



Computer System Design for Industrial Product Trading Company

By

Mr. Chaowit Puchitkanont

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

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

November, 1998

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MS (CIS)



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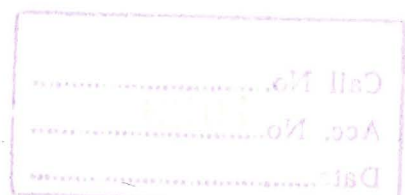
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Project Title : Computer System Design for Industrial
Product Trading Company
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Academic Year : December 1998

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

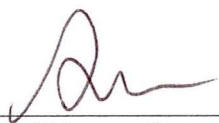
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ABSTRACT

This system development project was developed to improve the existing operation for A.T.S. Trading Co., Ltd. , the trading company for the geomembrane which is an industrial product for environment-concern in industrial use. A.T.S. has just built a fine reputation as a leading trading company specializing in industrial products. Some features that distinguish A.T.S. from other trading companies include the highly skilled and trained technical marketing staff and dedication to the development of high-value-added products with innovative functions and unique features.

The new system is to assist all the staff in managing the work systematically. Apparently, the company had faced problems since there are many transactions occurring among the departments. Sometimes, errors occur and the information is not up-to-date, so it leads to unsuitable decision making of the management team. Therefore, the new system has been implemented with the main purpose of improving the company's business efficiency. Furthermore, the new system is supposed to reduce the routine jobs and paper files. The design process has applied normalization method as well as other methods to minimize data redundancy. If the system is implemented, the result should be satisfactory because its work will be effectively supported and the ultimate outcome will be the fast and more reliable output supporting the manager's better decision and strengthening the company's operation into a very competitive one.

ACKNOWLEDGEMENTS

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The author is also wishes to thank A.T.S. Trading Co., Ltd. Managing Director , Mr. Piya Santichotiwong who made significant contribution to the success of this project. The author is also personally grateful to Mr. Prasert Sakulmeesap, General Manager of A.T.S. Trading Co., Ltd. , the leader of this system for providing clear necessary information of the existing system for the system development project.

Finally, it hardly needs saying that much of the value of this project report is due the above mentioned's to their assistance, but the author alone bears responsibility for any errors or omission that remain between the covers.

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I. INTRODUCTION

1.1 Background of The Project

A.T.S. Trading Co., Ltd. is a company which was established by a group of manufacturers who are interested in international marketing of their products. Its main function includes segmenting products according to each target country, find customers, settling payment system, and providing service to those customers.

However, due to the economic crisis around the world, marketing and selling of the company's products have been more difficult. Therefore, the managing director and the share holders decided to strategically refocus the company's business, one of which action was to focus on domestic demands on environment-related industry. Fortunately, A.T.S. found the opportunity to become an agent of the Geomembrane manufacturer. Geomembrane is a form of High Density Polyethylene (HDPE) plastic sheet, which is used as a substitute for concrete in order to prevent the leak of unwanted liquid into the soil.

As the company generated more businesses which are more sophisticated, it realized the importance of using computers and information system to be more efficient in terms of cost, timing and service. After a long discussion with the managing director, the author recommended a number of actions to be made. This project, therefore, is designed to serve A.T.S.'s needs in improving the efficiency of running the business. Initially, the agreement was that the author designed the information system to be implemented with the Geomembrane sales. If the project is successfully implemented with the Geomembrane product, A.T.S.'s managing director will use the project design to be implemented throughout all the products and integrate into a more-sophisticated system later.

By linking inter-organizational, inter-functional, and inter-personal levels of the process through IS networks, businesses are not only automating their activities, they are

also reshaping and improving their business processes. By accessing company-wise information from databases, IS integration is providing numerous opportunities to coordinate organizational activities by facilitating communication and information exchange across departments without the need to go up and down the vertical chain of command. The use of information networks to access relevant information from database has been of enormous importance to eliminate duplicate activities, prevent errors from occurring, cycle time reduction in product development, and customer responsiveness.

Company information systems integration is defined as the extent various information systems are formally linked of the sharing of consistent information within the company.

As a result, this project will cover the following areas for the industrial product Geomembrane (HDPE).

- A) Sales system - every sales transaction will be recorded and salesperson is also maintained for each sales to be able to produce daily sales report by salesperson and reports in other scenario.
- B) Inventory system - this system provides information regarding inventory such as inventory on-hand, inventory sold, etc. It performs and produces any functions and documents related to the stock control including Stock Report, and Warehouse Report.
- C) Technical & Support system - the system will record all the service activities which will be a very good history for the next support. Customers are satisfied with this kind of support.

1.2 Objectives of The Project

The potential of new technology has recently been discovered in the field of selling, and more and more companies are gaining immediate and practical benefits from the information system and IT equipment. Customer databases, PCs, portable and hand-held computers and electronic visual aids are all being used. The advantages of computerizing sales activities is that computerization allows salespeople to perform their activities more efficiently and also allows the role of selling to expand. From being isolated individuals in the field, with focus on immediate sales, their tasks are expanding to include building long-term relationships with clients or customers. The technology also allows major aspects of selling, such as generating and qualifying leads, to be conducted simply and effectively from the base office. The sales force can now be better organized, better informed and in a much better position to respond to customers' needs and competitive pressures.

The objectives of the project on A.T.S. Trading are as follows:

- 1) To design a low cost microcomputer-based information system for a trading company.
- 2) To perform the system analysis of the Sales, Purchase and Inventory.
- 3) To utilize the use of Artificial Intelligence techniques to strengthen the marketing competitive edges while controlling the costs.
- 4) To study the requirements of company's staff in case of using Computerized System to replace the manual system.
- 5) To design the Computerized system of the mentioned system.
- 6) To implement successfully the information system to serve the company's decision in marketing the Geomembrane sheet.

1.3 Scope of The Project

The project will cover all the major parts of A.T.S. Trading which includes:

1.3.1 Selling record and customer record

- records all the data into the database such as customer details (address, buying products, total amount, etc.), sales information or even print out the receipt to the customer.

1.3.2 Total selling information

- Summarizes the total amount in selling and all the products every month. The report can show the records of total sales break down by sales person, by products or by customers which are easily used for each purpose by the users.

1.3.3 Technical & Support system

- records all the details of the services related to each customer. Therefore, before the new transaction will occur, technical people can find out the history and know what exactly the customer needs.

1.3.4 Update inventory system

- Reduces time in checking stock. When selling the products, the system will update the stock automatically. Therefore, products will be transported efficiently and then will be no product shortage before being informed. This can help the company to plan an effective transportation and procurement system. Moreover, customers can definitely know when they can get the products which support them with more accurate schedule.

1.4 Deliverables :

The deliverables for the project on the A.T.S. Trading are as follows:

- 1) A Software package written in Microsoft access for Windows 95.
- 2) Screen layouts for user-interfaces.
- 3) Various Hard Copy Layouts containing:
 - Price list
 - Customer record
 - Sales order
 - Invoice
 - Monthly sales record
 - Monthly inventory
 - Purchasing order

1.5 Project Plan

The project plan is represented in Gantt Chart as Table 1.1 :

Table 1.1. Project Plan

ACTIVITIES	notes	July 1 2 3 4	Aug 1 2 3 4	Sept 1 2 3 4	Oct 1 2 3 4
SYSTEM ANALYSIS: <ul style="list-style-type: none"> - Context diagram of an old system - Identify the area under study - Develop the physical DFD of the existing system - Identify the contents of the existing data stores - Develop the logical DFD of the existing system 	 N/A N/A N/A	 ^^ ^^ 			
DETAIL ANALYSIS AND DESIGN: <ul style="list-style-type: none"> - Develop the logical DFD of the new system - Identify the contents of the data stores for the new system - Data Dictionary - Structured Charts - Develop the Physical DFD of the new system 		 ^^ ^^ 	 ^^ ^^ ^	 ^^	
IMPLEMENTATION: <ul style="list-style-type: none"> - Pseudocode or Minispec - Programming - Screen Layout - Report Layout - Data Conversion - Testing - Training - Acceptance Test - Production - Documentation 	 N/A N/A N/A			 ^ ^^^ ^^ ^ ^^ ^ ^	 ^

II. EXISTING SYSTEM

2.1 Background of the Organization

A.T.S Trading is the company which has business in international trading and industrial environment-related products especially in Geomembrane. At the beginning, Mr. Piya Santichotiwong opens the company with only 1 technician. Three years later, there are 16 staffs with sales turnover of approximately 3 millions per month. The company has high growth rate in staffs and products that create many problems in controlling for the manager.

The company is divided into 3 departments as follows:-

- 1) Sales Department - deals with the customers. They need the sales information and inventory information to support their activities and analysis. They must update all the information to serve their customer's satisfaction. In this field, salespersons must have an update information everyday so that they will not miss the opportunity to sell their products. Interaction between customer needs to be quick. For example, customer wants to buy the products at the time of sales visit. If sales people have the correct and update information, they could give the answer to the customer immediately instead of coming back to the office and checking the information from many departments. The service to provided the customer will be too slow. It might be competitive in the market place.
- 2) Technical & Support Department - The technical section will assemble and set up the finished product including installation preparation followed by the sales order. Support section will solve the problem for the customers after they bought the company's products. Another duty is providing consultation and trouble shooting for the customers. Both sections will in corporate with each other. As a result, the updated information will let the technical section know in advance of the necessary

installation tools and also the schedule in case of many customers wishing to be served in one day. In other words, after sales service will be improved.

- 3) Administration Department - Accounting section will be responsible for both accounting jobs and financial activities of the company. Stock section deals with the suppliers in purchasing the products. And it is also responsible for the stock information. Therefore, the financial affairs of the company has to be managed effectively and in time. The reports need to be updated and corrected for the right decision making for the management team.

A.T.S. Trading is seeking to heighten its profile in other areas with significant growth potential, particularly those associated with the rapidly advancing information society. The company markets imaging materials for information processing and office automation equipment.

