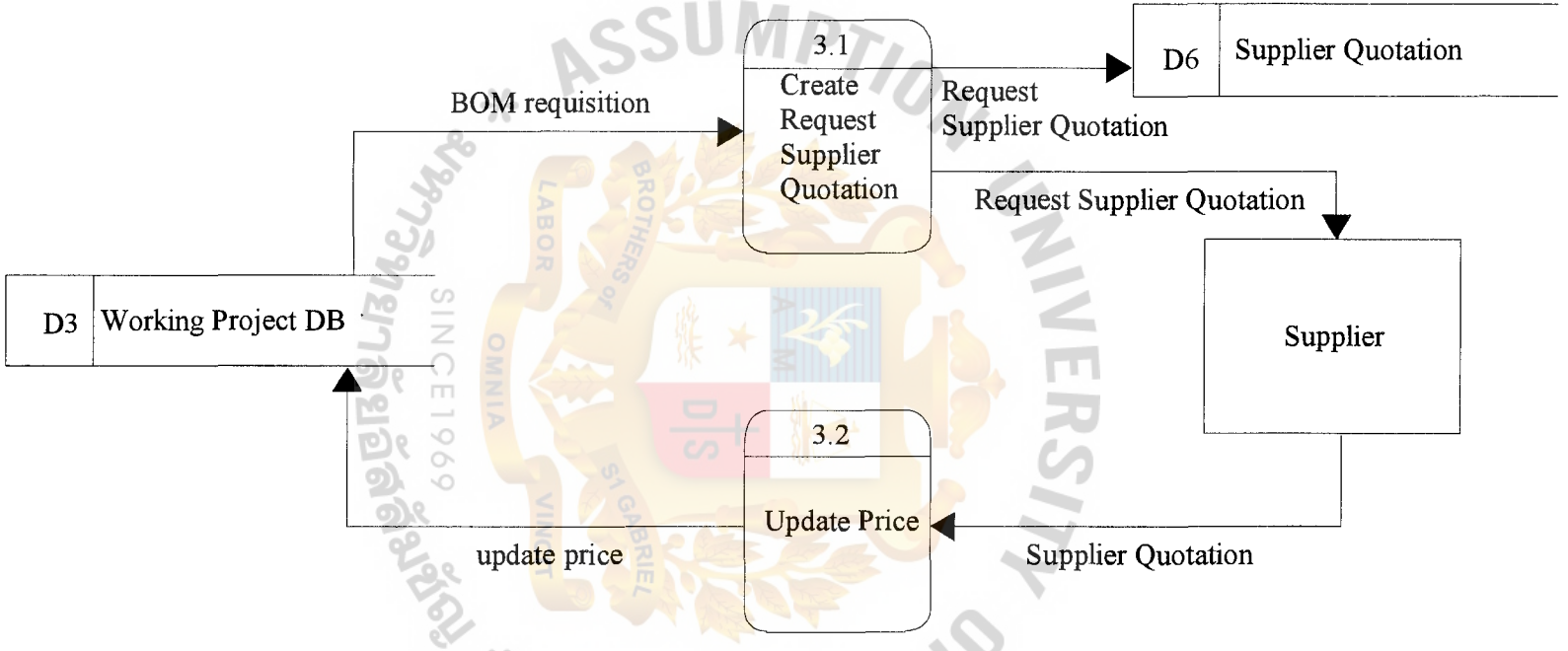

Figure C.4. Data Flow Diagram – Level1 (Process Name : Process Supplier Quotation).

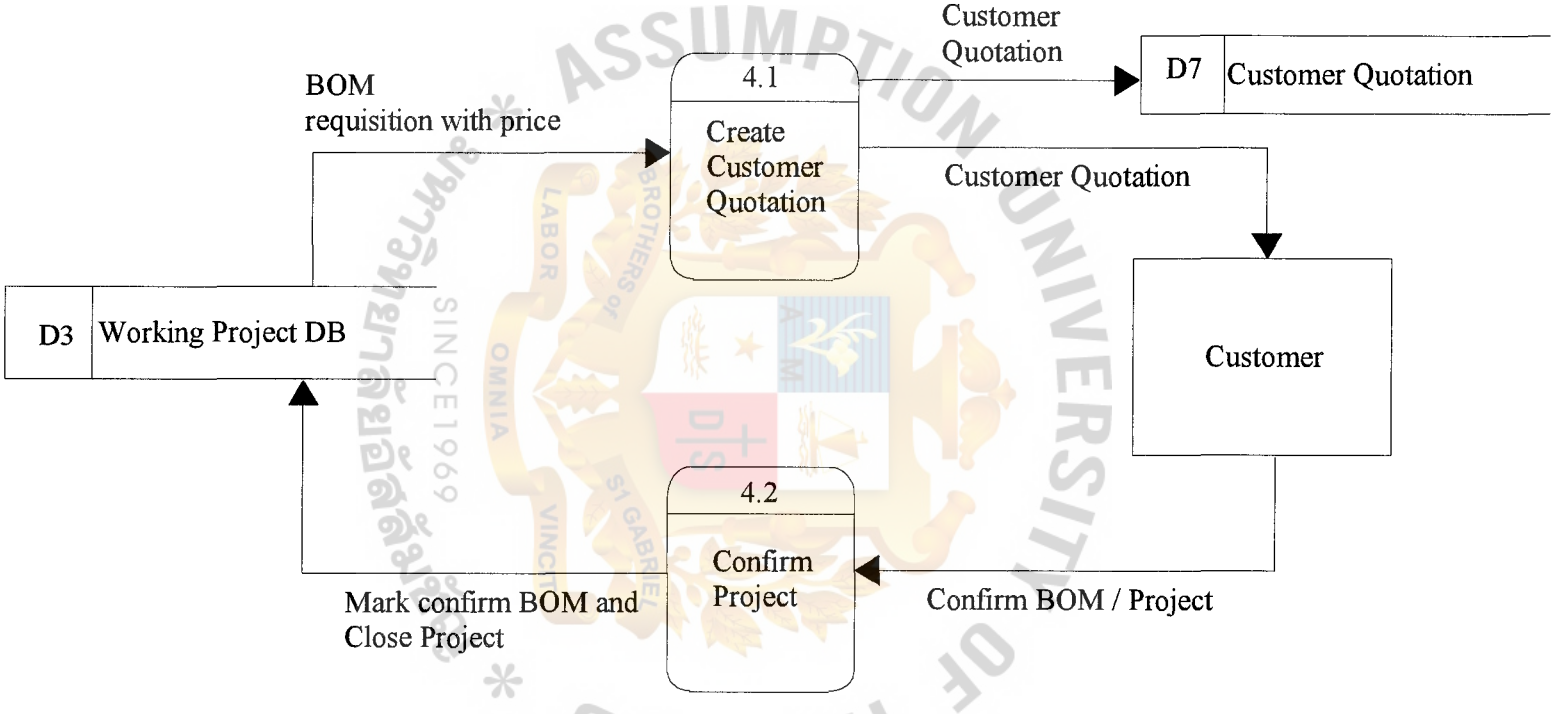

Figure C.5. Data Flow Diagram – Level1 (Process Name : Process Customer Quotation).

APPENDIX D

ENTITY RELATIONSHIP DIAGRAM

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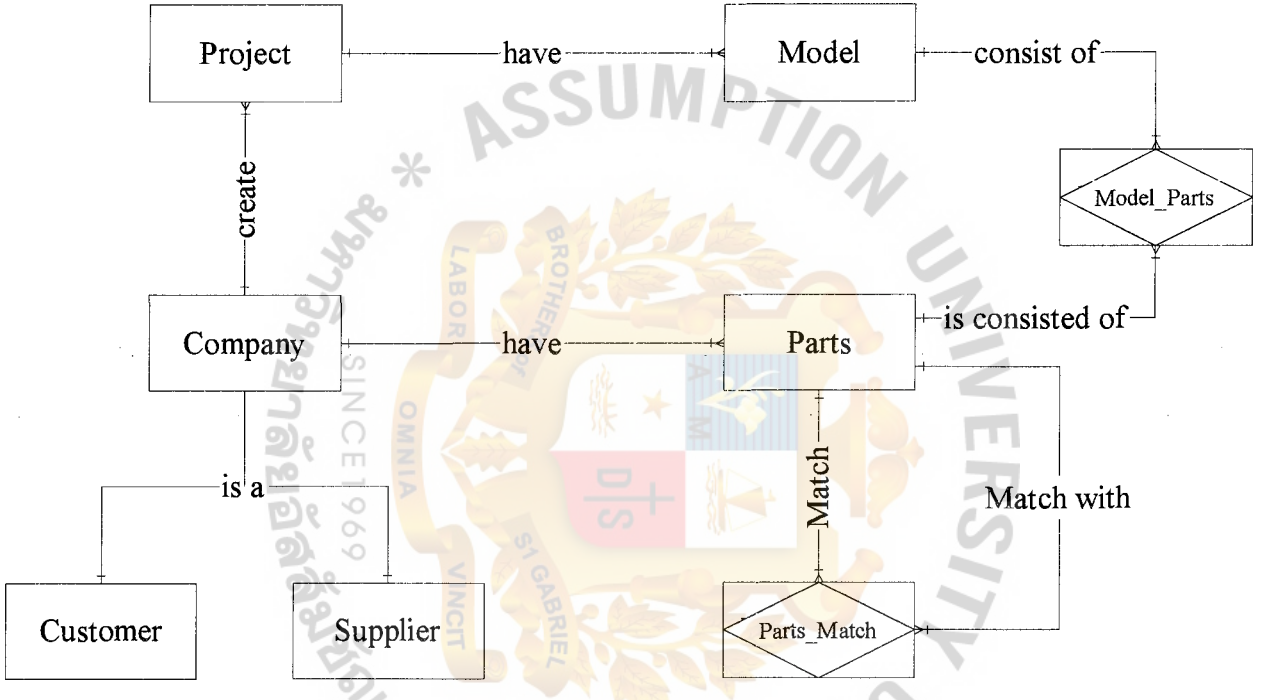

Figure D.1. Entity Relationship Context Diagram.

