THE INVENTORY TRACKING SYSTEM FOR BOOK & BEYOND CO., LTD.

by

Mr. Teerasak Boonvivatnanun

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

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

November, 2000

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Project Title	Inventory Tracking System for Book & Beyond Co., Ltd.
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Academic Year	November 2000

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

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ABSTRACT

The project, which is presented, was analyzed, designed, and developed to be actually used in Book & Beyond Retail Bookshop by focusing in inventory areas. It was basically designed and created as a tool to increase efficiency of data control, Timely and accurate information, decrease paper work, faster operation, sharing data, reduce mistakes and error etc.

This project provides the analysis of Inventory system. The analysis covers the current problem definitions, information gathering, services providing and understanding of the existing system. It also discusses about the existing manual system, the current problems of the existing manual system and area for improvement.

The proposed system is designed in structured analysis and design using data flow diagram, structure chart, and also relational database concept. It has a central database for consistency and shared resource. This system can resolve the manual operation's problem, save operation cost and time. It's also included designing the executive information system that will be use as a decision supporting system for the management.

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I. INTRODUCTION

1.1 Background of the Project

The report is done under requirement of the CIS Course, CS6998 System development project which includes a study of the problem of the existing system, analyze, define users requirement and design the appropriate system for an organization. This report concerns about replacing computerized system with the manual system of Book & Beyond Co., Ltd.

Book & Beyond Co., Ltd. was found in 1999, it is located at IT Zeer Rangsit Departmentstore. The company's main business is retailing of Computer Books and related products e.g. Internet package, Magazine, Computer CDs etc.

This report entails the inventory management system of Book & Beyond Co., Ltd. because the old system was arranged without computerization. The system will adjust several reports to reduce the delay of time in producing documents and consume less time in many operational processing. The system will enable the company to obtain timely and meaningful information on inventory system for effective management and competent planning control.

1.2 Objectives of the Project

The objectives of the project on the inventory system of Book and Beyond Co., Ltd. are as follows;

(1) To understand and Analyze Inventory System of Company

(2) To identify problems and users requirements: Study the requirements of users and design computer information system according to those requirements

(3) To use information systems analysis as a tool to improve organization's process and working focus in inventory field

(4) To improve company's operation by using computer-based information system

(5) To obtain and provide more accurate, faster, consistency inventory information

(6) To implement computer system as a tool to increase organization's work flow efficiency and effectiveness in term of;

(a) Timely and Accuracy information

(b) Efficiency of Data controlling

(c) Faster and more accurate Operation

(d) Decrease paper works

(e) Data sharing among related units

(f) Reduce mistakes and error from manual systems

(g) Reduce cost of human resource and office supplies e.g. paper

1.3 Scope of the Project

The project will cover major parts of the inventory control system, it consists of application functions which includes the following topics;

1.3.1 Inventory Management System

(1) Enable users to create product code for all product items, data can be entering, searched, sorted and updated.

(2) Enable users to provide and update inventory products and transaction

1.3.2 Supplier Information System

(1) Enable users to provide and update suppliers' information

(2) Enable users to query, review and keep track of suppliers' information

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1.3.3 Report System

(1) Inventory Transaction Report

(2) Stock status report

(3) Purchase order report

(4) Suppliers' information report

(5) Product report

1.4 Project Plan

The project plan can be defined as follows;

1.4.1 Analysis of the Existing System

(1) Define the objectives and scope

(2) Identify and Study Existing System

(3) Develop Context Diagram

(4) Develop Data Flow Diagram

(5) Cost and Benefit Analysis

1.4.2 Analysis and Design of Proposed System

(1) Report Design

(2) Database Design

(3) Network Design

(4) Program Design

1.4.3 Implementation of the Proposed System

(1) Coding and Testing

(2) Hardware and Software Installation

(3) Conversion

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

Figure 1.1. Project Plan of Book & Beyond Inventory system.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Book & Beyond Co., Ltd. is a company of small size, divided into 3 departments and all departments are under the control of General Manager as shown in company organization chart in Figure 2.1. Listed below are all 3 departments and their activities.

2.1.1 Financial and Account Department

This division is responsible for controlling and monitoring company's cashflow and all expenditure. It's also responsible for recording and clarifying all transaction and preparing the company's financial reports.