Figure 1.1 will show the company's background of the organization chart as in the next page:

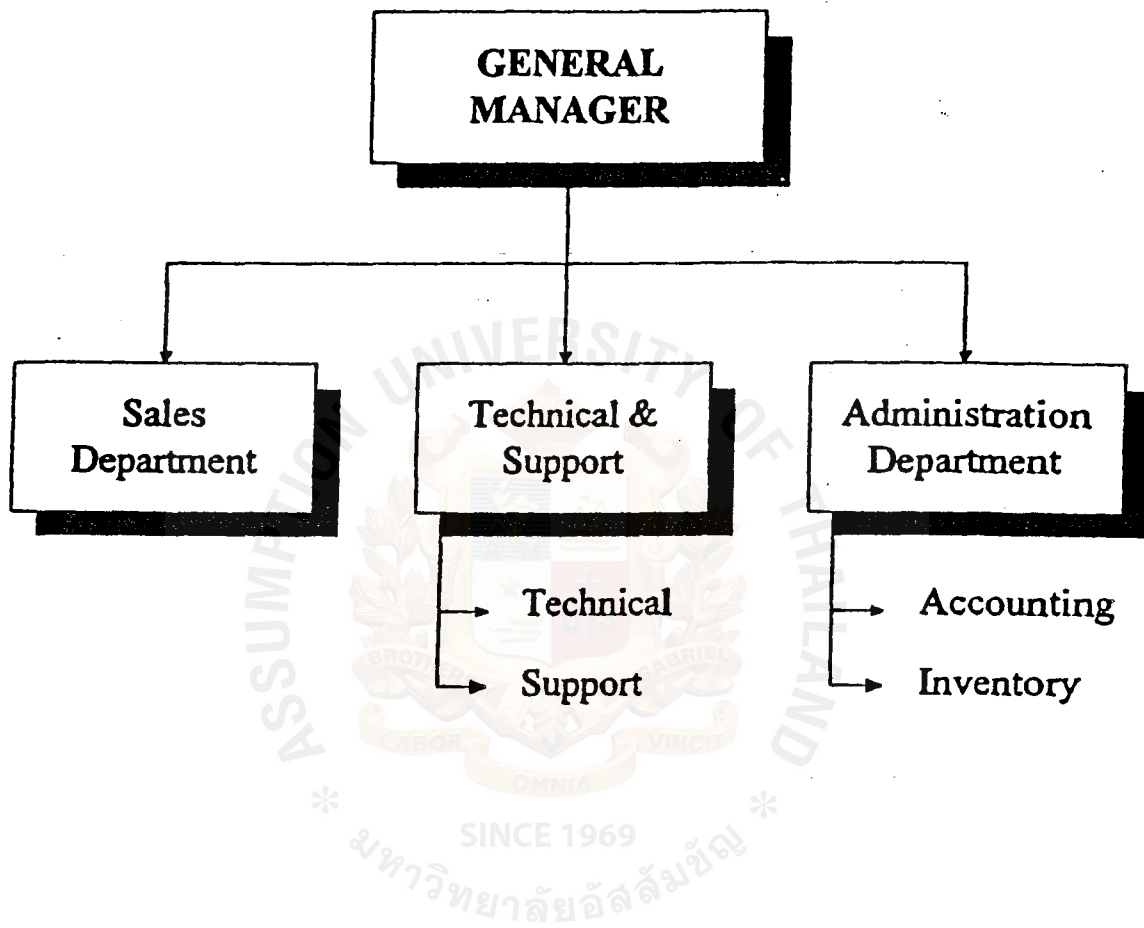


Figure 1.1. Organization Chart

2.2 Existing Business Function

A.T.S. Trading Co., Ltd. concentrates on seeking the geomembrane material from both local and international markets and supplies them to the local companies. A.T.S. concentrates on supplying the customers with variety of raw material especially from local petrochemical producers. The main activities are managing Delivery Order, Invoice, Receipt, Purchase Order, Goods Received Note and Debit /Credit Note.

Another division is the Finance and Administration which is taking care of all the financial functions, accounting functions, stock control and all kinds of personnel activities. All kinds of documents from each department must be sent to the Finance and Administration division for finance and accounting purposes such as stock control, VAT, Financial Report, Trial Balance, Profit and Loss and Balance Sheet. The jobs normally involve a large amount of documentary jobs. The division also has to keep the documents issued by each marketing division.

Process of the existing system :

STEP 1 Customer confirm order to salesperson.

STEP 2 Salesperson prepare the sales order form with 3 copies: for stock section, accounting and file keeping.

STEP 3 Stock section prepares the products as in the sales order form.

STEP 4 Stock section will update the inventory. Then, passes to the technical department.

STEP 5 Stock section will order the products to the supplier when the products reach the point for reordering.

- STEP 6 Technician assembles, tests and sends the products back to sales department.
- STEP 7 Salesperson checks the specification compared with the sales order details and sends the sales order form to the account department to issue invoice.
- STEP 8 Salesperson delivers the product to customer.
- STEP 9 Accountant receives the payment and sends receipt to the customer.
- STEP 10 If there is any problem with the product, the support section will check the warranty period and issue the repair/return product form to the customer.
- STEP 11 If the product has problems and it is still in the warranty period, the technician will send it to the supplier for replacement.
- STEP 12 After repairing or receiving the replacement product from the supplier, the support section will return it to the customer.

2.3 Existing Problems and Area of Improvement

There are some problems that can be analyzed as follows:

- 1) As the process of the system, deals and contacts many departments in the organization, sometimes the data will be changed, and then the staff must inform the other departments which are affected this situation. However, the information which must be transferred to other departments usually is missing in the manual process. Therefore, changes of a document occur many times in the sales department and it does not match with the invoice document which is issued by the Accounting Department.

- 2) The daily transactions which are transferred to another department must be rewritten and recorded to the document files. Therefore, every transaction occurring in a day consumer much times and causes of staff to face with routine jobs.
- 3) The organization will have numerous document files in each department and must spend the cost of office supplies and space on these duplicate documents. Not only to the forms control documents in each department, the organization will have many reports which are ordered for a time for each department manager. Therefore, at the end of the year, the staff in each department must have an activity to destroy these old documents.
- 4) There are many errors in the system. At the end of the year, the account auditing of the company will face many problems about the figures of sales amount, vat., cost, stock balance, etc. Therefore, he/she must spend much time to clear and find out the correct details to close the yearly account. In this case, it will cause high cost of account auditing in the company.
- 5) There are many reports in the system. Each report will consume much time and it not up-to-date for the manager to make decision immediately. This problem will make the company lose much opportunity cost of many things.

2.4 Existing Computer Information System

There is no fully computerized system assisting the company. All documents are produced manually. The staff use the spread sheet application on PC to store and produce the official documents. In particular, they use Excel to do the task and then print out one copy to send to customer or supplier, one copy for keeping in the department and another copy is sent to the finance and accounting division. Finance and accounting division receives information from marketing and feed each concerned document into the system. After every information is fed to the system, the reports about financial status such as trial balance, profit and loss of balance sheet are prepared by hand.

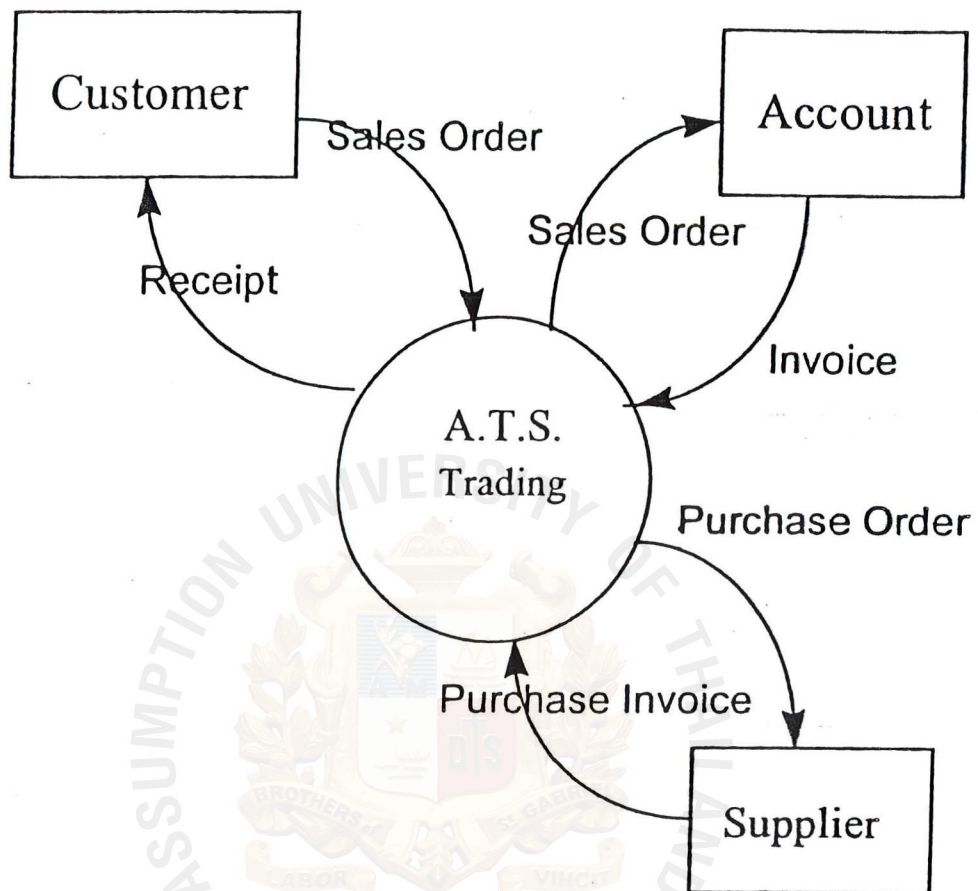


Figure 2.1. Context Diagram Existing System

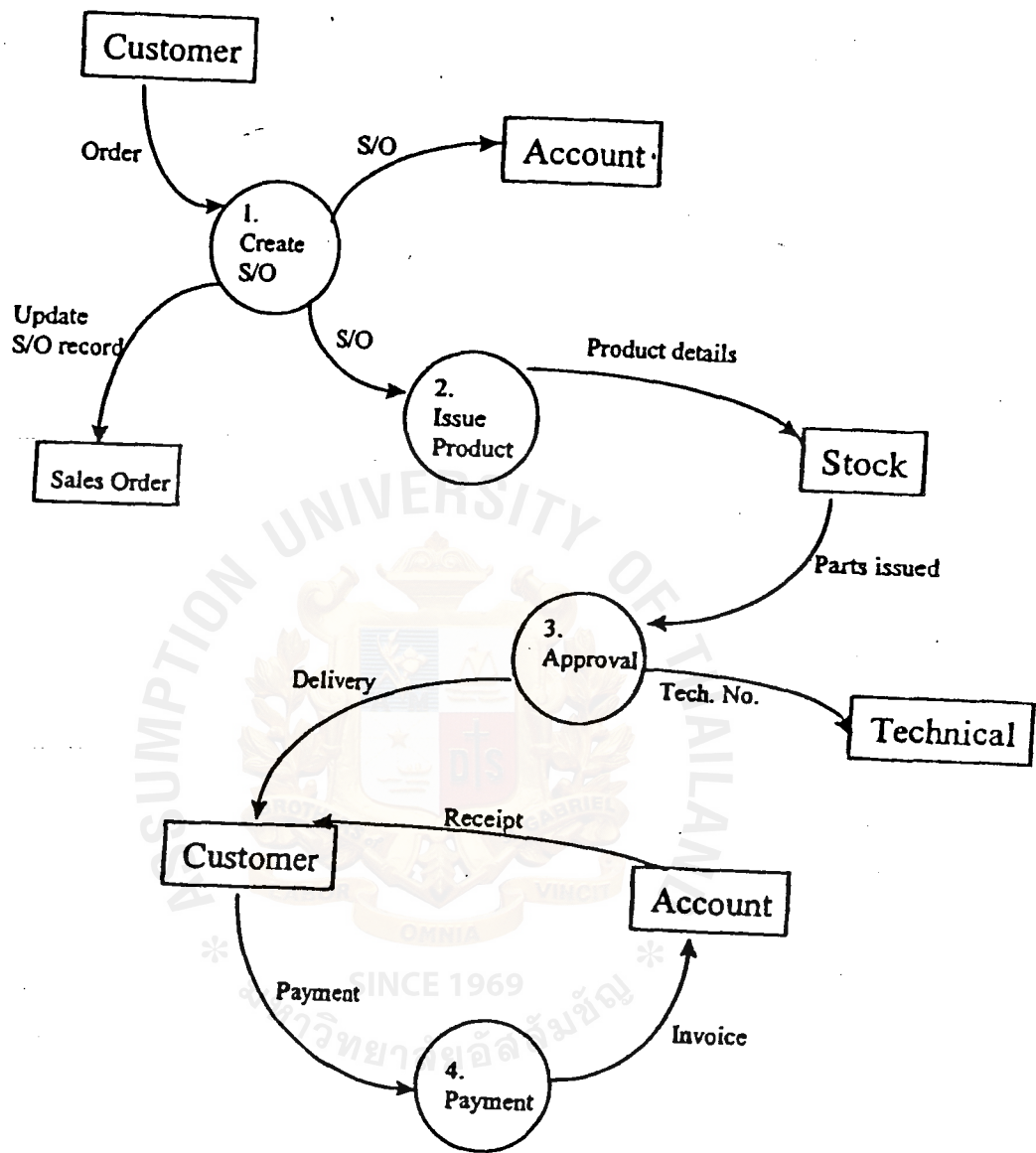


Figure 2.2. Data Flow Diagram of Existing System

III. THE PROPOSED SYSTEM

3.1 User Requirements

The user requirements are obtained from the users themselves and the existing system evaluation. Actually, the existing system can serve the user requirements to some extent. But users still need further development for more system functions as well as improvement within the existing system operating scope. The main development and improvement of the new system includes query capability and report production, database storage and security.