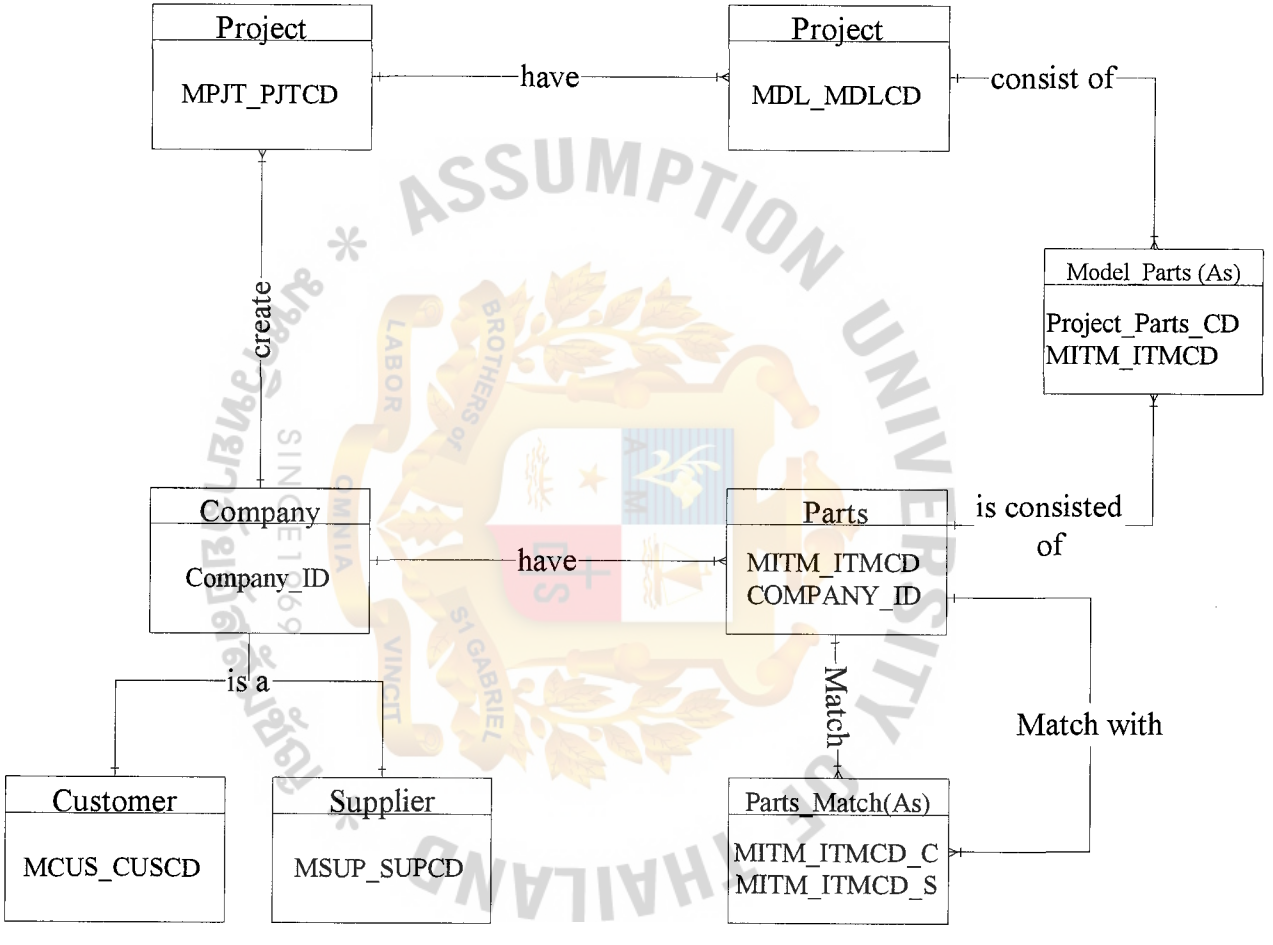

Figure D.2. Key Based Entity Relationship Diagram.

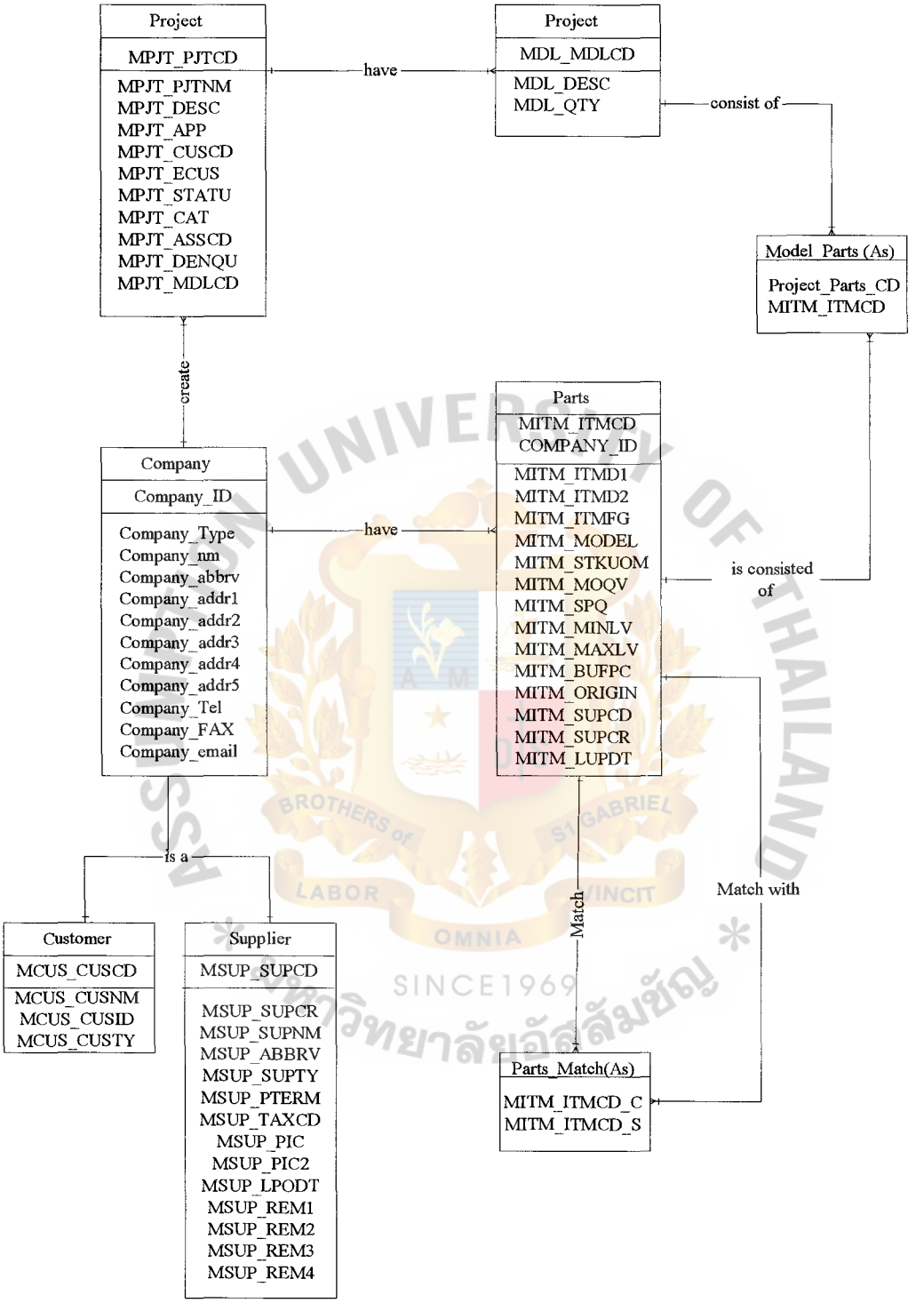

Figure D.3. Fully Attributed Entity Relationship Diagram.

APPENDIX E

INTERFACE DESIGN

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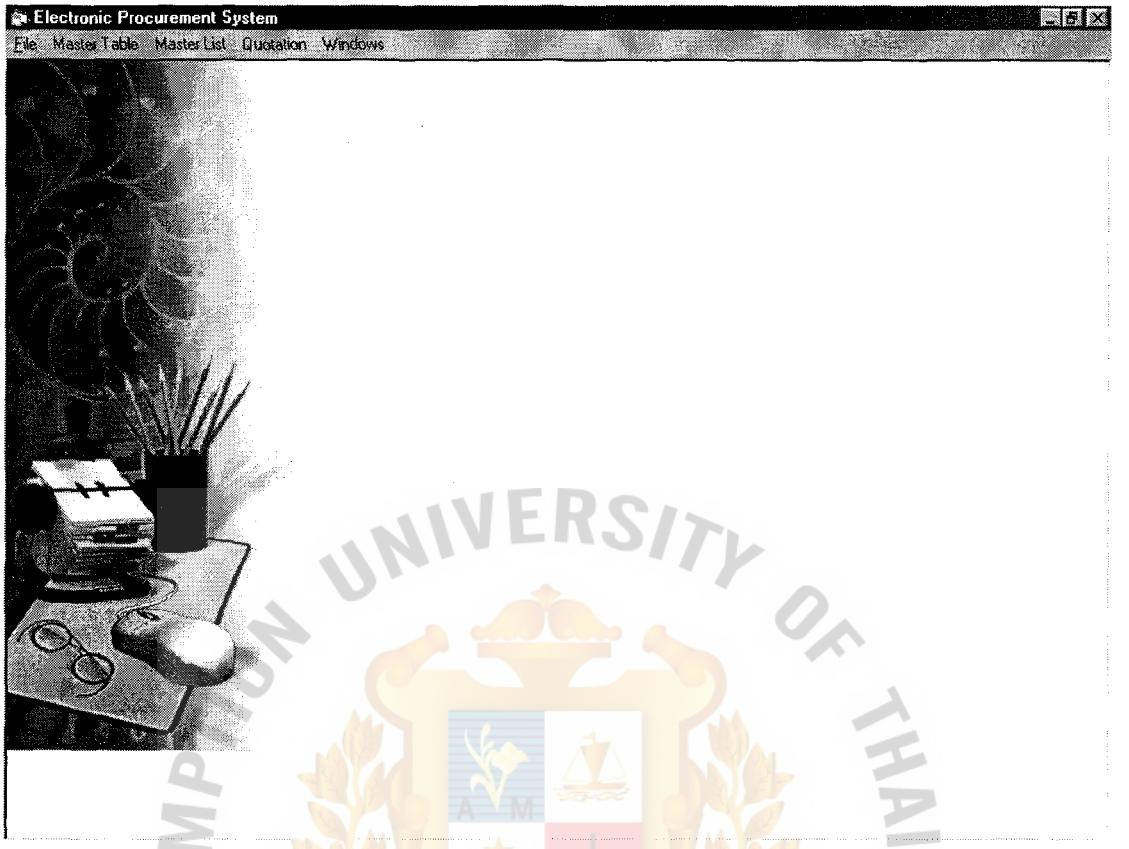

Figure E.1. Main Menu Form.