2.1.2 Sales and Marketing Department

This division is responsible setting up marketing strategies, promotional plans and implement them. It's also taking care of the sales representative to co-ordinate with the marketing team and following the plans to achieve the sales target.

2.1.3 Inventory and Purchasing Department

This division is very important and is our focus in this report. They are responsible for inventory management to checking, control, in order to save the inventory cost and maintain the minimum stock level. They are also deals with the outsource suppliers to search and negotiate for requested products, issuing purchase order, handling problems with suppliers and record order transactions.

2.2 Existing Business Function and System

The existing manual system operation starting from Inventory and Purchasing department receive the report from sales and marketing department about the requested products. They then check the inventory stock and issue the purchase order to according suppliers. Suppliers then send the invoice, which divided into 2 types; cash and credit

term with products. Inventory division will unpack the products, check packing lists according to the invoice, and then send the products to sales and marketing department to sell to customers. The invoices will be sent to accounting department to record the transactions and preparing the financial reports. All of operation processes are done with manual, all paper works and no computer involved so it consumes a lot of time, and causes a lot of problems.

2.3 Current Problems and Area for Improvement

The current problem and areas for improvements of the existing system can be summarized as follows;

(1) A lot of paper works created by existing system make data are hardly to be searched and causes the storage problems as data lost or forgotten.

(2) The manual system is not efficiency for staffs to provide the up-to-date information for analysis and making decision.

(3) The information, including the report cannot be provided to management at the right time due to the existing system.

(4) Inventory report is not covered all of information needed and often be wrong or outdated information.

(5) Data are not able to be sharing efficiency with other departments to support decision making efficiency

(6) An inaccuracy of inventory data causes an inefficient financial control and management

(7) No security control for all documents

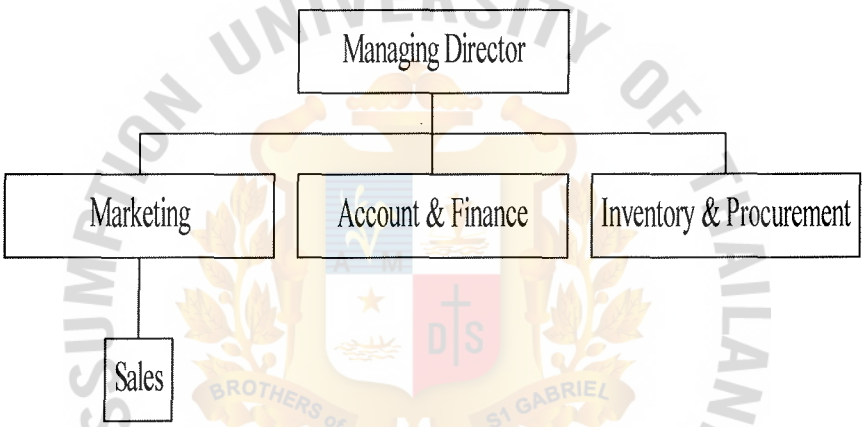

Figure 2.1. Book & Beyond Co., Ltd. Organization Chart.

Context Diagram of Existing System

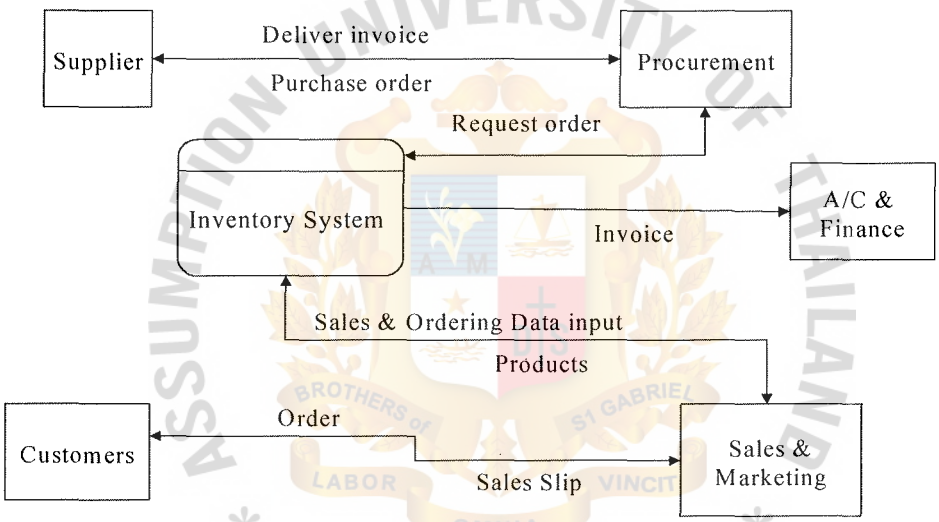

Figure 2.2. Context Diagram of Existing System.