The objective definition of the new system requirements are to assemble an overall pictures of inputs, outputs, operations and resources required by the system to meet the present and future needs of the organization. The requirements for the new system are those features or details that are needed. Those are activities or improvements that the new system must provide. The new system requirements are defined as:

- 1) To reduce the paper documents and time consumption for every department.
- 2) To reduce the redundancy process for the overall system.
- 3) To provide the forecasting for the manager to control stock or buying products and analyze the pending and back order quantity.
- 4) To provide the monthly sales report for the manager to plan marketing and to control their salespersons.
- 5) To control the stock balance and all transactions occurring in the stock department.

- 6) To reduce the errors which will be partially achieved by automation.
Eliminate human error from manual work.
- 7) Technical and Support can follow up the problem and can create better service to customer.

3.2 System Design

This system is implemented for a small trading company. So, there are only four personal computers being used in the A.T.S. company. One is for the manager, one is for the Accountant, one's for the Sales department and one's for the Administration. The new system requires LAN system to communicate between the four computers. The files are designed to match the requirements of the users and support the report design.

The system is designed to be the center of the information of the stock control and control the main process of the system such as sales transaction, receive transaction and adjust stock in-out transaction.

The new system can be divided into 3 main processes as follows:

3.2.1 Input design

The input design refers to the design of screen design, document form and document flow. The basic function is to accept data entry, verification, validation, editing, adding, changing and deleting information. This process is the most difficult parts. It consumes time in programming and designing because the validation, checking, retrieving, saving, looping, calculation, screen positioning, and viewing functions must be done by the input functions.

3.2.2 Database design

The proposed database system will be created and maintained to provide several benefits as follows:

- a) Improve data control with more consistency in data descriptions.
- b) Increase data accessibility for user to extract needed information from the data resources.
- c) Improve data quality, data shareability which reduce data duplication and redundancy.
- d) Improve data security by preventing unauthorized access to data.
- e) Improve the performance of data resource, utilize the physical computer resources with efficiency.

3.2.3 Output design

The output design is the required reports and screens generating information for reporting. Output design is the first step in the program development shared by the programmer who communicates with the user about what is required. The system will be able to generate reports and display on both screen and printers.

3.3 Hardware / Software Requirements

3.3.1 Hardware Requirements

Hardware requirement can be summarized as follows:

- | | |
|--|--------|
| A) Personal computer Pentium-266 MMX | 6 sets |
| <ul style="list-style-type: none"> - Memory 32 MB on board - Cache memory 512 KB - Harddisk 2.1 GB - Diskdrive 3.5" 1.44 MB - 14" SVGA color monitor - CD ROM 32 X | |
| B) Printer HP Laserjet 6 L | 3 sets |
| C) Printer NEC Printwriter P7300 | 1 sets |
| D) UPS (500 VA, 15 MIN) | 2 sets |
| E) Tape back up 1 GB, SCSI | 1 sets |
| F) Lan card, Ethernet 10 - base T | 6 sets |

3.3.2 Software requirement

- G) Operating System : MS DOS Version 6.22 , Windows 95
- H) Communication Software : Windows 95 workgroup
- I) System Development Software : Visual Basic , Microsoft access

3.4 Security and Control

The program provides the password protection over using the program. There are 2 types of user that the program classified ie. Normal user and Administrative user.

First, normal user is the one who key in the data to maintain the master file and run report. Second, administrative user is the one who maintains the user account including password. Administrative user can erase the data in the master file and clear the transaction data.

The computer set the password using 4 numeric password. The setting of the computer password should be done in the room that only authorized person can access. The physical key lock is given to the authorized person. In this system, the general manager is assigned to be the authorized person.

The computer is used only for accounting purpose. Protection against data damage is done by setting the policy to backup the data weekly on Friday or after the input of the transactions into the program. The monthly backup must be on the last Friday of the month and the backup disk is kept in another place not in the room.

The backup process is done by the user using commercial backup software in the market. The compression program is recommended because the ratio of compression will be more than 70% of the total bytes of the program and data. That is if you have about 10 MB of data in the directory, you can backup using compression program and get the 3 MB data backup.

The scan virus policy done weekly on Friday is recommended using the virus protection software provided by DOS 6.7, Norton Anti-Virus, Central Point Anti-Virus or MC Afee. UPS must be use to prevent electronic shock and shortage. The ability of stabilizer is also recommended.

File protection and other facilities must be done with care. The training file and the off-site backup must be done by the user of the system. Although the program provide password security within the program itself, the encryption program is not written yet and should be considered as recommendation for the next version. The implementation of the database is also taken into account and will be developed using the security provided the database in the future. Different checks can be established for each type of access to each piece of information in the database. However, without such checks the security of the data might actually be more at risk than in a traditional filing system.

3.5 Cost / Benefit Analysis

The development of the proposed system is a long-term investment which represents sizable outlays of fund that commit a company to some cause of action. Procedures are needed to analyze and select it properly. Capital budgeting is the process of evaluating and selecting long-term investment consistent with the company's goal. There are 2 categories that can be analyzed as follows:

3.5.1 Cost Analysis

There are 3 cost categories for cost analysis: investment cost, implementation cost and annual operating cost.

A) Investment Cost

Hardware : Hardware is considered from the hardware in the company, then add-on some hardware that are required in the sales and customer information system which is considered from many criteria. Below is the details of the hardware configuration and other details:

Table 3.1. Hardware Cost Estimate

Hardware Cost Estimated	Unit	Price/Unit	Total
1. Computer Pentium-266 MMX	6	35,000.-	210,000.-
2. Printer HP Laserjet 6L	3	12,000.-	36,000.-
3. Printer NEC Printwriter P7300	1	15,000.-	15,000.-
4. UPS (500VA,15 MIN)	2	4,500.-	9,000.-
5. Tape backup SCSI, 1 GB	1	13,500.-	13,500.-
6. LAN Card, Ethernet 10 - base T	6	1,500.-	9,000.-

Total Hardware Cost

292,500.-

Table 3.2. Software Cost Estimated

Software Cost Estimated	Unit	Price/Unit	Total
1. MS DOS 6.22 Thai	1	3,200.-	3,200.-
2. Windows 95	1	6,500.-	6,500.-

Total Software Cost 9,700.-

Table 3.3. Hardware Installation Charge

Hardware Installation Charge	Price
- Site survey	3,000.-
- Consultation Fee	5,000.-
- Engineer Fee	5,000.-
- Transportation Fee	2,000.-

Total Hardware Installation Charge 15,000.-

TOTAL INVESTMENT COST = 317,200.-

B) Implementation Cost

Table 3.4. Implementation Cost

Implementation Cost Description	Price
- User training	8,000.-
- Site preparation	2,000.-

Total implementation cost 10,000.-

C) Annual Operation Cost

Table 3.5. Annual Operation Cost

Annual Operation Cost Description	Price
- Continuous/A4 paper	3,600.-
- Utility and Hardware maintenance	10,000.-
- Software maintenance	5,000.-
- Other expense	2,000.-

⇒ **Total Annual Cost** **20,600.-**

The formula of annual cost of the proposed system:

Annual Cost = $\frac{\text{Investment Cost} + \text{Implement Cost} + \text{Annual Operating Cost}}{\text{Estimated System Life Year}}$

$$= \frac{317,200 + 10,000 + 20,600}{5}$$

$$= 67,560$$

Total saving :

a) Elimination of clerical personal (2 person 8,500 x12)	204,000.-
b) Reduce paper material due to double filing	<u>20,000.-</u>
Total saving	<u>224,000.-</u>

Payback Period

The payback period is the exact amount of time required for the company to recover its initial investment as calculated from cash inflows. The after taxes payback period is :

$$P = \frac{I}{(1-T)R}$$

$$P = \text{Payback period}$$

$$I = \text{Investment cost}$$

$$R = \text{Average annual return on investment}$$

$$T = \text{Corporate tax rate in percentage (30\%)}$$

Find average annual return on investment (R):

$$\begin{aligned} R &= \text{Total saving} - \text{Annual operating cost} \\ &= 224,000 - 67,560 \\ &= 156,440 \end{aligned}$$

Find payback period (P) :

$$\begin{aligned} P &= \frac{I}{(1-T)R} \\ &= \frac{317,200}{(1-0.3) 156,440} \\ &= 2.896 \end{aligned}$$

Payback period (after tax) for the proposed system is 2.89 years.

Payback Period Graph

Table 3.6. System Cost Comparison

Year	Cost (Bht)	Accumulate Cost	Benefit (Bht)	Accumulate Benefit
1	337,800.00	337,800.00	156,800.00	224,000.00
2	79,100.00	416,900.00	156,800.00	380,800.00
3	87,010.00	503,910.00	156,800.00	537,600.00
4	95,711.00	599,621.00	156,800.00	694,400.00
5	105,282.10	704,903.10	156,800.00	851,200.00
6	115,810.31	820,713.41	156,800.00	1,008,000.00

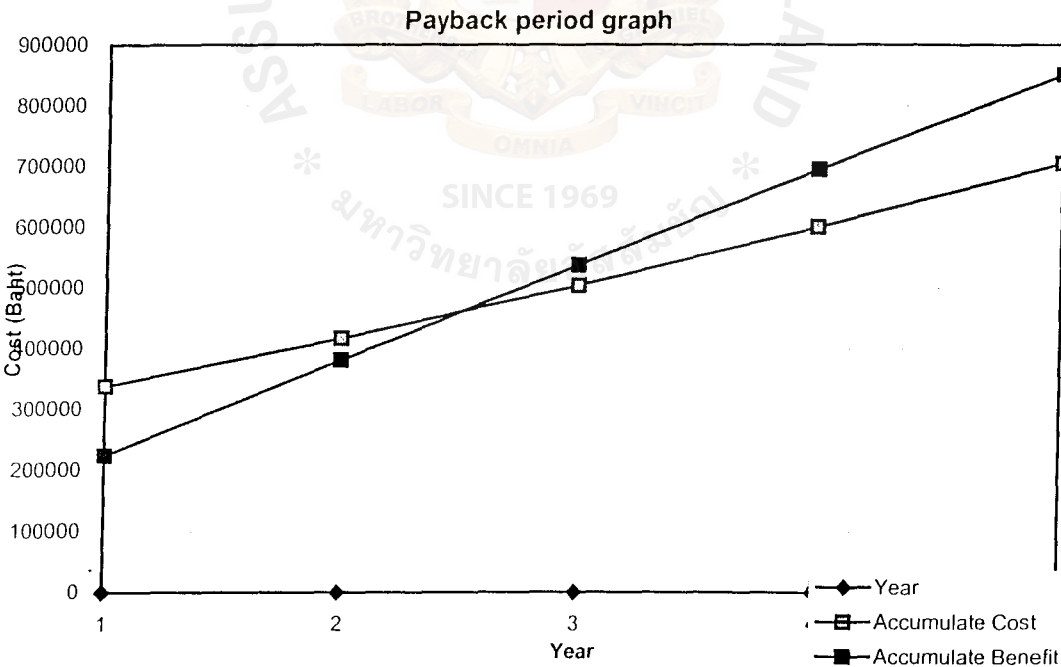


Figure 3.1. System Cost Comparison

3.5.2 Benefit Analysis

The benefit of system can be split into two categories as follows:

A) Tangible benefits

a) Elimination of clerical personal (1 person 8,500x12)	204,000.-
b) Reduction of paper material due to double filing and other expense	<u>10,000.-</u>
Total tangible benefits	<u>224,000.-</u>

B) Intangible benefits

- a) Smoothing of operational flows.
- b) Reducing volume of paper produced and handled.
- c) Improving decision process by providing faster access to information.
- d) Ability to meet the competition.
- e) Rise in level of service quality and performance.
- f) Better utilization of resource.
- g) Future cost avoidance.
- h) Better planning information for making decision.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The implementation process is set up by using the parallel run concept. By this concept, the process will work on both the old system and the new system for the number of cycles until the result of the new system proves to be operation. Therefore, it will take much time in this period for the users who do double the job each day and must be familiar with the new process. However, the new process is designed and programmed based on the routine job of the users which consume a short time for some users to understand the process and operate it correctly. During project implementation, there must be a person who checks the error of the reports, verify data input and co-ordinate with the manual system.