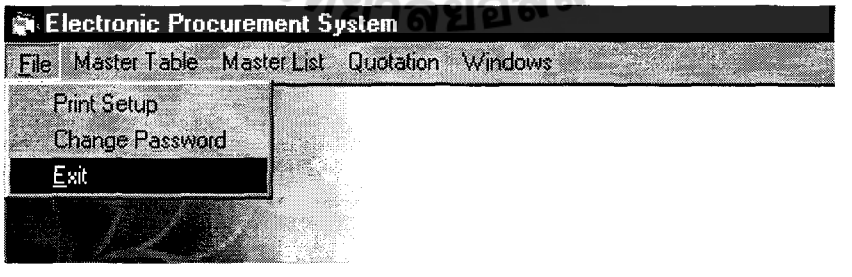

Figure E.2. Main Menu Form (File Menu).

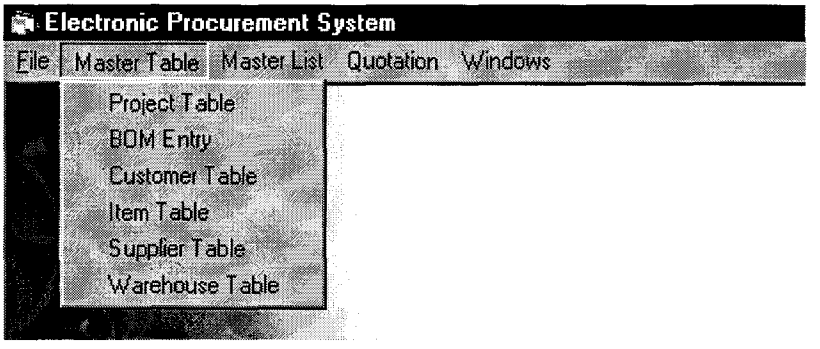

Figure E.3. Main Menu Form (Master Table Menu).

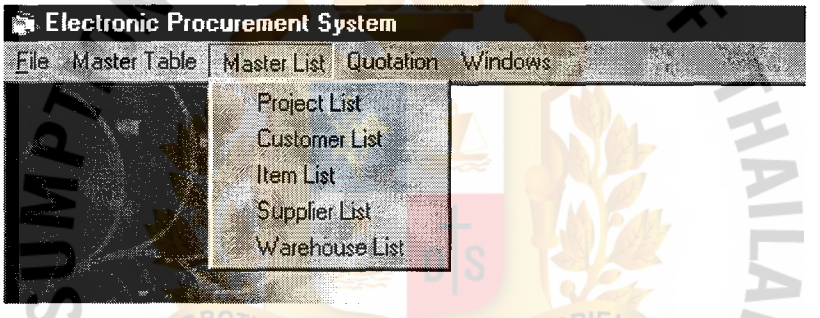

Figure E.4. Main Menu Form (Master List Menu).

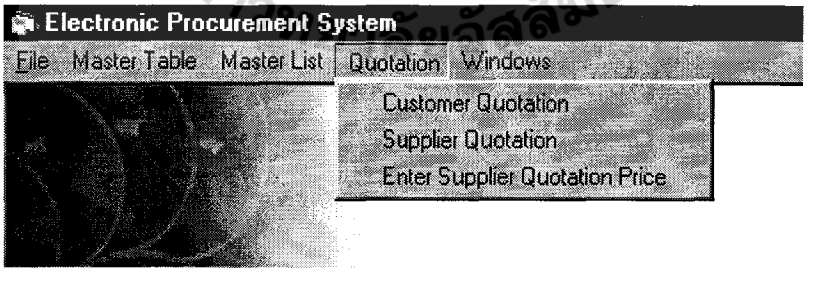

Figure E.5. Main Menu Form (Quotation Menu).

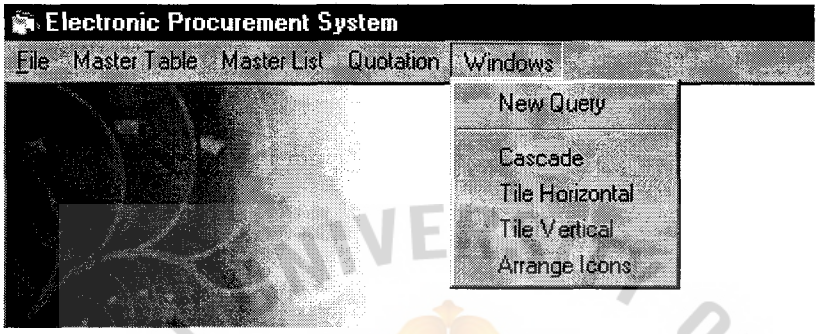

Figure E.6. Main Menu Form (Windows Menu).

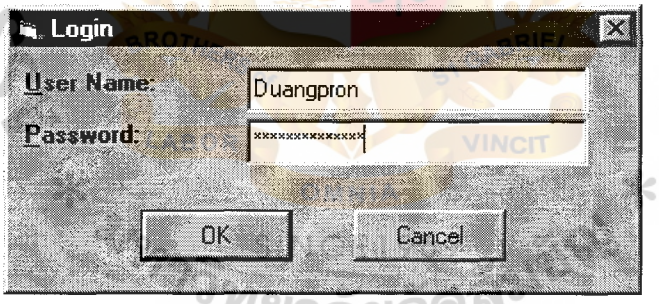

Figure E.7. Login Form.

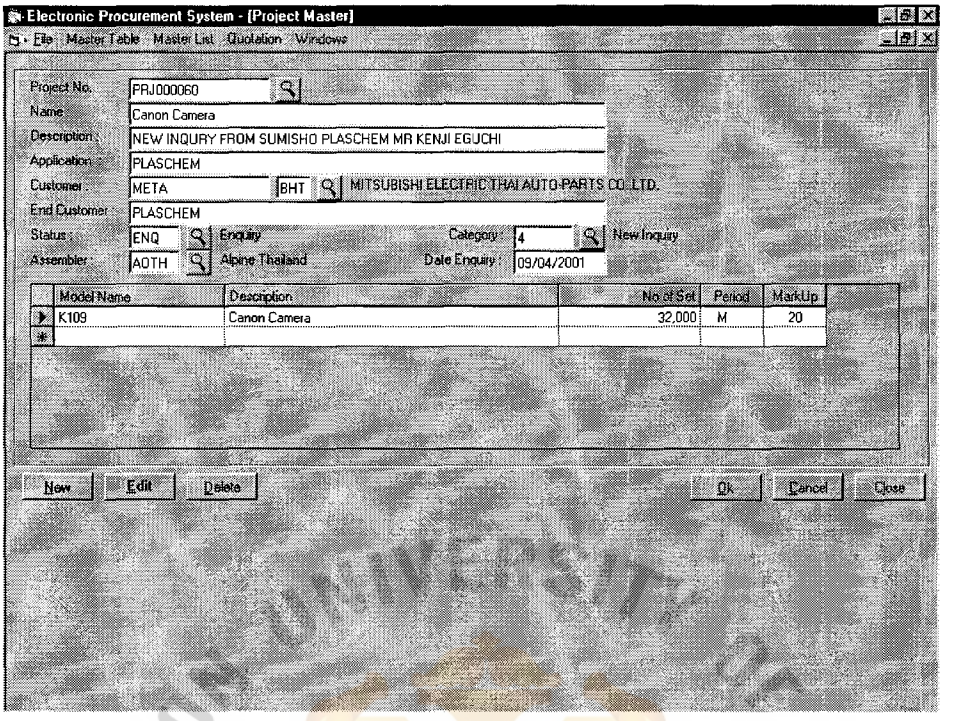

Figure E.8. Project Master Form.

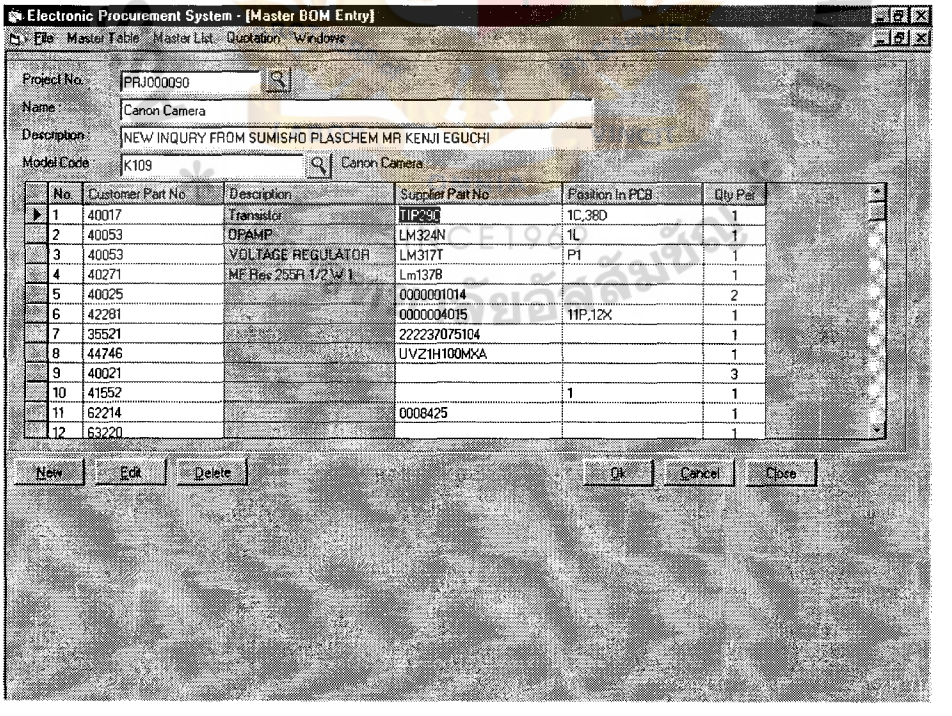

Figure E.9. BOM requisition Form.