III. THE PROPOSED SYSTEM

3.1 User Requirement

Computerized system should provide an update and accurate information, several users are able to retrieve information from on-line computer simultaneously by using LAN technology. New data entry will be automatically updated. This will reduce time consumption, reduce cost, and eliminate the redundancy data. Some periodic reports, and requested reports should be provided by the computer system.

3.2 System Design

The new system design was created to meet all users' requirement as defined above. The computerized system is introduced to help improve working performance of all divisions and provide an efficient and accurate data that enables management to plan and forecast the market and sales trend.

In the designing stage, the logical data flow diagram (DFD) is used as a tool for both structure analysis and system design. Figure 3.1 represents the context diagram of the new system. The data flow diagram in level 0 is shown in Figure 3.2 and the data flow diagram in level 1 of all processes are shown from Figure 3.3 and onward.

The proposed system can be divided into 6 main processes as follows;

(1) Product available checking process : The process of checking product available in the stock. This process is to check the quantity unit of products available in the stock.

(2) Product transmission process : The process of transmission the products. Once the products are available, this process involves with delivery the products to related units e.g. Sales or Customers.

(3) Ordering process : The process of ordering products from suppliers. This process is created to order products from suppliers.

(4) Product receive and checking process : The process of receiving and checking the products before accepting them in to stock. This process is occurred when products ordered from supplier arrived, receiving and checking process is done to verify that whether products are matched with purchase order or not.

(5) Generate product code: The process of generate the coding of product. This process is occurred when product received has no product code, coding product is required to bring in products to stock and make them available for sales.

(6) Create report: This process involved with generating reports to related units and management for checking, planing and developing plans for inventory control.

3.3 Hardware and Software Requirement

The following are the hardware and software requirement for the proposed system. The purpose inventory system is to be run on the local area network on the basis of file server architecture. Initially the system will be installed to 1 server and 2 workstations, connected with 1 dot matrix printer. Also, the system implements Point of Sales equipment which including Barcode reader, Barcode printer, Cash Drawer, and Slip printer.

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3.3.1 Hardware Requirement

Computer Set

Table 3.1. Hardware Requirement.

Server	2 Workstations
IBM Compatible PC with Pentium III 733 MHz or Higher processor	IBM Compatible PC with Celeron 500 MHz or Higher processor
20 GB Harddisk or Higher and 1.44 Floppy Drive	10 GB Harddisk or Higher and 1.44 Floppy Drive
128 MB RAM	64 MB RAM
Compatible input Device : Mouse & Keyboard	Compatible input Device : Mouse & Keyboard
VDO Controller 2 MB	VDO Controller 8 MB
15" SVGA or Compatible Display	15" SVGA or Compatible Display
Modem 56.6 Kb or Higher speed	Modem 56.6 Kb or Higher speed (Optional)
Dot Matrix printer (EPSON LQ 2170I)	
Network Interface Card 10/100	Network Interface Card 10/100
HUB 10/100 4 or 8 Ports	
Unshielded twisted Pair Cable	Unshielded twisted Pair Cable
UPS 500 VA	

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Point of Sale equipment

(1) Barcode Reader 2 sets (CCD type)

(2) Barcode Printer 1 set

(3) Cash Drawer 2 sets

(4) Slip Printer 1 set

3.3.2 Software Requirement

Table 3.2. Software Requirement.

Server	2 Workstations
MS Windows 98 (Thai Edition)	MS Windows 98 (Thai Edition)
MS Office 7.0 Professional (Thai edition) (MS Word, Excel, Power Point, Access)	MS Office 7.0 Professional (Thai edition)
Internet application software	Internet application software (Optional)
WinFax Pro 9.0	

Expected Computer Peopleware to be Employed

As an application program is a small system and designed only to support small workgroup in the 1st phrase, no needed to employ permanent programmers or technicians, may be EDP advisor is required at the beginning part time to consult implement program efficiency. The persons expecting to be assigned work with computerized system are the persons who are currently working for the company, by sending them to train how to use and implement the program. EDP advisor and more computer literate people will be recruited as the permanent system expands in the future.