The implementation process is the most difficult step of developing the proposed system. The developer may discover some problems that have not been anticipated during his/her study and software development or new requirements have been discovered after applying the system. So, the development team must be required to solve these problems and provide modifications to the original program.

4.2 Stage of Implementation

The implementation consist of three stages which are the separated and distinct tasks which must be performed in sequential order.

4.2.1 Programming

In this stage, the application programs are written in order to perform whatever business are being computerized.

4.2.2 Testing

It involves the testing of the program, a full systems test, and the documentation of the programs. A complete schedule of testing involves the following:

- 1) Testing individual program
- 2) Creating test data
- 3) Link/string/single-thread testing
- 4) System/multiple-thread testing
- 5) Backup and restart testing

4.2.3 Installation

At this stage, the overall system runs the program, interface with the different files, utilization and telecommunication networks, and interface with the users.

4.2.4 Training

Training the staff is the necessary job in this section because the user will operate the system correctly when they understand it well. The training process is provided according to duty and department. We classify the group of users into 2 groups. The first group is the users group which will be trained about by each department focal point and the other group is the managers who will be trained all of the system in the program and it's flow in one course. Therefore, the managers group have to spend sometimes for training about the flow of the new system.

4.2.5 Documentation

Documentation of this system will be separated into 2 types of documents. The first is the user-guide which describes the method to use this program in each screen. The other document is the programming guide which describes the flow of the system and data-dictionary. This document will help the programmer to develop system expandable and the maintenance of the system in the future.

4.3 Test Planning

All of the system's newly written or modified application programs, as well as new procedural manual, new hardware and all system interfaces, must be tested thoroughly.

Testing of specific programs, subsystems, and total systems is essential for quality assurance. Testing is done to turn up any existing problems with the programs and their interfaces before the system is actually used. Typically, testing is done in a bottom-up fashion with program codes being desk checked first. Following several intermediate test steps, testing of the full system with live data is accomplished. This provides an opportunity to work out any problems that arise before the system is put into production.

Once the simulation was established, the staff in each department involved have to select their representatives involved in all functions in the system, not only the changes in their functions, but also the movement throughout the system, from one function to another. Also from this simulation run, additional requirements and report modification are identified by them.

Following are work packages in this simulation task :-

- a) Simulation planning

- b) Review with users
- c) User training (system overview and changes)
- d) Simulation preparation in
 - Input documents
 - Hardware and software
 - Site
 - Simulation run
 - Identifying modifications and conclusion

Resource Utilization

During development, resource utilization comprises both tangible and intangible resource. Intangible rework includes the effort from MIS officer, Finance Officer and Marketing Officer. These are measurable in man-hour, and computing facility for system developer. Tangible resource includes general office supplies.

Actually, the computing facility has already been available as the company has provided the staff for the basic facility.

4.4 Result of the Implementation

At first , the analysts face the problem of the users who are still familiar with the old system. They have to explain and convince them to change the routine jobs from the manual process to the new computerize process. There are many staffs dealing with this system. So, there must be separate departmental meeting. However, the management level staff provide the best co-operation in this project.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The purpose of this system development project is to analyze, design and implement the system for the trading company. The system specification and the output report can support the management team. The major benefit from this system can reduce cost of expansion, control stock loss and many departments can know the stock status. In addition, it is accepted that the new system can reduce the error which occur with the inventory section and provide the flexibility in operating. Moreover, from the graph, pay back period is about 2.8 years.

The new system is designed to improve the efficiency and effectiveness of the current system. It can be used to reduce the workload and provide timely, accurate, complete and update information. This system can produce various reports that simplify and also save over time expenses. The screen layouts are also designed to be user-friendly, easy to use and understand for users.

Moreover, the new system can be linked to other system of the company such as account system because the master files are designed to support them. So, every department can share the database and will receive the accurate information in the company. Sales department will know the product in-hand and inventory department can control and reorder the products. And for the accountant department, the new system can control the debt, payment and receipt transaction. This system can be future enhanced according to the user requirements.

The next step of implementation phases are :

- 1) Accept testing to ensure that it works as per user requirements.

- 2) Conduct a training course for user to operate this program together with problem solving techniques if any occur.
- 3) Operate the system by parallelly running with the manually system and compare the results in order to do correction for any unexpected problem. After 3 months operation - if the computerized system has no problem, it can be run solely and the manual system can be stopped.

5.2 Recommendations

In the future, the system should be done in the section of after sales service which will be very important for the company to get a good image from the customers. This section can extend to do a preventive maintenance at customer site. The company can earn a lot of profit and will do a full cycle in this field. When customer come in to the shop, they will get a full service from the company.

It has stressed the importance of information to all levels of management, for all types of decisions. Frequently, managers feel they are drowning in a sea of data without being given the information they need and an information system will only add to these problems if it is not carefully designed not just to improve information flow, but also to improve the selective flow of certain types of information, and the transformation of other data into a meaningful form. The information system must therefore be based entirely on the needs of the potential users if it is to be effective in improving the efficiency of decision-making within the company. One of the main advances in computerized information provision has not been in the portability and power of the equipment, but the impetus this gave to the design of user-friendly software by more consumer-oriented company.

Flexibility is the keyword for the company in building an information system: flexibility to meet the different levels of sophistication of users, flexibility to meet the different needs of users and flexibility to handle the different forms of information used

for decision-making. When information systems have met these requirements of user-orientation and flexibility, they have been used to great effect by marketers in gaining competitive advantage over rivals.

As problems over incompatibility are solved , it will become much easier for PCs to become part of a marketing manger's tool-kit. External databases can be accessed, the data or text manipulated as required and then integrated into an original report. The raw data can be presented graphically and the final version transmitted by computer line or fax to the relevant audience.

It is shown that the competitive advantage for the retailing system is increasing in accordance with the degree of co-operation obtained from the retailer. As the nature of retailing changes so will methods of operation, which again may force changes on retailer. These changes are increasingly important as fewer buying points control greater shares of the retail market. It is becoming a major proactive influence in its own right and as such is increasing its strategic importance in marketing decisions.

Lastly, after the completion of the system, A.T.S. Trading Co., Ltd. is concerned about implementing the same system into other potential locations which may have a branch office. For example, China , Myanmar and Vietnam which the company already has some business bases and a relationship with these country.

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5. Keith Fletcher, Marketing management and information technology, Prentice-Hall Europe, 1995