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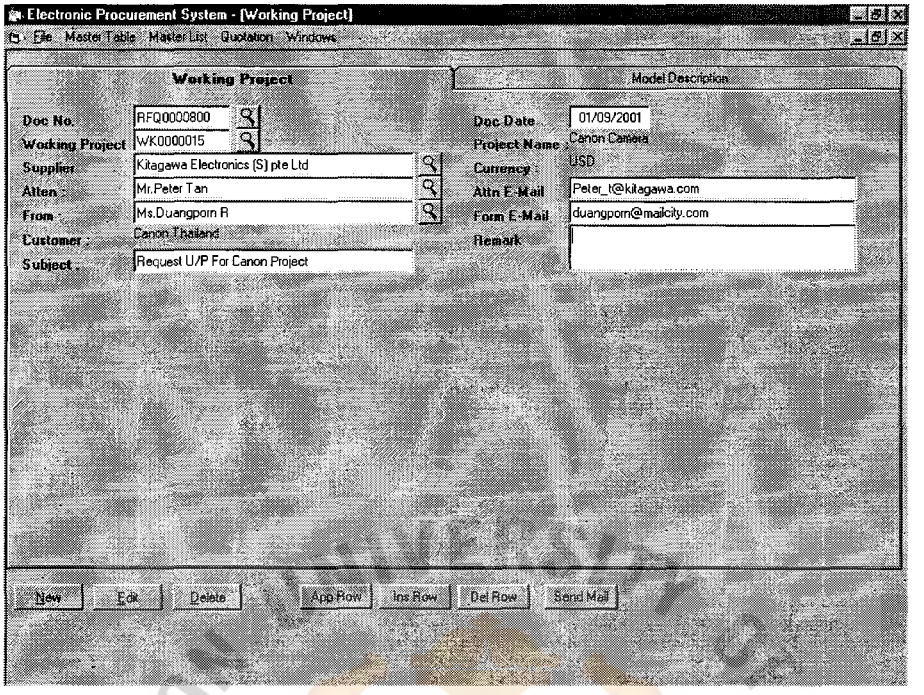

Figure E.10. Working Project Form (First Screen).

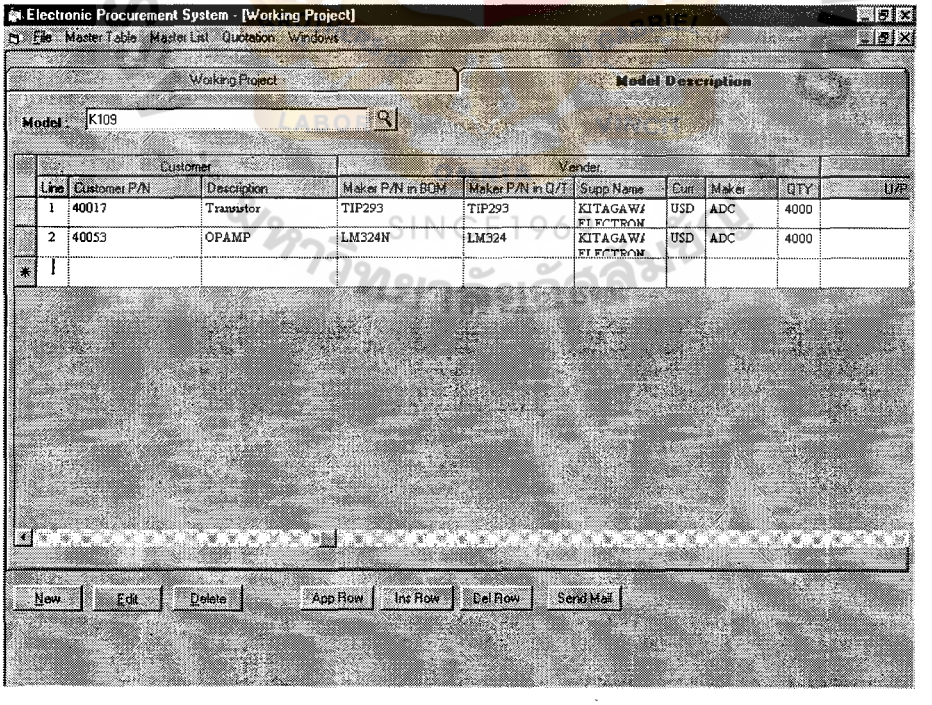

Figure E.11. Working Project Form (Second Screen).

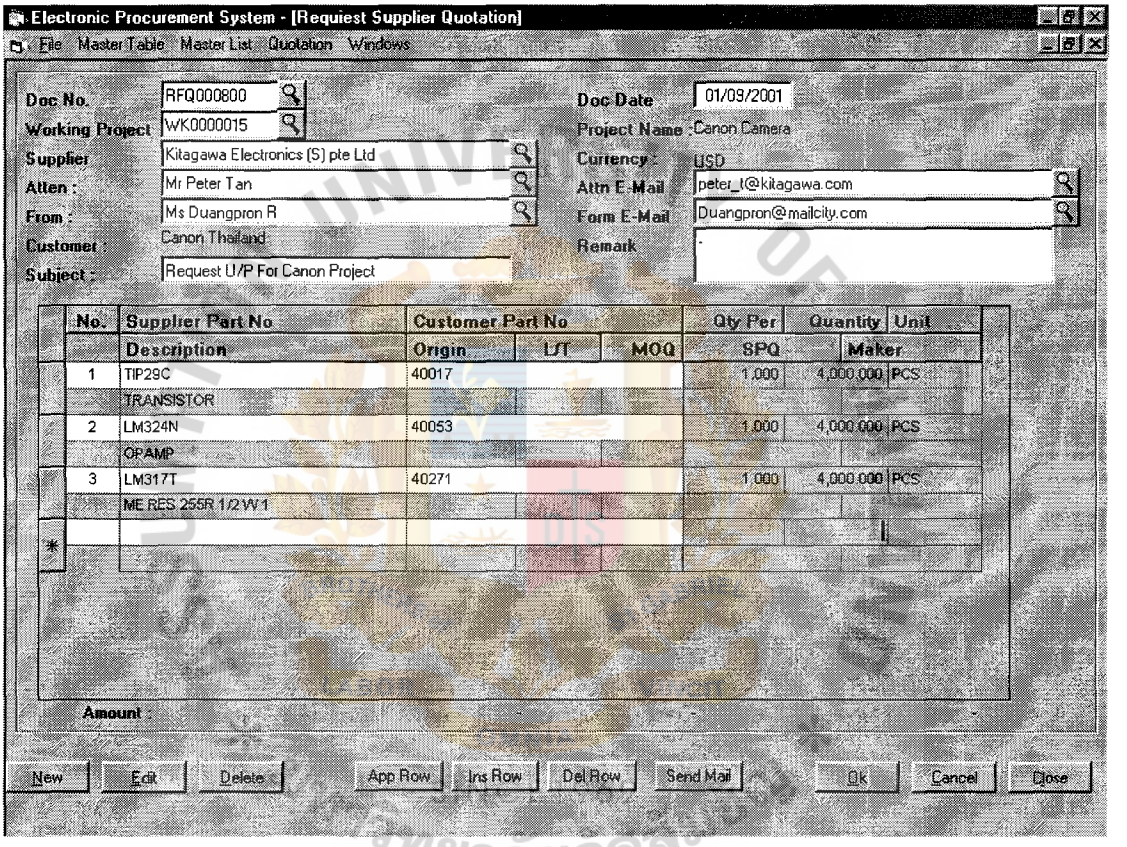

Figure E.12. Supplier Quotation Form.

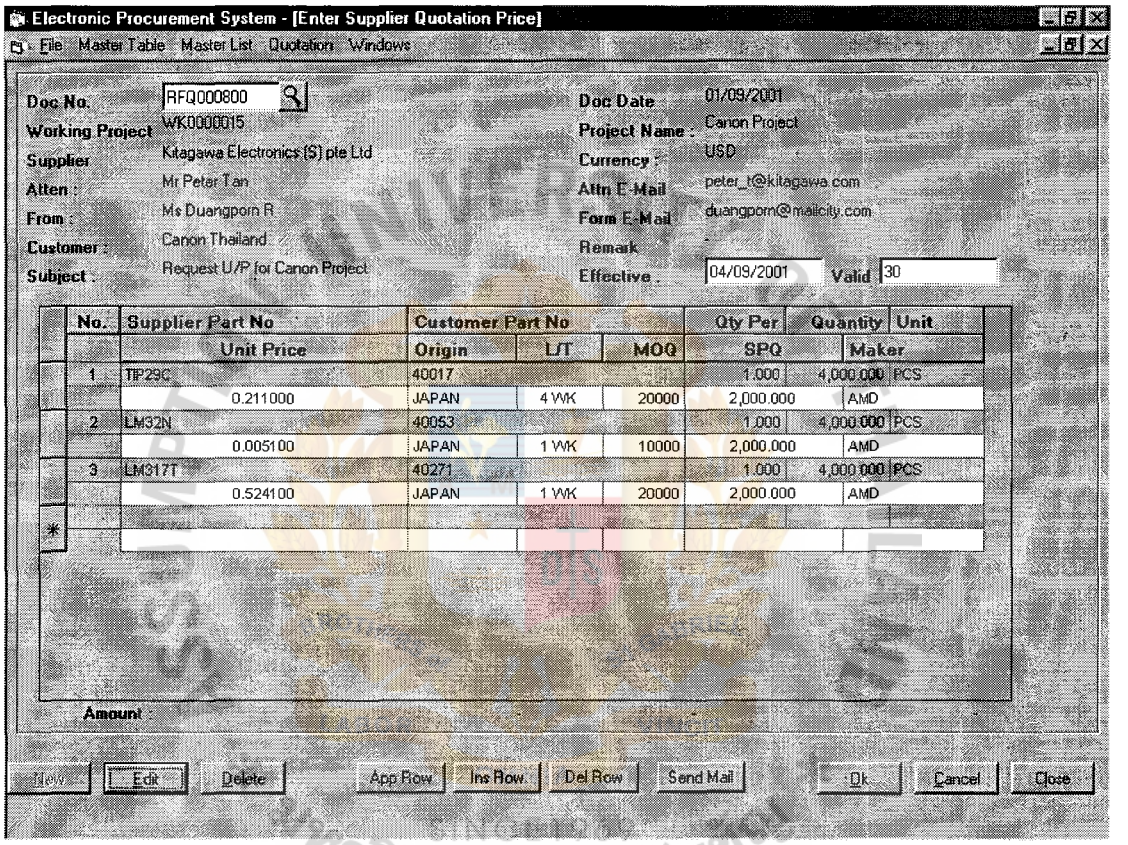

Figure E.13. Supplier Quotation Form (Update Price).