3.4 Security and Control

The information in inventory control system is important to many sections. The master file must always be available to users when they need it. A satisfactory level of sharing information must be supported and unauthorized must be prevented. The following security and controls should be covered by the computerized system.

(1) There must be username and password for log-in the system, to prevent unauthorized users to access the system

(2) There must be back up devices for data and program backup & Restoring

(3) Report using must be kept in safe place

(4) Report must be produced upon the predetermined conditions or management request as needed

3.5 Cost/Benefit Analysis

The cost of Manual system and Cost of computerized system have both advantages and disadvantages. In the past, the computer is so expensive and were not introduced and accepted so much in the market, so most companies are labor-oriented. Nowadays, computer become an important part of companies and human life, it's also been accepted widely that it can increase the organization's work flow more effectiveness and efficiency, and also worth to invest in the long run.

For Book & Beyond Co., Ltd., in the 1st phrase of implementation and transition to computerized system, the only cost occurred is the initial investment for Hardware & Software system plus an extra EDP's consultants. And also supplies used by some of peripherals e.g. Printer, Internet Fees as detail below this. Other costs seem to be the same or have a little difference gap that we will ignore this.

By using Computerized system, it's hard to say how much we will get something in return in exact value, but we're quite confident that it will improve more efficiency and effectiveness of working flow by 20-40%. And if we estimate in terms of money value, we expect that it will result in incremental of contribute margins by about 10-20% and also decrease the operational expense by about 10-20%. By using computerized system Book & Beyond will meet break even point within 2 years and also it helps a lot in the long run to expand the business. We plan to install the full range computerized system with more value added and contribution margin in the future. The cost and benefit analysis (estimated value) is in detail as follows:

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The estimate cost of the manual system can be divided as follows:

Table 3.3. Manual System Cost Analysis, Baht.

Cost items		Years				
		1	2	3	4	5
Operating Cost						
Salary Cost:						
Store Manager	1 person @ 18,000	216,000	216,000	216,000	216,000	216,000
Staff:						
Stock officer	2 person @ 10,000	240,000	240,000	240,000	240,000	240,000
Receiving clerk	2 persons @ 9,000	216,000	216,000	216,000	216,000	216,000
Dispatch officer	1 person @ 8,000	96,000	96,000	96,000	96,000	96,000
Bonus		64,000	64,000	64,000	64,000	64,000
Total Annual Salary Cost		832,000	832,000	832,000	832,000	832,000
Office Supplies & Miscellaneous Cost:						
Stationary	Per Annual	6,000	6,000	6,000	6,000	6,000
Paper	Per Annual	7,000	7,000	7,000	7,000	7,000
Utility	Per Annual	20,000	20,000	20,000	20,000	20,000
Miscellaneous	Per Annual	30,000	30,000	30,000	30,000	30,000
Total Annual Office Supplies & Miscellaneous Cost		63,000	63,000	63,000	63,000	63,000
Total Annual Operating Cost		765,000	765,000	765,000	765,000	765,000
Total Manual System Cost		895,000	895,000	895,000	895,000	895,000

Table 3.4. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	895,000.00	895,000.00
2	895,000.00	1,790,000.00
3	895,000.00	2,685,000.00
4	895,000.00	3,580,000.00
5	895,000.00	4,475,000.00
Total	4,475,000.00	-

The estimated costs for the proposed inventory system is divided into:

Table 3.8. Computerized System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Computer Server Cost	15,000	15,000	15,000	15,000	15,000
Workstation Cost 2 sets @ 35,000	14,000	14,000	14,000	14,000	14,000
Printer Dot Matrix EPSON LQ 2170I	4,000	4,000	4,000	4,000	4,000
Barcode Reader 2 sets @ 19,000	7,600	7,600	7,600	7,600	7,600
Barcode Printer 1 set	7,000	7,000	7,000	7,000	7,000
Cast Drawer 2 sets @ 9,000	3,600	3,600	3,600	3,600	3,600
Slip Printer 1 set	6,000	6,000	6,000	6,000	6,000
Total Hardware Cost	57,200	57,200	57,200	57,200	57,200
Software Cost:					
Licensed Windows 98 3sets @2,500	1,500	1,500	1,500	1,500	1,500
Microsoft Office 97 3sets @22,000	13,200	13,200	13,200	13,200	13,200
Inventory System Development Cost	7,000	7,000	7,000	7,000	7,000
Total Software Cost:	22,300	22,300	22,300	22,300	22,300
Network Cost:					
Hub 8 Ports 10/100	1,000	1,000	1,000	1,000	1,000
UTP Cable	200	200	200	200	200
Network Interface Card 3 sets @1,000	600	600	600	600	600
Total Network Cost	1,800	1,800	1,800	1,800	1,800
Maintenance Cost:	17,175	17,175	17,175	17,175	17,175
Implementation Cost:					
Advanced Training Cost	40,000	-	-	-	-
Basic Training Cost	30,000	-	-	-	-
Set up Cost	20,000	-	-	-	-
Service Cost for 5 Years	40,000	-	-	-	-
Total Implementation Cost	140,000	-	-	-	-
Total Fixed Cost	238,475	98,475	98,475	98,475	98,475
Operating Cost					
People-Ware Cost:					
Store Manager 1 person @ 18,000	216,000	216,000	216,000	216,000	216,000
Staff:					
Receiving Clerk 2 person @ 9,000	216,000	216,000	216,000	216,000	216,000
Dispatch Officer 1 person @ 8,000	96,000	96,000	96,000	96,000	96,000
Bonus	45,000	45,000	45,000	45,000	45,000
Total Annual Salary Cost	573,000	573,000	573,000	573,000	573,000
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	4,800	4,800	4,800	4,800	4,800
Paper Per Annual	5,600	5,600	5,600	5,600	5,600
Utility Per Annual	15,000	15,000	15,000	15,000	15,000
Miscellaneous Per Annual	25,000	25,000	25,000	25,000	25,000
Annual Office Supplies & Miscellaneous Cost	50,400	50,400	50,400	50,400	50,400
Total Operating Cost	623,400	623,400	623,400	623,400	623,400
Total Computerized System Cost	861,875	721,875	721,875	721,875	721,875

Table 3.6. Five Years Accumulated Computerized Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	861,875.00	861,875.00
2	721,875.00	1,583,750.00
3	721,875.00	2,305,625.00
4	721,875.00	3,027,500.00
5	721,875.00	3,749,375.00
Total	3,749,375.00	-

Table 3.7. The Comparison of the System Cost, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	895,000.00	861,875.00
2	1,790,000.00	1,583,750.00
3	2,685,000.00	2,305,625.00
4	3,580,000.00	3,027,500.00
5	4,475,000.00	3,749,375.00

Remark: The calculation is based on these conditions:

(1) The business is running nowadays and gets a revenue around 0.6-0.8 million/month: the net profit/month is in the range of 0.15-0.2 million/month.

(2) The interest rate is marked at 12% as normal rate.

(3) Maintenance cost is fixed rate for 5 years

(4) The system lifetime is expected to be 5 years and the company need to change, revise or modify the system.

3.5.1 Comparison of Transition from Manual System to Computerized System

Advantage

(1) Save time: A computer can execute multitasks in a short period of time when compare to the human labor, since a computer can perform many routine tasks within milliseconds, results in more effusiveness and efficiency of work flows and also less paper working.

(2) Reliability: Computers seldom make mistakes and in a sense is a totally willing and obedient slave.

(3) Storage and Memory: Computer has the ability to store vast quantities of information, which can access very quickly, resulting in more productivity and also faster operation. Besides, the information can be kept for a long time and have less chance of losing or ruined.

(4) Cost: Using computer can create a low cost compared to human labored needed for the same task and can generate a long run contribution margin.

Disadvantage

(1) High initial investment: Company has to pay a large amount of money setting the computer system in the beginning. Although it seems to be expensive, it can save costs of the company for a long run compared to manual system.

(2) Require computer literacy: Company in the beginning have to hire or train the employees to be literate with the computer system so that programs can be implemented, it resulted in Training fees or Consultant's fees.