APPENDIX A

Proposed System Data Flow Diagram



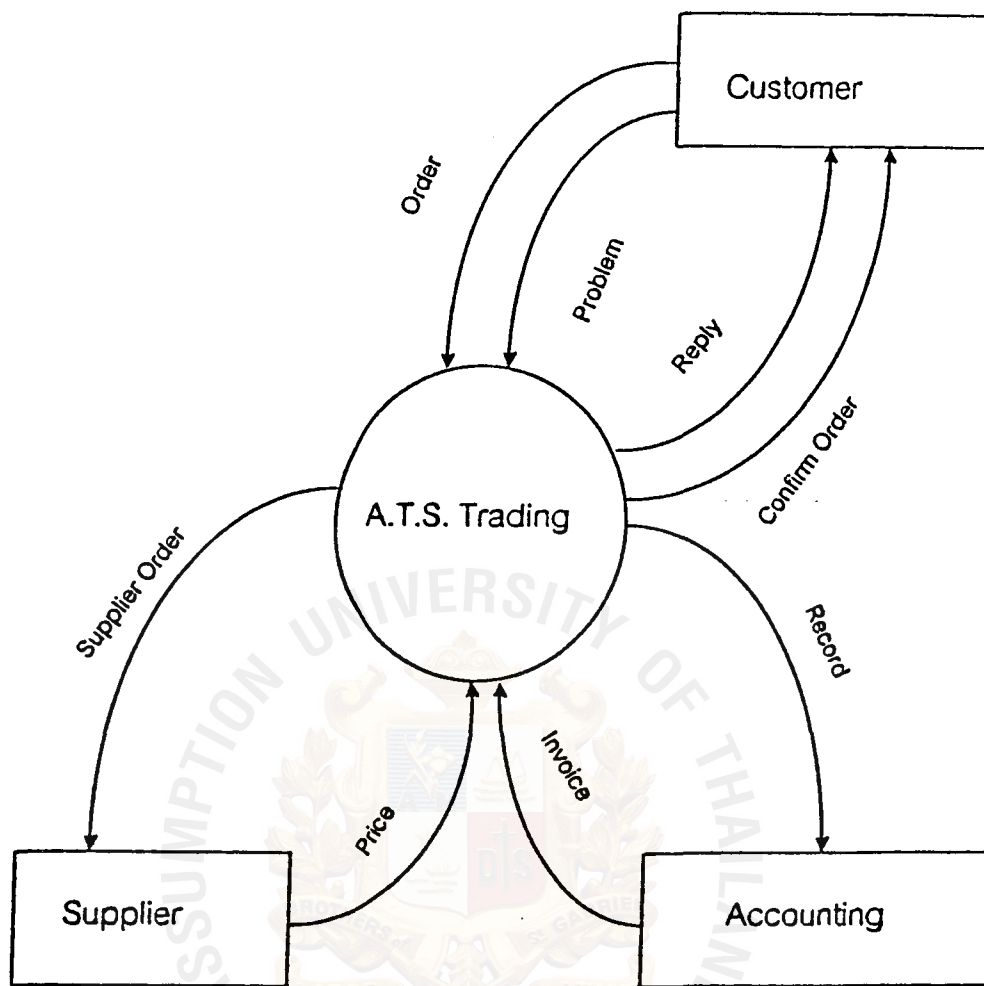


Figure A.1. Context Diagram of New System

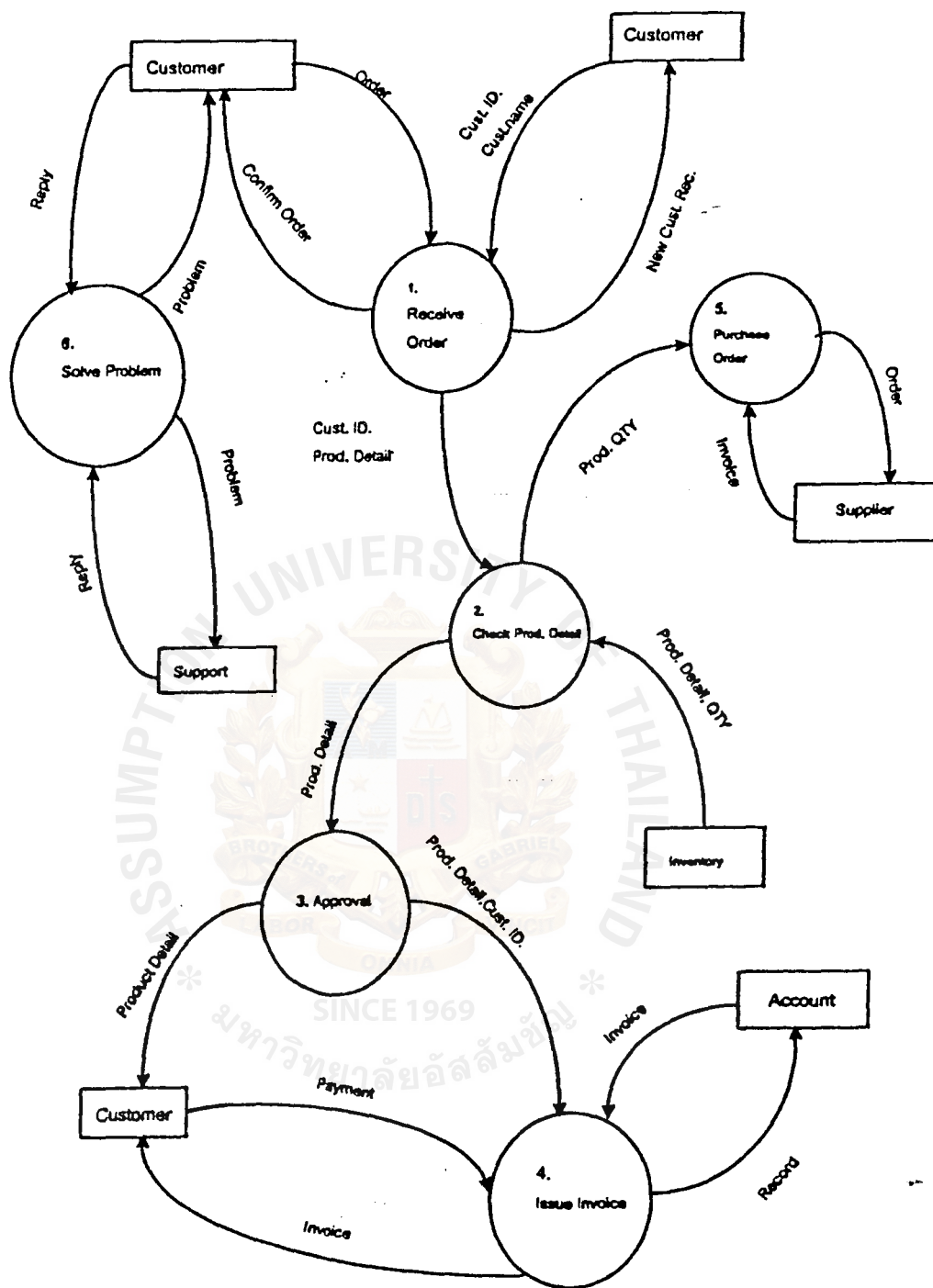


Figure A.2. Level 0 Data Flow Diagram

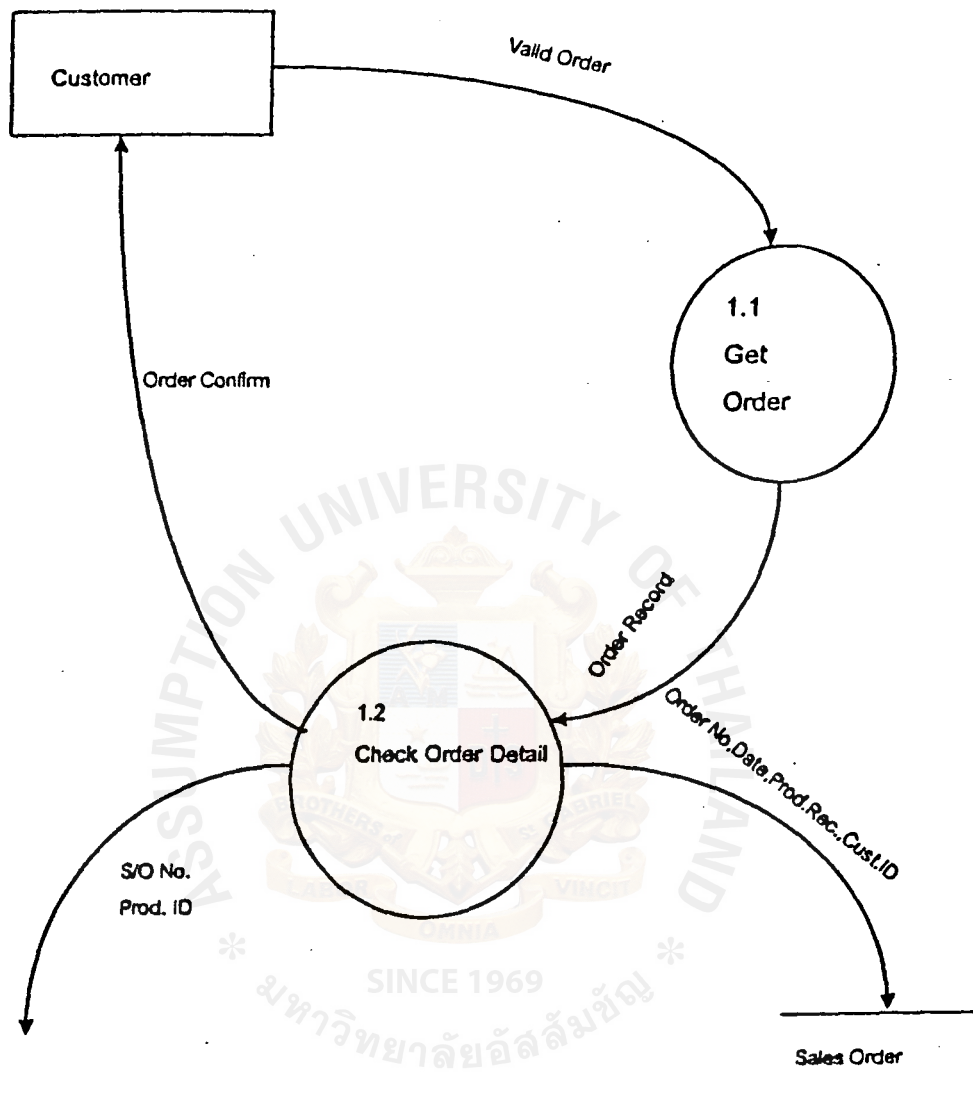


Figure A.3. Level 1 Receive Order

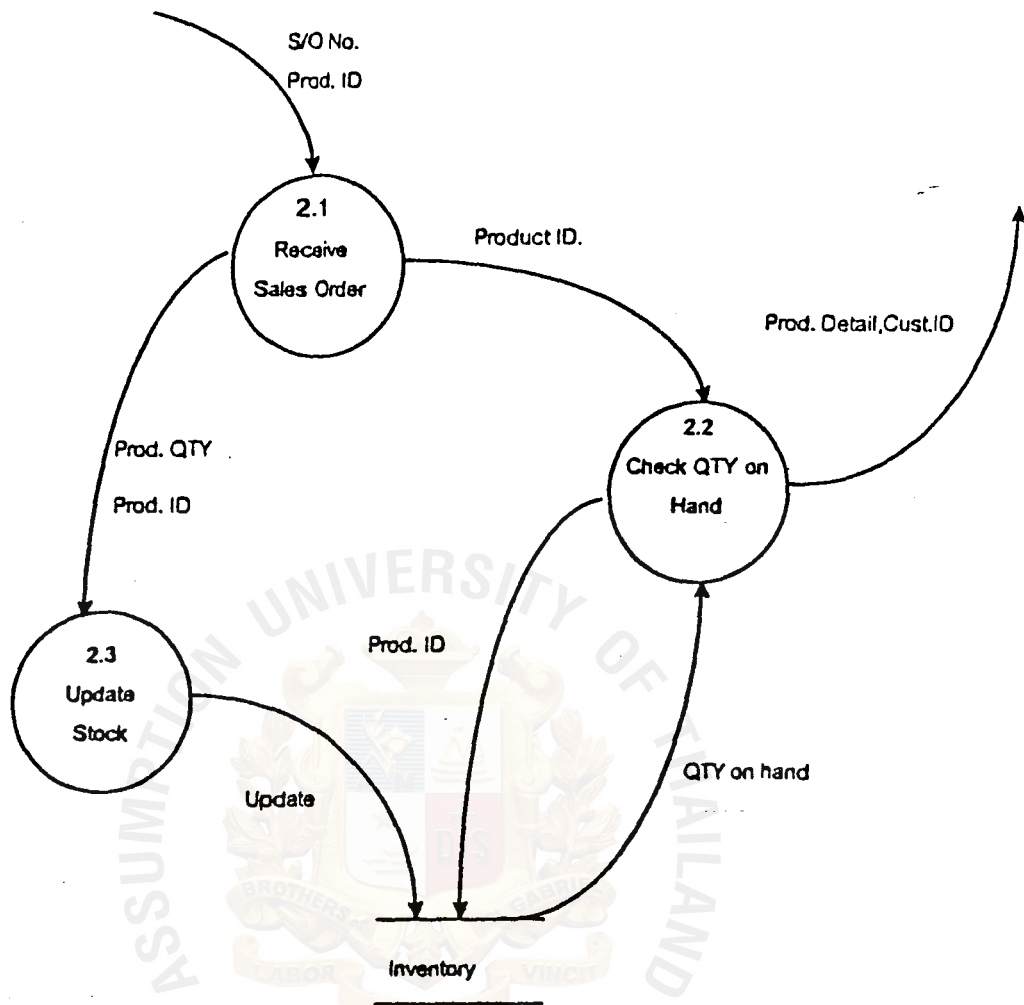


Figure A.4. Check Product Details

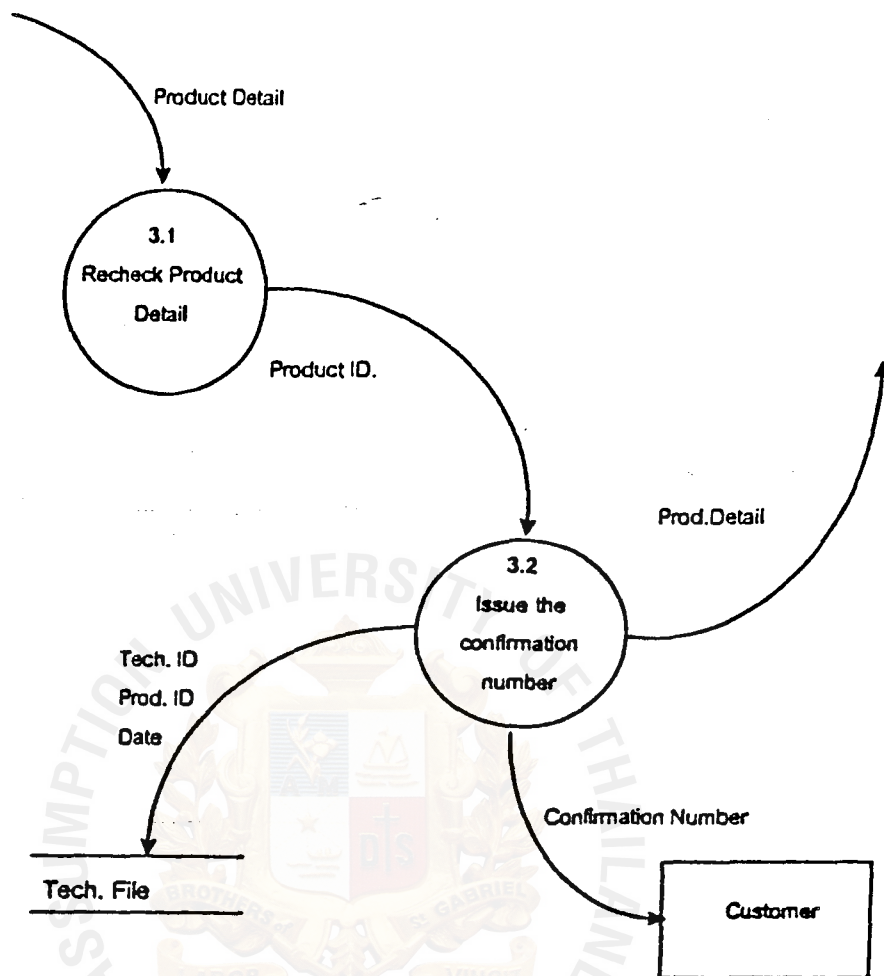


Figure A.5. Approval

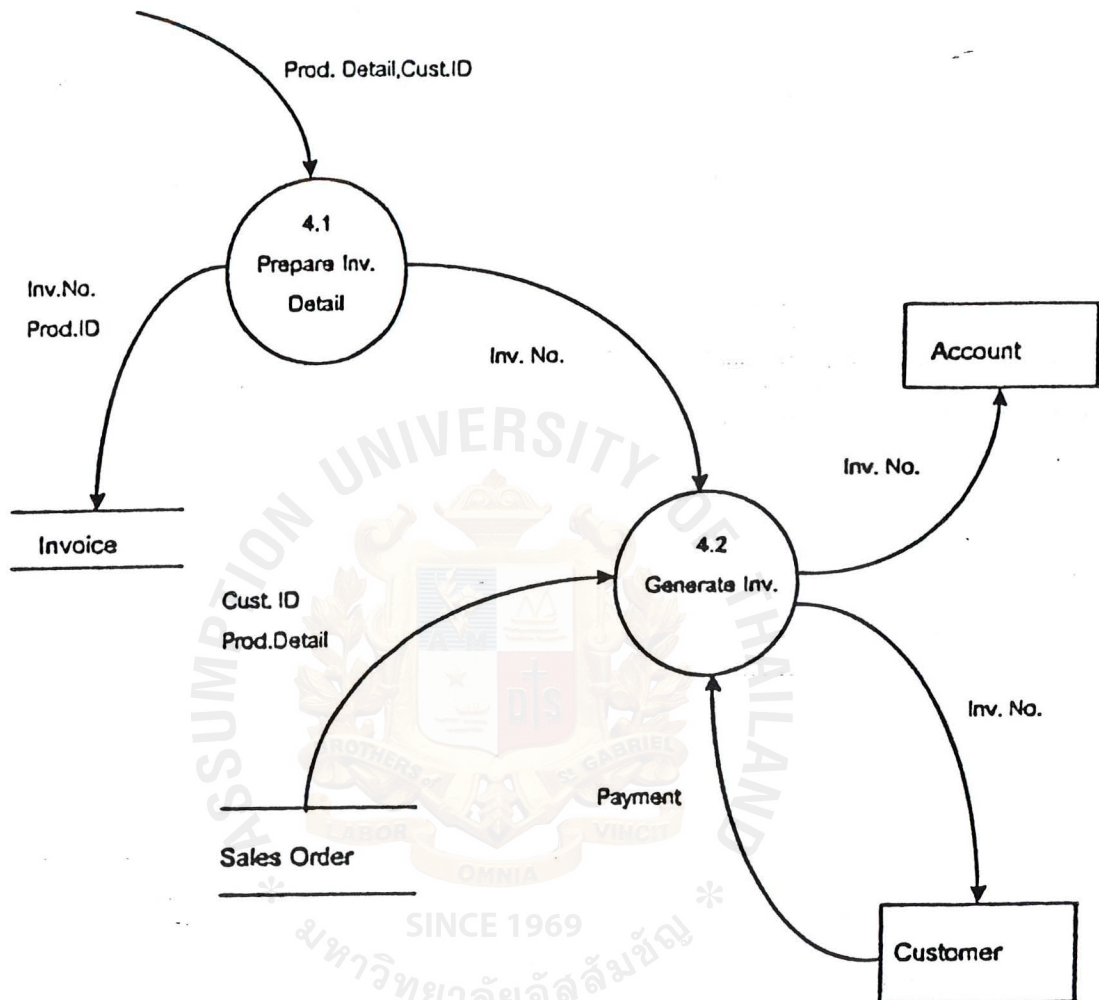


Figure A.6. Issue Invoice

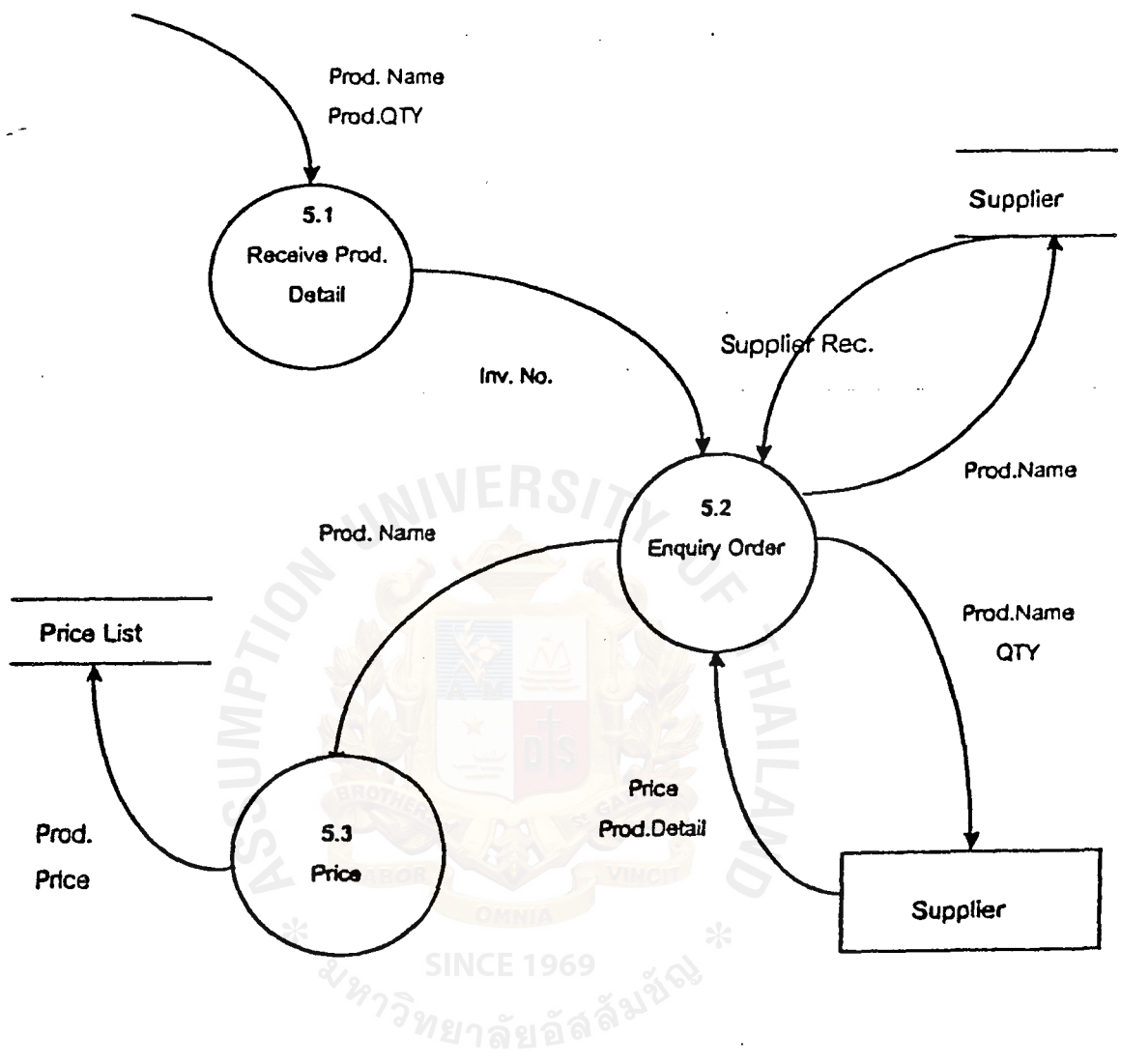


Figure A.7. Purchase Order

APPENDIX B

Input Forms and Input Screens



Figure B.1. Relationship of Input Screen

Microsoft Access - Customer : Table

Field Name	Data Type	Description
Customer ID	Number	
Country ID	Number	
Date Receive	Date/Time	
Date Send	Date/Time	
By	Text	
Date Feedback	Date/Time	
Company Name	Text	
Add_Im	Text	
Attn_Im	Text	
Position_Im	Text	
Tel_Im	Text	
Fax_Im	Text	
Telex_Im	Text	
E-mail_Im	Text	
Product ID	Number	
Detail Product	Memo	
From	Text	

Field Properties

Field Size	Long Integer
Decimal Places	000000
Default Value	Auto
Field Width	000000
Label	
Default Value	0
Validation Rule	
Validation Text	
Required	No
Indexed	Yes (No Duplicates)

Design view | Microsoft Office Word 2003 | Microsoft Access - [C...]

Figure B.2. Customer Information Input Table

Microsoft Access - Supplier : Table

Name	Data Type	Field Properties
Supplier ID	Number	
Product	Text	
CompanyName	Text	
Add_Sup	Text	
Attn_Sup	Text	
Position_Sup	Text	
Tel_Sup	Text	
Fax_Sup	Text	
Telex_Sup	Text	
E-mail_Sup	Text	
Memo_Sp	Memo	

Field Name	Field Properties
Field Size	Long Integer
Decimal	000
Primary Key	Auto
Index	000
Index Name	0
Validation Rule	
Validation Text	
Required	Yes
Unique	Yes (No Duplicates)

Field Name can contain 255 characters and include spaces. Press F1 for help on field names.

Design View | Switchboard | Ribbon

Microsoft Office Standard Bar | Microsoft Access - [S...]