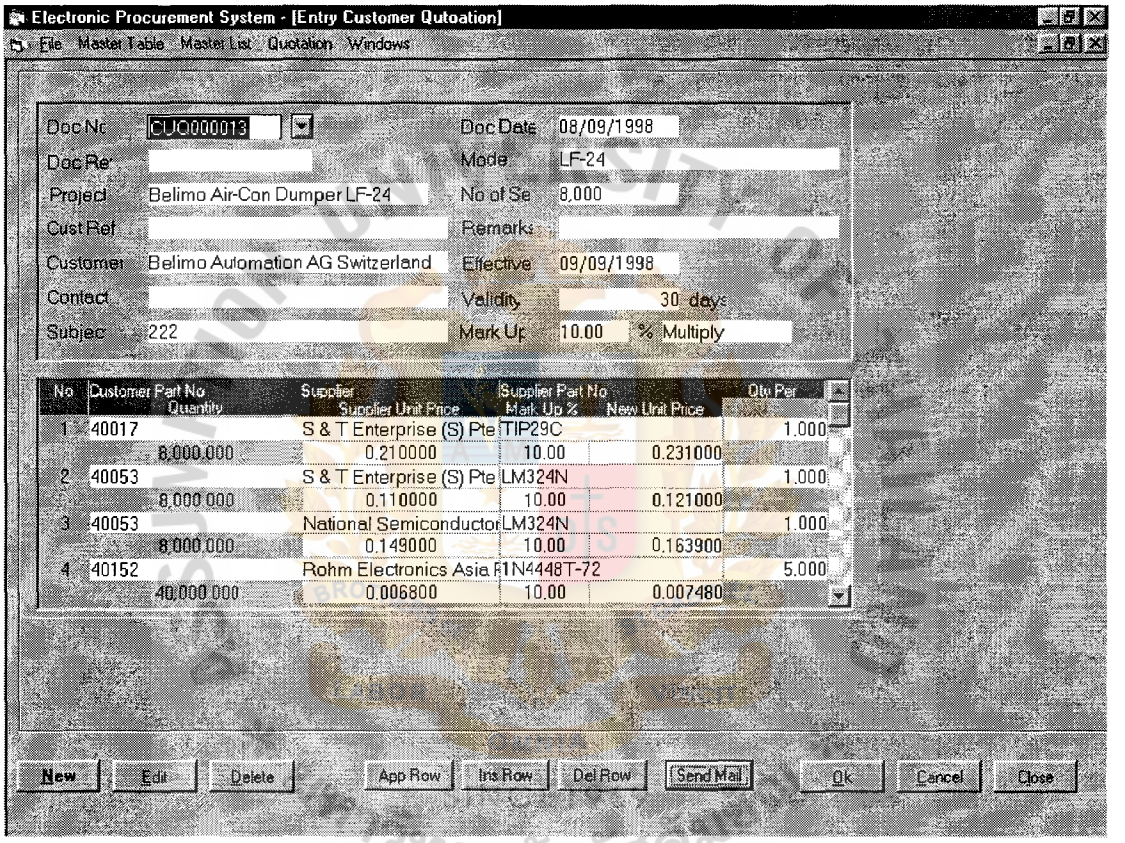

Figure E.14. Customer Quotation Form.

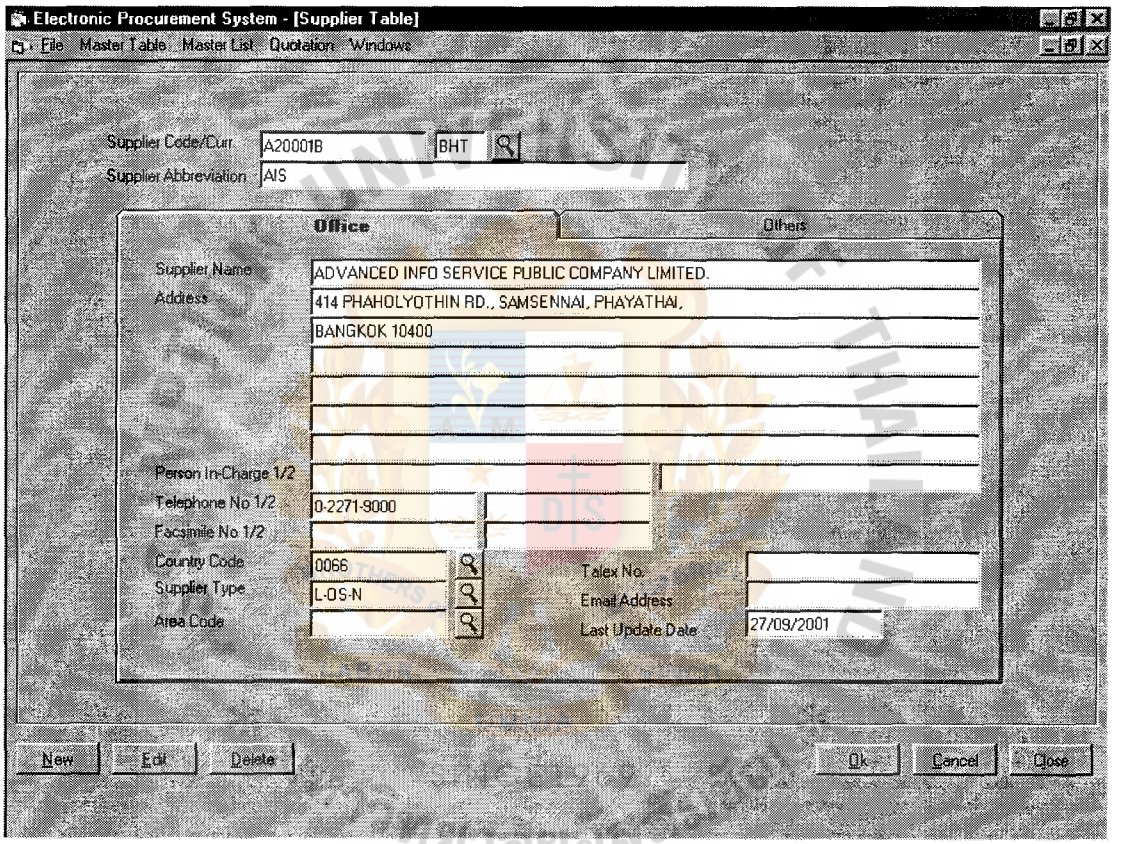

Figure E.15. Supplier Form (First Screen).

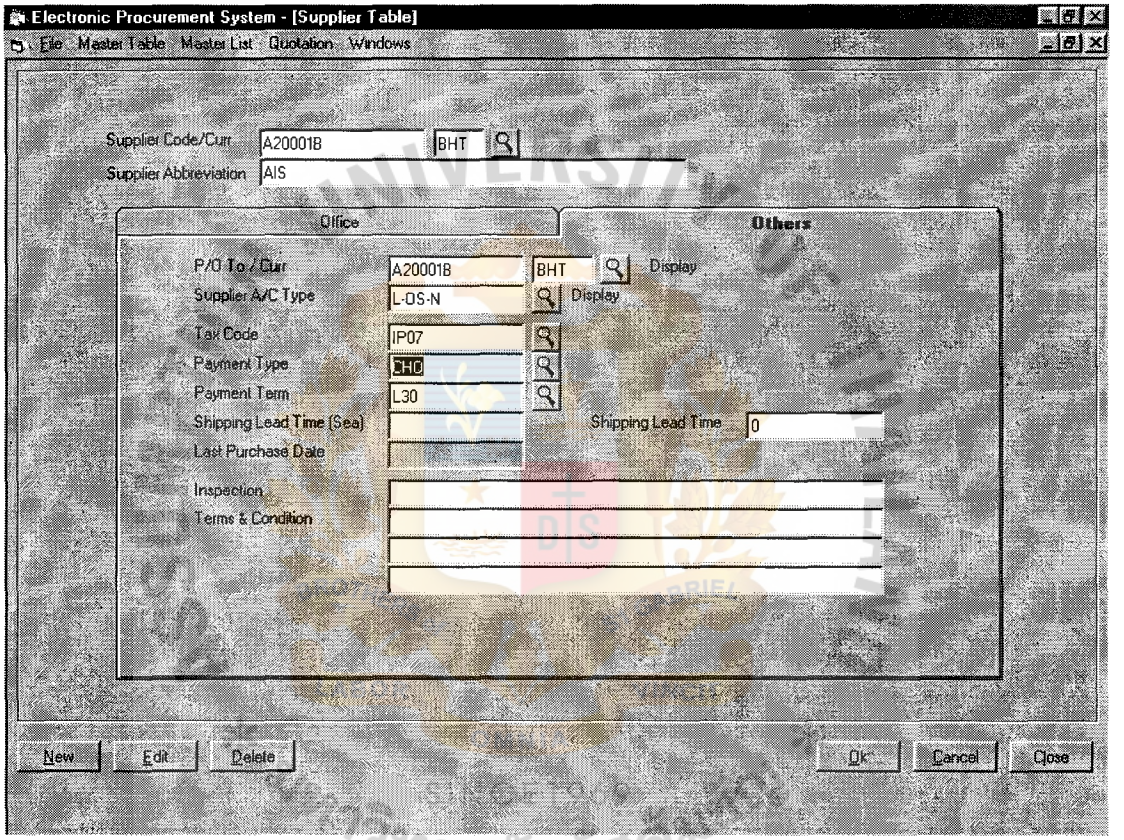

Figure E.16. Supplier Form (Second Screen).