Figure B.4. Supplier Information Input Table

Microsoft Access - Supplier1

Supplier_ID 000 Product

Company Name

Address

Attention Position

Telephone Fax

Telex

E-mail

Memo

Records 59

Form View

15:07

Figure B.5. Supplier Information Input Screen

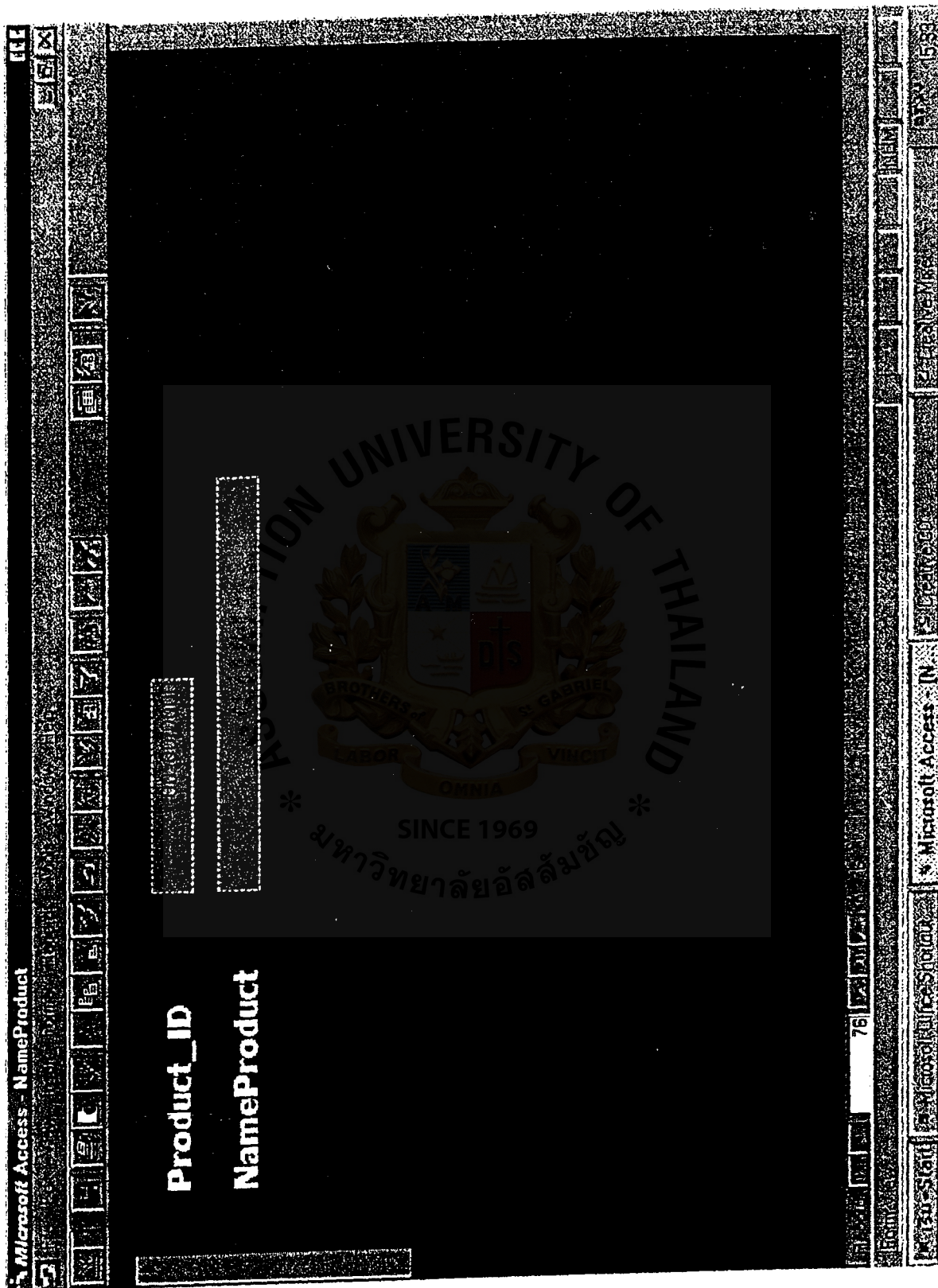


Figure B.7. Product Information Input Screen

Microsoft Access - Country : Table

Field Name	Data Type	Description
Country_ID	Number	
NameCountry	Text	
Add_Embassy	Text	
Contract Name	Text	
Position Name	Text	
Tel_Em	Text	
Fax_Em	Text	
Telex_Em	Text	
E-mail_Em	Text	
Count_Com	Number	

Field Properties

General

Design view | Switch pane | Field Headers

Figure B.8. Country Information Input Table

Microsoft Access - Communication : Table

Field Name	Data Type	Field Properties
RefNo	Text	
Date	Date/Time	
Time	Date/Time	
CommuBy	Text	
INorOUT	Text	
RefNo FaxIN	Text	
ComName	Text	
ContractName	Text	
Position	Text	
Customer_ID	Number	
Supplier_ID	Number	
Memo_Com	Text	

Field Properties

Design view

Microsoft Access - [C:\Program Files\Microsoft Office\Office\MSACCESS.EXE] - [Communication : Table] - [Design view]

Microsoft Office Word 2003 - [C:\Program Files\Microsoft Office\Office\WORD.EXE] - [Microsoft Office Word 2003] - [14:22]

Figure B.9. Communication Input Table

APPENDIX C

Process Specification



PROCESS SPECIFICATION

PROCESS NO. 1.1

PROCESS NAME : GET ORDER

BEGIN

ACCEPT valid order record

WRITE order record to order form

DISPLAY order record

END

PROCESS NO. 1.2

PROCESS NAME : CHECK ORDER DETAIL

BEGIN

ACCEPT order record

FIND order record from SALES ORDER

IF record not found

STORE order_no., order_date, customer_ID, product record

DISPLAY "VALID ORDER"

ELSE

DISPLAY "DUPLICATE ORDER"

ENDIF

END

PROCESS NO. 2.1

PROCESS NAME : RECEIVE SALES ORDER

BEGIN

ACCEPT sales order record

FIND order record to SALES ORDER

IF found record

READ product name

DISPLAY "PRODUCT DETAIL IS VALID"

ELSE

DISPLAY "INVALID ORDER"

ENDIF

END

PROCESS NO. 2.2

PROCESS NAME : CHECK QUANTITY ON HAND

BEGIN

ACCEPT product number

FIND quantity on hand from INVENTORY

IF found

READ product name, quantity on hand

ELSE

DISPLAY "INVALID PRODUCT"

ENDIF

END

PROCESS NO. 2.3

PROCESS NAME : UPDATE STOCK

BEGIN

ACCEPT quantity on order, supplier invoice

IF sales product

SET quantity on hand = quantity on hand - quantity on order

ELSE

IF purchase

ADD quantity on order to
quantity on hand

ELSE

DISPLAY "INVALID TRANSACTION"

ENDIF

ENDIF

STORE quantity on hand to INVENTORY

END

PROCESS NO. 3.1

PROCESS NAME : CHECK PRODUCT DETAIL

BEGIN

ACCEPT product name

FIND product record from INVENTORY

IF found record

READ product record

ELSE

DISPLAY "INVALID PRODUCT"

ENDIF

END

PROCESS NO. 4.1

PROCESS NAME : PREPARE INVOICE DETAIL

BEGIN

ACCEPT product detail, customer_ID

FIND order record from SALES ORDER

STORE invoice no., product detail

END

PROCESS NO. 4.2

PROCESS NAME : GENERATE INVOICE

BEGIN

ACCEPT invoice number

FIND customer_ID, product detail from SALES ORDER

IF found record

 READ product detail

 DISPLAY product record

ELSE

 DISPLAY "INVALID SALES ORDER"

ENDIF

END

PROCESS NO. 5.1

PROCESS NAME : RECEIVE PRODUCT DETAIL

BEGIN

ACCEPT product detail, quantity on order

DISPLAY product record

DISPLAY quantity on order

END

PROCESS NO. 5.2

PROCESS NAME : ENQUIRY ORDER

BEGIN

ACCEPT invoice number

FIND product detail from SUPPLIER

DISPLAY supplier record

END

PROCESS NO. 5.3

PROCESS NAME : STORE PRICE

BEGIN

ACCEPT product detail, price

STORE product detail, price

DISPLAY product record

DISPLAY price

END

PROCESS NO. 6.1

PROCESS NAME : CREATE SERVICE FORM

BEGIN

ACCEPT problem, service record

FIND service record from SERVICE FILE

IF found record

DISPLAY service record

ELSE

DISPLAY "SERVICE NOT FOUND"

ENDIF

END

PROCESS NO. 6.2

PROCESS NAME : CREATE SERVICE FORM

BEGIN

ACCEPT customer_ID, Date

ADD reply, technician no., Date

STORE reply record to SERVICE FILE

END



APPENDIX D

Data Dictionary



DATA DICTIONARY OF NEW SYSTEM

CONFIRM ORDER	= * confirm order to customer *
	* *
COURTESY-TITLE	= * the prefix in front of a person's first name *
	* ["Mr."/ "Ms."]*
CUST.ID	= * customer identification number *
	* *
CUST. NAME	= {courtesy-title} + {first name} + {last name}
CUST. ADDRESS	= * address where we contact and send product * number + street + province + city + postal-code
DATE	= * DD/MM/YY *
INV.	= * INVOICE *
	* *
INV. NO.	= * a unique number assigned to each invoice* 4{numeric digit}4
LEGAL-CHARACTER	= [A-Z / a-z / 0-9 / ' / -]
NEW CUST. REC.	= * detail of new customer * cust.id + cust.name + cust.address + telephone no.
NUMERIC-DIGIT	= [0-9]
ORDER	= * customer order products *
	* *
ORDER NO.	= * a unique number assigned to each sales order form* 4{numeric digit}4
PAYMENT	= * pay money for invoice *
	* *
PRICE	= * price of product *

* *
 PROBLEM = * characteristic of paper problem *
 * *
 PROD.DETAIL = * detail of the product *

 product number + product name + count +

 cost unit price + sale unit price + quantity

 PROD.ID = * product identification number *

 * *
 PROD. NAME = {legal-character}

 PROD. QTY = * quantity of sales order or purchase
 order of product *
 * *
 QTY ON HAND = * quantity on hand at that time *

 * *
 RECORD = * customer ID + customer name +

 product detail + quantity + price *

 REPLY = * form that technician issue to conclude

problem for customer *

* *

SALES ORDER NO.

= * a unique number assigned to each

sales order form *

4{numeric digit}4

SERVICE FORM

= * record of problem and result that

make claim or return products or software

problem *

* *

SUPPLIER ORDER*

= * purchase order issued to supplier*

SUPPLIER RECORD

= * supplier number + supplier name +

address + telephone number + person to

contact

* *

TECH.NO.