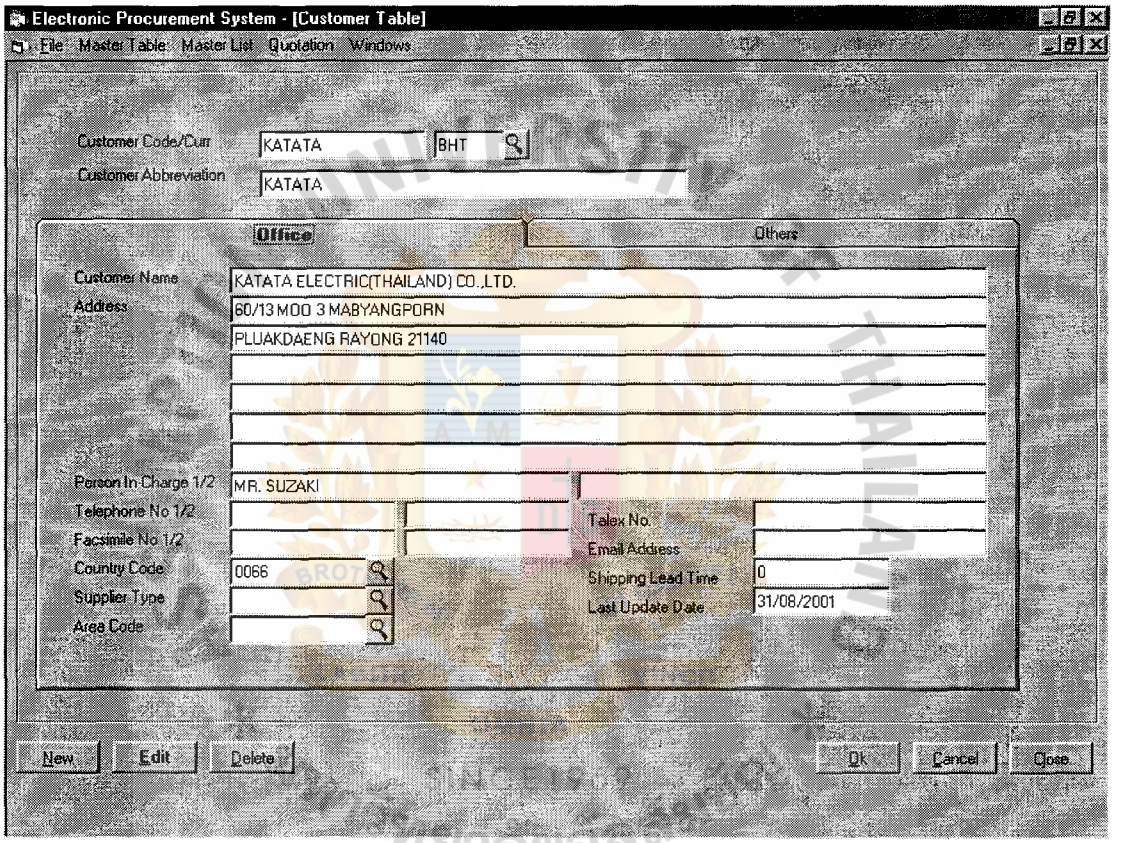

Figure E.17. Customer Form.

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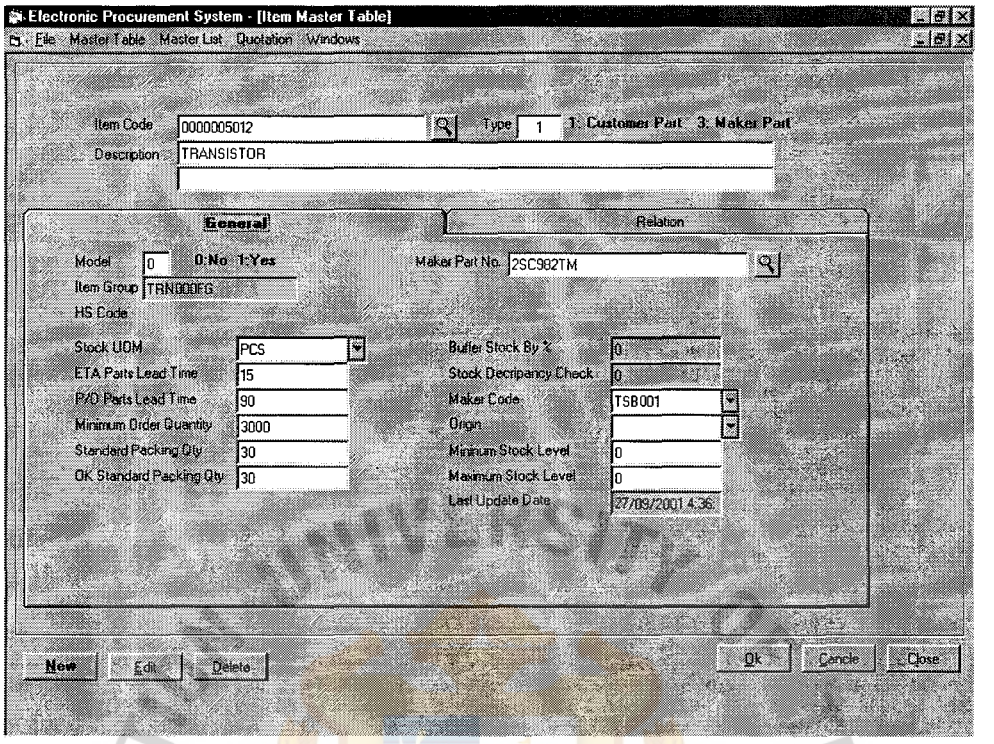

Figure E.18. Item Master Form.

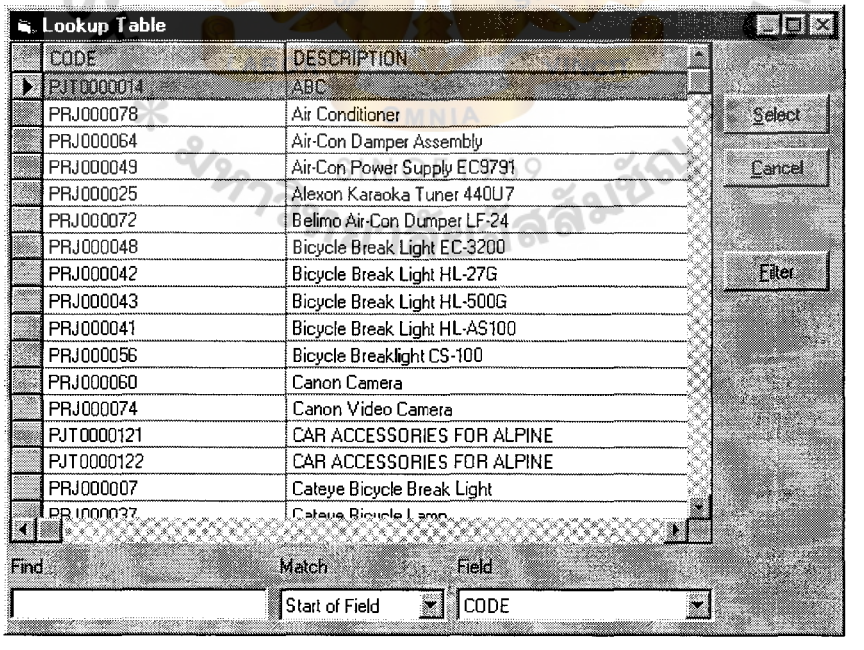

Figure E.19. Lookup Form.

APPENDIX F

REPORT DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Xtronic Co.,Ltd

EPS

Project Description

PAGE :1 of 1

DATE:18/05/2001 14:56

PJ NO	PJ Name	DATE ENQUIRY	Application	Customer			
LINE	Model		DESCRIPTION		No of Set	PER	Markup
PRJ000060	Canon Camera	09/04/2001	PLASCHEM	Misubishi Electric Co.,Ltd			
1	k109		canon camera		32,000	M	20
2	k110		canon camera-001		20,000	M	10
PRJ000062	IBM LCD Module	29/04/2001	LCD DISPLAY FOR IBM THAILAND SMT				
1	SHU2562		LCD M001		10,000	M	10

Figure F.1. Project Detail Report.

Xtronic Co.,Ltd

EPS

PAGE :1 of 1

Completed Project

DATE:18/05/2001 14:56

Project No.: PRJ000060 Name : Canon Camera
Status : Enquiry
Customer : MISUBISHI ELECTRIC THAI AUTO PARTS CO.,LTD

ModelNo. Name

LINE	ITEM #	DESCRIPTION	Supplier	Supplier Item#	UOM	MOQ	SPQ
K109 Canon PS3835							
1	ca000001	RESISTOR	ACD	MCR 1/4W 150 OHMJ	PCS	2000	2000
2	ca000004	RESISTOR	ACD	MCR 1/4W 150 OHMJ	PCS	2000	2000
3	ca000010	TRANSISTOR	AMD	0000001014	PCS	1000	1000
4	ca000011	TRANSISTOR	AMD	0000001017	PCS	3000	3000
K110 Canon PS3850							
1	ca000001	RESISTOR	ACD	MCR 1/4W 150 OHMJ	PCS	2000	2000
2	ca000004	RESISTOR	ACD	MCR 1/4W 150 OHMJ	PCS	2000	2000
3	ca000010	TRANSISTOR	AMD	0000001014	PCS	1000	1000
4	ca000011	TRANSISTOR	AMD	0000001017	PCS	3000	3000
5	ca000015	DIODE	Kmp	ERJ3GE-YJ512V	PCS	1000	1000
6	ca000016	IC	ABA	FMG8A	PCS	1000	1000

Figure F.2. Completed Project Report.

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EPS

Supplier List

PAGE :1 of 1

DATE:18/05/2001 14:56

LINE	SupplierNo.	Name	PIC	Address	Telephone No.	Fax No.	E-mail Address
1	SUP00001	DENSO	KANIKA T.	166 PHAHOLYOTHIN PLACE BUILDING PHAYATHI, BANGKOK 10400	022221111	022221122	KANIKA@DENSO.COM
2	SUP00002	SANYO	APINUN A.	100 SILOM BLID. BKK	026661000	026661001	APINUN@SUNYO.COM
3	SUP00003	AMD	PETER P	234 SOI SUKHUMVIT 101 BANGCHAK, PRAKANONG, BANGKOK 10260	027717000	027717200	PETER@AMD.COM

NO. OF RECORD LISTED 3

Figure F.3. Supplier List Report.

Xtronic Co.,Ltd

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Customer List

PAGE :1 of 1

DATE:18/05/2001 14:56

LINE	SupplierNo.	Name	PIC	Address	Telephone No.	Fax No.	E-mail Address
1	CUS00001	CANON	ANNA S	1/28 SRINAKARIN ROAD, NONGBON PRAVEST, BANGKOK 10260	029355001	029355002	ANNA@CANON.COM
2	CUS00002	FUJISU	KENSI T.	444 TARUA ROAD,KWAENG KHET KLONGTOEY,	026661000	026661001	KENSI@FUJISU.COM

NO. OF RECORD LISTED 2

Figure F.4. Customer List Report.

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Xtronic Co.,Ltd

EPS

PAGE :1 of 1

BILL OF MATERIEL

DATE:18/05/2001 14:56

Project No.: PRJ000060 Name : Canon Camera
Status : Enquiry
Customer : MISUBISHI ELECTRIC THAI AUTO PARTS CO.,LTD
Model No.: K109 Model Name : Canon PS3835

LINE	Customer ITEM #	DESCRIPTION	Supplier	Supplier Item#	UOM	Qty Per
1	40017	Transistor	ACD	TIP29C	PCS	1
2	40053	OPAMP	ACD	LM324N	PCS	1
3	ca000010	TRANSISTOR	AMD		PCS	2
4	ca000011	TRANSISTOR			PCS	1

NO. OF RECORD LISTED 4

Figure F.5. Bill of Materiel Report.