= * technician identification number *

* *

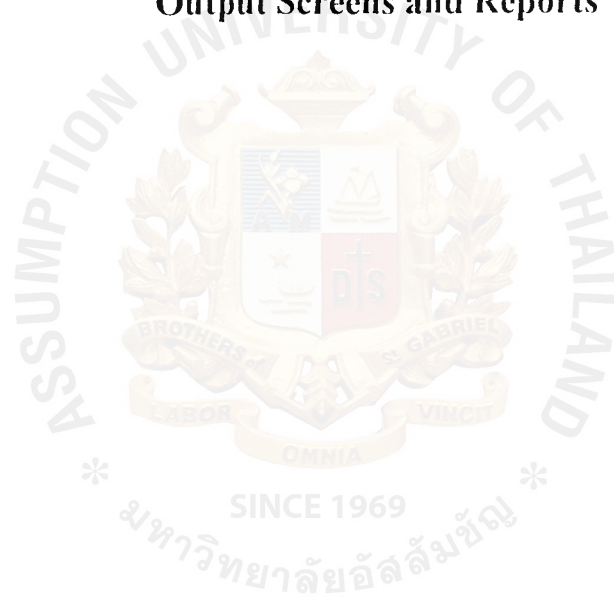
UPDATE

= * Inventory file was updated*



APPENDIX E

Output Screens and Reports



Microsoft Access - Importer

Customer List

Import ID	Company Name	Address	City	State	Zip	Phone	Fax	E-mail	Web	Notes
1000000001	ABC COMPANY	1234 Main St	New York	NY	10001	(212) 555-1234	(212) 555-5678	abc@company.com	http://www.abc.com	
1000000002	DEF COMPANY	5678 Elm St	Los Angeles	CA	90001	(310) 555-9876	(310) 555-4321	def@company.com	http://www.def.com	
1000000003	GHI COMPANY	9012 Oak St	Chicago	IL	60601	(312) 555-2109	(312) 555-8765	ghi@company.com	http://www.ghi.com	
1000000004	JKL COMPANY	3456 Pine St	San Francisco	CA	94101	(415) 555-3456	(415) 555-7890	jkl@company.com	http://www.jkl.com	
1000000005	MNO COMPANY	7890 Cedar St	Seattle	WA	98101	(206) 555-6789	(206) 555-0123	mno@company.com	http://www.mno.com	
1000000006	PQR COMPANY	2345 Birch St	Portland	OR	97201	(503) 555-0123	(503) 555-4567	pqr@company.com	http://www.pqr.com	
1000000007	STU COMPANY	6789 Maple St	Denver	CO	80201	(303) 555-4567	(303) 555-8901	stu@company.com	http://www.stu.com	
1000000008	VWX COMPANY	10110 Spruce St	Phoenix	AZ	85001	(602) 555-8901	(602) 555-2345	vwx@company.com	http://www.vwx.com	
1000000009	YZA COMPANY	11213 Willow St	San Diego	CA	92101	(619) 555-2345	(619) 555-6789	yz@company.com	http://www.yz.com	
1000000010	BCD COMPANY	14150 Ash St	San Jose	CA	95101	(408) 555-6789	(408) 555-0123	bc@company.com	http://www.bc.com	

Form View

Microsoft Access - (Database)

File Edit View Database Tools Window Help

Figure E.1. Customer List Report Screen

Microsoft Access - Supplier1

File Edit View Database Tools Window Help

Supplier_ID: 000 Product: GEOMEMBRANE

Company Name: PETROCHEMICAL

Address: 17500 1st Avenue N. Bldg 100 S-600

Attention: JAMES H. BISHOP Position: ADMINISTRATIVE

Telephone: 808-3015-01 Fax: 808-2528

Telex: Telex: E-mail: Memo:

Microsoft Access - IS Microsoft Access - Supplier1

40 15:02

Figure E.2. Supplier List Report Screen

Figure E.3. Communication Report Screen



A.T.S. TRADING CO., LTD.

บริษัท เอ.ที.เอส.เทรดดิ้ง จำกัด

เลขที่ / NO. 0011

วันที่ / DATE

ต้นฉบับ
ORIGINAL

192/20 ถนนพระราม 4 แขวงปทุมวัน เขตปทุมวัน กรุงเทพมหานคร 10330
โทร 655-8183, 655-8121 แฟกซ์ 655-8109, 265-1900 E-mail ats@ats-trading.co.th
192/20 RAMA 4 RD, PATTANIVAN, PATHUMVAN, BANGKOK 10330, THAILAND
Tel 655-8183, 655-8121 Fax 655-8109, 265-1900 Email ats@ats-trading.co.th

เลขประจำตัวเสียภาษี 3-01-1-92341-2

ใบส่งสินค้า / ใบกำกับภาษี
DELIVERY ORDER / TAX INVOICE

เอกสารออกเป็นชุด / DOCUMENT ISSUED IN SET

ชื่อและที่อยู่ลูกค้า / CUSTOMER'S NAME AND ADDRESS		ใบสั่งสินค้า เลขที่ CUSTOMER ORDER NO.		รหัสการขาย SALE CODE	
		เงื่อนไขการชำระเงิน / TERMS OF PAYMENT			
รหัสสินค้า PRODUCT CODE	รายการ DESCRIPTION	จำนวน QUANTITY	ราคาต่อหน่วย UNIT PRICE	จำนวนเงิน AMOUNT	
			รวมราคาส่ง สุทธิ TOTAL		
			ภาษีมูลค่าเพิ่ม 10 % VAT 10 %		
จำนวนเงินเป็นคำอธิบาย / AMOUNT IN WORDS			จำนวนเงินทั้งสิ้น TOTAL		
ได้รับสินค้าถูกต้องเรียบร้อยแล้ว RECEIVED BY ABOVE INFORMATION PROVIDED IN GOOD CONDITION					
ลงนามผู้รับ (เซ็นชื่อ) RECEIVER'S SIGNATURE		วันที่ DATE	ผู้ส่ง DELIVERED BY	อนุมัติโดย APPROVED BY	

Interest at 1.5% per month shall be charged on the total or part of the amount which remains unpaid thirty (30) days after the date of terms of payment

เมื่อครบกำหนดเวลาชำระหนี้เงินค้างชำระจะคิดดอกเบี้ยร้อยละ 1.5 ต่อเดือนรวมดอกเบี้ยที่ค้างชำระเกิน 30 วัน

กรรมสิทธิ์ในสินค้าคงเหลือจะตกเป็นของผู้ขายจนกว่าผู้ซื้อจะชำระหนี้เงินครบถ้วนแล้ว

Figure E.5. Delivery Order/Tax Invoice Form



A.T.S. TRADING CO., LTD.

บริษัท เอ.ที.เอส.เทรดดิ้ง จำกัด

เลขที่ / NO 0011

วันที่ / DATE

1921/20 ถนนพระราม 4 แขวงปทุมวัน เขตปทุมวัน กรุงเทพมหานคร 10330

โทร. 655-8183, 655-8321 แฟกซ์ 655-8185, 266-9909 Email: ats@atsinfo.co.th

1921/20 RAMA 4 RD, THIMPHI, PATTUMWAN, BANGKOK 10330, THAILAND

Tel: (662) 655-8183, 655-8321 Fax: (662) 655-8185, 266-9909 Email: ats@atsinfo.co.th

เลขประจำตัวเสียภาษี 3 01 1 92341 2

ใบเสร็จรับเงิน (ใบใส่ใบกำกับภาษี)

RECEIPT

(เอกสารออกเป็นชุด / DOCUMENT ISSUED IN SET)

ชื่อและที่อยู่ลูกค้า / CUSTOMER'S NAME AND ADDRESS		ใบสั่งสินค้าเลขที่ CUSTOMER ORDER NO.		พนักงานขาย SALE CODE	
		เงื่อนไขการชำระเงิน / TERMS OF PAYMENT			
รหัสสินค้า PRODUCT CODE	รายการ DESCRIPTION	จำนวน QUANTITY	ราคาต่อหน่วย UNIT PRICE	จำนวนเงิน AMOUNT	
			รวมราคาทั้งสิ้น SUB TOTAL		
			ภาษีมูลค่าเพิ่ม 10 % VAT 10 %		
จำนวนเงินเป็นคำหนึ่งข้อ / AMOUNT IN WORDS			จำนวนเงินทั้งสิ้น TOTAL		

โดย ☐ เงินสด / CASH

☐ เช็ค / CHEQUE ธนาคาร / BANK เลขที่ / CHEQUE NO. ลงวันที่ / DATE

ผู้รับเงิน (ตัวบรรจง)

RECEIVER'S SIGNATURE

ผู้จัดการ (ตัวบรรจง)

MANAGER'S SIGNATURE

ใบเสร็จรับเงินฉบับนี้จะสมบูรณ์ ค่ะเมื่อมีลายเซ็นของผู้จัดการและผู้รับเงิน

This receipt is only valid when it bears the manager's signature and receiver.

ถ้าชำระเงินด้วยเช็ค ใบเสร็จรับเงินฉบับนี้จะสมบูรณ์ เมื่อเจ้ารองท่านเรียกเก็บเงินจากธนาคารได้ครบถ้วนแล้ว

If payment is made by cheque, the receipt will be valid after the cheque has been honored by the bank.

Figure E.6. Receipt Form

Monthly Sales Report

Month : October

Items	Date	Company	Province	Area (Sq.m.)	Thickness (mm.)	Cost (Baht)	Price (Baht)	Net Profit	Salesperson
1	1/10/98	บริษัท เฟรชโก อินเดอร์เทรต จำกัด	แพร่	50,000.00	1.00	50.00	85.00	1,750,000.00	วสันต์
2	3/10/98	หจก. โยไทยการช่าง	นครราชสีมา	5,000.00	1.00	50.00	90.00	200,000.00	พงศกร
3	7/10/98	บริษัท เบตเตอร์ เวิลด์ กรีน จำกัด	สระบุรี	12,000.00	1.00	50.00	87.00	444,000.00	วิสิต
		Total		67,000.00				2,394,000.00	

Figure E.7. Monthly Sales Report

TO : Khun Supanee Saengthamma		SALES REF. # 88 / 001217	
<u>PURCHASE REQUISITION</u>			
		P.R. # 1180 / 0202 / 0456	
PRODUCT NAME	HDPE 0.30 mm.	CO 0011	roduct cod 7 5 6 4 7 Item code 1 4 7 6 2
PRODUCT EX :	Puttamontol Warehouse		
QTY / PACKAGING :	40 rolls		
PRICE TO CUST :	28 Baht/sq.metre.		
PRICE APPROVAL	28 Baht/sq.meter.		
BY MKT. MANAGER			
TYPE OF SALE :	D L/C 30 day		
CUSTOMER NAME :	Tan Ta Wan Farming Co., Ltd.		
ADDRESS	82/34 Moo 3 Petchadasem Rd. 93 Aom-Noi Kratumban Samutsakorn 74130		
CUST'S P. O. :	98-11983		
DELEVER DATE :	December 7, 1998		
SPECIAL INSTRUCTION :	1. D/A has to be signed when product arrived. 2.		
REQUESTED B		<i>Suchai Matawee</i>	
SALES CODE		01/29	
DATE		November 29, 1998	

Figure E.8. Purchase Requisition Report

Price list of November 1998

Product	Thickness	Width (m)	Length/ Roll (m)	Area (sq. m)	Weight (Kg.)	Price (Bht/sq.m.)
HDPE Sheet	0.3 mm	6.86	200	1,372	384	28.00
HDPE Sheet	0.5 mm	6.86	423	2,902	1,364	52.00
HDPE Sheet	0.75 mm	6.86	300	2,058	1,450	65.00
HDPE Sheet	1.00 mm	6.86	211	1,447	1,364	93.00
HDPE Sheet	1.50 mm	6.86	141	967	1,364	139.00
HDPE Sheet	2.00 mm	6.86	106	727	1,364	185.00
HDPE Sheet	2.50 mm	6.86	85	583	1,364	233.00

Approved by

Prasert Sakulmeesap

Marketing Manager

Date

15 November 1998

Figure E.9. Price List

Inventory of November 1998

Product	Thickness	Width (m)	Length/ Roll (m)	Area (sq. m)	Weight (Kg.)	Inventory (Rolls)
HDPE Sheet	0.30 mm	6.86	200	1,372	384	72.00
HDPE Sheet	0.50 mm	6.86	423	2,902	1,364	62.00
HDPE Sheet	0.75 mm	6.86	300	2,058	1,450	55.00
HDPE Sheet	1.00 mm	6.86	211	1,447	1,364	44.00
HDPE Sheet	1.50 mm	6.86	141	967	1,364	37.00
HDPE Sheet	2.00 mm	6.86	106	727	1,364	29.00
HDPE Sheet	2.50 mm	6.86	85	583	1,364	15.00

Checked by

Somchai Tantasriwong

Warehouse Manager

Date

November 27 ,1998

Figure E.10. Inventory Report