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EPS

PAGE :1 of 1

ITEM LIST (LAST PURCHASE DATE)

DATE:18/05/2001 14:56

ITME No.: A0008 Description : TRANSISTOR

LINE	Supplier	Supplier ITEM#	Last Purchase Date	U/P
1	40017	NISSEI	10/01/2001	0.0621
2	40053	NITSUKO	15/02/2001	0.1212
3	CF22M	AMD	02/03/2001	0.1200

NO. OF RECORD LISTED 3

Figure F.6. Item List (Last Purchase Date) Report.

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EPS

Working Project

PAGE :1 of 1

DATE:18/05/2001 14:56

Doc No. : RFQ0000800
Working Project : WK0000015
Project No.: PRJ000060
Customer : MISUBISHI ELECTRIC THAI AUTO PARTS CO.,LTD
End Customer : PLASCHEM
Model No.: K109

Project Name : Canon Camera
Currency : BHT
Assemble : AOTH
Model Name : Canon PS3835

LINE	Customer ITEM#	DESCRIPTION	Supplier	Supplier Item#	Cur.	Qty
1	001	TRANSISTOR	AOTH	S001	BHT	4000
			JAS	S101	USD	4000
			TAX	S101	BHT	4000
2	0045	IC	AOTH	S002	BHT	4000
			TAX	S020	BHT	4000

NO. OF RECORD LISTED 2

Figure F.7. Working Project Report.

Xtronics Co.,Ltd
112 Silom Rd. Bangrak Bkk.
Thailand

Our Ref: RFQ000799
Date: 01/09/2001
Page: 1 of 1

Tel 02-6610000
Fax 02-6620000

To: Tachibana Compnay
Attn: Mr.Tee R

Fax No: 771-1000

Project Name : Vending Machine
Model Name : GHN-200
Quantity : 500 per M
Location : PT SMT
Customer : Glory Handing Machines Co.,Ltd

Kindly quote your best price, standard packing, lead time and country of origin for the below mentioned parts. Please do not hesitate to contact us if you required any clarification. Also, please quote our Ref. No. on your quotation.

NO .	Supplier Part No./Description	Customer part No.	Qty per	Qty	Unit
1	M6M80011AL EEPROM	4E39T0070	1	500	PCS
2	M51957BL Reset IC	4E49T0300	1	500	PCS

Figure F.8. Request Supplier Quotation.

Xtronics Co.,Ltd
CUS000013
112 Silom Rd. Bangrak Bkk.
Thailand

Tel 02-6610000
Fax 02-6620000

Our Ref:

Date: 01/09/2001
Page: 1 of 1

To: Belimo Automation AG Switzerland
Attn: Ms.Sumalee S

Fax No: 02-2226666

Project Name : Belimo Air-Con Dumper
Model Name : GHN-200
Quantity : 500 per M

NO.	Customer Part No.	Supplier	Supplier Part No.	Supplier U/P
1	40017	S&T Enterprise	TIP29C	0.231000
2	40053	S&T Enterprise	LM324S	0.121000
		National Semiconduction	LM324N	0.163900
3.	40152	Rohm Electronics Aisa	R4448	0.163900
		TSS	TS448	0.160000

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Figure F.9. Customer Quotation.

Xtronic Co.,Ltd

EPS

ITEM LIST BY TYPE

PAGE :1 of 1

DATE:18/05/2001 14:56

ITME TYPE: IC

LINE	Supplier ITEM#	Supplier Name	STD PACK	L/T	ORIGIN
1	R1120N351A (3.5V)	RICOH(Kanematsu)	1K	6 w	Japan
2	UPD754244GS-533-BA5	NEC	3K	6 w	Japan
3	CF22M	AMD	1K	8 W	Korea
4	SML-210LTT86	ROHM	3K	8 W	Japan

NO. OF RECORD LISTED 4

Figure F.10. Item List by Type Report.

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Xtronic Co.,Ltd

EPS

PAGE :1 of 1

CUSTOMER QUOTATION EDIT LIST

DATE:18/05/2001 14:56

Doc No. : CUQ000013
Project No.: PRJ000060
Customer : MISUBISHI ELECTRIC THAI AUTO PARTS CO.,LTD
End Customer : PLASCHEM
Model No.: K109
No.of Set: 8,000

Project Name : Canon Camera
Currency : BHT
Assemble : AOTH
Model Name : Canon PS3835
Mark Up 10.00 %

LINE	Customer ITEM# DESCRIPTION	Supplier ITEM# Supplier	QtyPer	Unit/Price	(%)	Cal.U/P	Uprice/set	stdPack	L/T
1	001 TRANSISTOR	S001 AOTH	1	0.21000	10	0.23100	0.23100	1,000	60
2	004 IC	S002 AOTH	1	0.11000	10	0.12100	0.12100	1,000	60
3	005 IC	S012 S&T	1	0.14900	10	0.16300	0.16300	25	14
4	007 OPAMP	Lm2017 GS	1	0.23000	10	0.25300	0.25300	500	45

Total per set : 0.768

NO. OF RECORD LISTED 4

Figure F.11. Customer Quotation Edit List Report.

Xtronic Co.,Ltd

EPS

Price Change

PAGE :1 of 1

DATE:18/05/2001 14:56

Month : May 2001

LINE	Supplier ITEM#	Supplier Name	STD PACK	Update Price	Update Date	Last Price	Last Date
1	R1120N351A (3.5V)	RICOH(Kanematsu)	1K	0.1317	05/05/2001	0.1500	15/02/2001
2	UPD754244GS-533-BA5	NEC	3K	0.2300	12/05/2001	0.2400	15/03/2001
3	CF22M	AMD	1K	0.0415	15/05/2001	0.0450	5/04/2001
4	SML-210LTT86	ROHM	3K	0. 9900	27/05/2001	1.0000	04/02/2001

NO.OF RECORD LISTED 4

Figure F12 . Price Change Report.

APPENDIX G

DATABASE DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table G.1. Customer Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	MCUS_CUSCD	Char(10)	Y	Y				Primary Key
2	MCUS_CURCD	Char (4)	Y		Y	MCUR_TBL		Attribute
3	MCUS_CUSNM	Char (10)						Attribute
4	MCUS_ABBRV	Char (25)	Y		Y			Attribute
5	MCUS_CTRCD	Char (10)						Attribute
6	MCUS_CUSTY	Char(10)	Y					Attribute
7	MCUS_TAXCD	Char (5)			Y			Attribute
8	MCUS_PTERM	Char(5)						Attribute
9	MCUS_PTYPE	Char (10)	Y					Attribute
10	MCUS_ADDR1	Varchar(50)						Attribute
11	MCUS_ADDR2	Varchar(50)			Y			Attribute
12	MCUS_ADDR3	Varchar(50)			Y			Attribute
13	MCUS_ADDR4	Varchar (50	Y		Y			Attribute
14	MCUS_ADDR5	Varchar(50)			Y			Attribute
15	MCUS_TELNO	Char(20)						Attribute
16	MCUS_TELNO	Char(20)			Y			Attribute
17	MCUS_FAXNO	Char(20)			Y			Attribute
18	MCUS_FAXNO	Char(20)			Y			Attribute
19	MCUS_TELEX	Char(20)			Y			Attribute
20	MCUS_EMAIL	Char(50)			Y			Attribute
21	MCUS_PIC	Char(40)			Y			Attribute
22	MCUS_PIC2	Char(40)			Y			Attribute
23	MCUS_CRCHK	Char(1)						Attribute

ASSUMPTION UNIVERSITY OF THAILAND

Table G.2. Supplier Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	MSUP_SUPCD	Char(10)	Y	Y				Primary Key
2	MSUP_SUPCR	Char(4)			Y			Attribute
3	MSUP_SUPNM	Char(50)	Y					Attribute
4	MSUP_ABBRV	Char(25)	Y	Y	Y			Attribute
5	MSUP_SUPTY	Char(10)						Attribute
6	MSUP_CTRCD	Char(10)			Y			Attribute
7	MSUP_PTERM	Char(10)			Y			Attribute
8	MSUP_TAXCD	Char(5)			Y			Attribute
9	MSUP_ADDR1	Varchar(50)						Attribute
10	MSUP_ADDR2	Varchar(50)			Y			Attribute
11	MSUP_ADDR3	Varchar(50)			Y			Attribute
12	MSUP_ADDR4	Varchar(50)			Y			Attribute
13	MSUP_ADDR5	Varchar(50)			Y			Attribute
14	MSUP_ARECD	Char(10)			Y			Attribute
15	MSUP_TELNO	Char(20)						Attribute
16	MSUP_TELNO2	Char(20)			Y			Attribute
17	MSUP_FAXNO	Char(20)						Attribute
18	MSUP_FAXNO	Char(20)			Y			Attribute
19	MSUP_TELEX	Char(20)			Y			Attribute
20	MSUP_EMAIL	Char(40)						Attribute

Table G.2. Supplier Table (Continued).

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
21	MSUP_PIC	Char(40)						Attribute
22	MSUP_PIC2	Char(40)			Y			Attribute
23	MSUP_LPODT	Datetime						Attribute
24	MSUP_REM	Varchar(80)						Attribute
25	MSUP_REVISE	Char(1)						Attribute
26	MSUP_PAYTY	Char(10)						Attribute
27	MSUP_PLTDA	Smallint(2)						Attribute
28	MSUP_AIRLT	Smallint(2)						Attribute
29	MSUP_SPFG	Char(1)						Attribute
30	MSUP_LUPDT	Datetime						Attribute
31	MSUP_POTO	Char(10)						Attribute
32	MSUP_POCUR	Char(4)						Attribute
33	MSUP_REM2	Char(80)						Attribute
34	MSUP_REM3	Char(80)						Attribute
35	MSUP_REM4	Char(80)						Attribute
36	MSUP_ADDR6	Char(50)						Attribute
37	MSUP_SACTY	Char(80)						Attribute

Table G.3. Project Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	MPJT_PJTCD	Varchar(10)	Y	Y				Primary Key
2	MPJT_STATU	Varchar(5)						Attribute
3	MPJT_CUSCD	Varchar(10)	Y					Attribute
4	MPJT_CURCD	Varchar(4)	Y					Attribute
5	MPJT_DESC	Varchar(30)						Attribute
6	MPJT_CAT	Varchar(1)	Y		Y			Attribute
7	MPJT_LDESC	Varchar(200)			Y			Attribute
8	MPJT_DENQU	Datetime						Attribute
9	MPJT_MDLCD	Varchar(25)						Attribute
10	MPJT_NOSET	Int(4)						Attribute
11	MPJT_PER	Varchar(10)						Attribute
12	MPJT_ECUS	Varchar(50)						Attribute
13	MPJT_ASSCD	Varchar(5)						Attribute
14	MPJT_APP	Varchar(100)						Attribute

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Table G.4. Customer Quotation Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	CQUO_DOCNO	Varchar(10)	Y	Y				Primary Key
2	CQUO_MDLCD	Varchar(25)	Y					Attribute
3	CQUO_LINE	Int(4)	Y					Attribute
4	CQUO_SUPCD	Varchar(10)	Y			MSUP_SUPCD		Attribute
5	CQUO_SUPCR	Varchar(4)			Y			Attribute
6	CQUO_NMUCD	Varchar(10)			Y			Attribute
7	CQUO_SUPNO	Varchar(25)			Y			Attribute
8	CQUO_CUSNO	Varchar(25)	Y			MCUS_CUSCD		Attribute
9	CQUO_ITMBOM	Varchar(25)	Y					Attribute
10	CQUO_DESC	Varchar(40)			Y			Attribute
11	CQUO_QTYPE	Float(8)			Y			Attribute
12	CQUO_QTY	Float(8)						Attribute
13	CQUO_UP	Float(8)						Attribute
14	CQUO_CTYPE	Char(4)						Attribute
15	CQUO_MAKUP	Float(8)						Attribute
16	CQUO_CALUP	Float(8)						Attribute
17	CQUO_SETUP	Float(8)						Attribute
18	CQUO_BHT	Float(8)						Attribute
19	CQUO_STD	Float(8)						Attribute
20	CQUO_MOQ	Float(8)						Attribute
21	CQUO_LT	Int(4)						Attribute
22	CQUO_SUM	Int(4)						Attribute
23	CQUO_MAIL	Int(4)						Attribute

Table G.5. Request For Supplier Quotation Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	MRFQ_DOCNO	Varchar(10)	Y	Y				Primary Key
2	MRFQ_MDLCD	Varchar(25)	Y					Attribute
3	MRFQ_LINE	Int(4)						Attribute
4	MRFQ_SUPCD	Varchar(10)	Y			MSUP_SUPCD		Attribute
5	MRFQ_SUPCR	Varchar(4)			Y			Attribute
6	MRFQ_NMUCD	Varchar(10)			Y			Attribute
7	MRFQ_SUPNO	Varchar(25)			Y			Attribute
8	MRFQ_CUSNO	Varchar(25)	Y			MCUS_CUSCD		Attribute
9	MRFQ_ITMBOM	Varchar(25)						Attribute
10	MRFQ_DESC	Varchar(40)			Y			Attribute
11	MRFQ_QTYPE	Float(8)			Y			Attribute
12	MRFQ_QTY	Float(8)						Attribute
13	MRFQ_UP	Float(8)						Attribute
14	MRFQ_CTYPE	Char(4)						Attribute
15	MRFQ_MAKUP	Float(8)						Attribute
16	MRFQ_CALUP	Float(8)						Attribute
17	MRFQ_SETUP	Float(8)						Attribute
18	MRFQ_BHT	Float(8)						Attribute
19	MRFQ_STD	Float(8)						Attribute
20	MRFQ_MOQ	Float(8)						Attribute
21	MRFQ_LT	Int(4)						Attribute
22	MRFQ_SUM	Int(4)						Attribute
23	MRFQ_MAIL	Int(4)						Attribute

Table G.6. Master Item Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	MITM_ITMCD	Char(10)	Y	Y				Primary Key
2	MITM_ITMD1	Varchar(50)			Y			Attribute
3	MITM_ITMD2	Varchar(50)			Y			Attribute
4	MITM_ITMFG	Char(1)						Attribute
5	MITM_MODEL	Varchar(10)	Y					Attribute
6	MITM_STKUOM	Varchar(10)						Attribute
7	MITM_MOQV	Varchar(10)						Attribute
8	MITM_SPQ	Varchar(10)						Attribute
9	MITM_MINLV	Varchar(10)						Attribute
10	MITM_MAXLV	Varchar(10)						Attribute
11	MITM_BUFPC	Varchar(5)						Attribute
12	MITM_ORIGIN	Varchar(3)						Attribute
13	MITM_SUPCD	Varchar(10)						Attribute
14	MITM_SUPCR	Varchar(4)						Attribute
15	MITM_LUPDT	Datetime						Attribute

APPENDIX H

DATA DICTIONARY

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Project: EPS

Detailed Listing -- Alphabetically

Company **Entity**

Composition:

Company_ID[10] : company id

Company_type[5] : company type (Customer/Supplier)

company_nm[20] : COMPANY name

Company_abbrv[50] : company abbrvate

Company_Addr1[50] : company address

Company_Addr2[50] : company address

Company_Addr3[50] : company address

Company_Addr4[50] : company address

Company_Addr5[50] : company address

Company_Tel[20] : company Telephone

Company_FAX[20] : company Fax

Company_email[50] : company E-mail

Primary Key:

Index Name: Generated by VAW

Column(s): Company_ID [ASC]

Location:

ERD

Attached relationships on ERD:

create MIN: 1 MAX: many

project

[ ] MIN: 0 MAX: 1

customer

[ ] MIN: 0 MAX: 1

Supplier

have MIN: 1 MAX: many

Parts

Customer **Entity**

Description:

Customer Information

Composition:

MCUS_CUSCD[10] : Customer Code

MCUS_CUSNM[10] : Customer Name

MCUS_CUSid[20] : Customer Code

MCUS_CUSTY[5] : Customer Type

Primary Key:

Index Name: Generated by VAW

Column(s): MCUS_CUSCD [ASC]

Foreign Key(s):

Customer Quotation "

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Company "

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:

ERD

Attached relationships on ERD:

[ ] MIN: 1 MAX: 1

Company

Model_Parts **Associative Entity**

Composition:

Project_Parts_CD[10] : project_parts_cd

MITM_ITMCD[10] : ITMCD

Primary Key:

Index Name: Generated by VAW

Column(s): Project_Parts_CD [ASC]

MITM_ITMCD [ASC]

Foreign Key(s):

Model 'consist of'

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Parts 'is consisted of'

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:

ERD

Attached relationships on ERD:

[consist of] MIN: 1 MAX: 1

Model

[is consisted of] MIN: 1 MAX: 1

Parts

Parts **Entity**

Description:

Part Description

Composition:

MITM_ITMCD[10] : ITEMCD

MITM_ITMD1[50] : ITMD1

MITM_ITMD2[50] : ITMD2

MITM_ITMFG[1] : ITMFG

MITM_MODEL[10] : MODEL

MITM_STKUOM[10] : STKUOM

MITM_MOQV[10] : MOQ

MITM_SPQ[10] : SPQ

MITM_MINLV[10] : MINLV

MITM_MAXLV[10] : MAXLV

MITM_BUFPC[5] : BUFPC

MITM_ORIGIN[3] : ORIGIN

MITM_SUPCD[10] : SUPCD

MITM_SUPCR[4] : SUPCR

MITM_LUPDT : LUPDT

COMPANY_ID[10] : COMPANYID

Primary Key:

Index Name: Generated by VAW

Column(s): MITM_ITMCD [ASC]

COMPANY_ID [ASC]

Foreign Key(s):

Company 'have'

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:

ERD

Attached relationships on ERD:

is consisted of	MIN: 1	MAX: many
Model_Parts		
[have]	MIN: 1	MAX: 1
Company		
match	MIN: 1	MAX: many
Parts_Match		
match with	MIN: 1	MAX: many
Parts_Match		

Parts_Match **Associative Entity**

Composition:

MITM_ITMCD_C[10] : ITEM CODE OF CUSTOMER

MITM_ITMCD_S[10] : ITEM CODE OF SUPPLIER

Primary Key:

Index Name: Generated by VAW

Column(s): MITM_ITMCD_C [ASC]

MITM_ITMCD_S [ASC]

Foreign Key(s):

Parts 'match with'

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Parts 'match'

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:

ERD

Attached relationships on ERD:

[match] MIN: 1 MAX: 1

Parts

[match with] MIN: 1 MAX: 1

Parts

Date Last Altered:26/02/2002 Date Created:26/02/2002

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project **Entity**

Description:

Project Description

Composition:

MPJT_PJTCD[10] : PJTCD

MPJT_PJTNM[20] : PJTNM

MPJT_DESC[30] : DESC

MPJT_APP[100] : APP

MPJT_CUSCD[10] : CUSCD

MPJT_ECUS[50] : ECUS

MPJT_STATU[5] : STATU

MPJT_CAT[1] : CAT

MPJT_ASSCD[5] : ASSCD

MPJT_DENQU : DENQU

MPJT_MDLCD[25] : MDLCD

Primary Key:

Index Name: Generated by VAW

Column(s): MPJT_PJTCD [ASC]

Foreign Key(s):

Company 'create'

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

customer 'make'

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:

ERD

Attached relationships on ERD:

[create] MIN: 1 MAX: 1

Company

have MIN: 1 MAX: many

Model

Project_Model **Entity**

Composition:

PROJ_MOD_PJTCD[10] : PROJECT CODE

PROJ_MOD_MDLCD[10] : MODEL CODE

PROJ_MOD_ID[10] : PROJECT MODEL ID

Primary Key:

Index Name: Generated by VAW

Column(s): PROJ_MOD_ID [ASC]

Supplier **Entity**

Description:

Supplier Information

MSUP_SUPCD[10] : SUPCD

MSUP_SUPCR[4] : SUPCR

MSUP_SUPNM[50] : SUPNM

MSUP_ABBRV[25] : ABBRV

MSUP_SUPTY[10] : SUPTY

MSUP_PTERM[10] : PTERM

MSUP_TAXCD[5] : TAXCD

MSUP_PIC[40] : PIC

MSUP_PIC2[40] : PIC2

MSUP_LPODT : LPODT

MSUP_REM[80] : TELNO1

MSUP_LUPDT : LUPDT

MSUP_REM1[80] : REM1

MSUP_REM2[80] : REM2

MSUP_REM3[80] : REM3

MSUP_REM4[80] : REM4

Primary Key:

Index Name: Generated by VAW

Column(s): MSUP_SUPCD [ASC]

Foreign Key(s):

Company "

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:

ERD

Attached relationships on ERD:

[ ] MIN: 1 MAX: 1

Company

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