3.5.2 Benefit Analysis

The benefits are divided into tangible and intangible. The proposed system provides several benefits as follows:

The tangible befits are:

(1) Revenue can be increased due to the faster operational processing, and increase sale due to better responsiveness

(2) Reduce the operation cost, inventory cost, and the operation supplies e.g. paper

(3) Eliminating redundancy in recording data

(4) Eliminating errors from recording data transaction

The intangible benefits are:

(1) Improve efficiency and effectiveness of operation

(2) Improve decision process by providing accurate and faster access to information

(3) Improve the quality of service

(4) Provide better managerial control for inventory system

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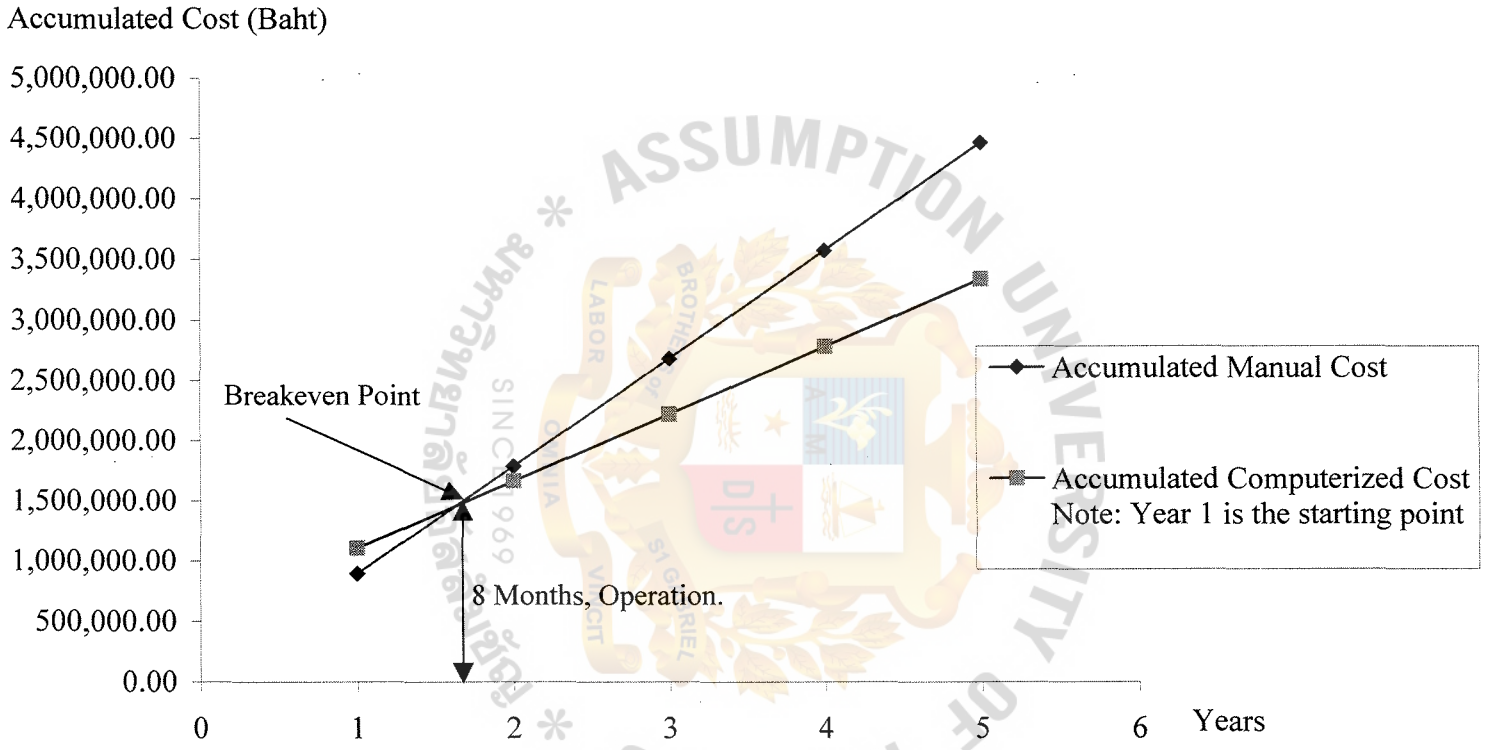

Figure 3.1. Cost Comparison between Manual and Proposed System.

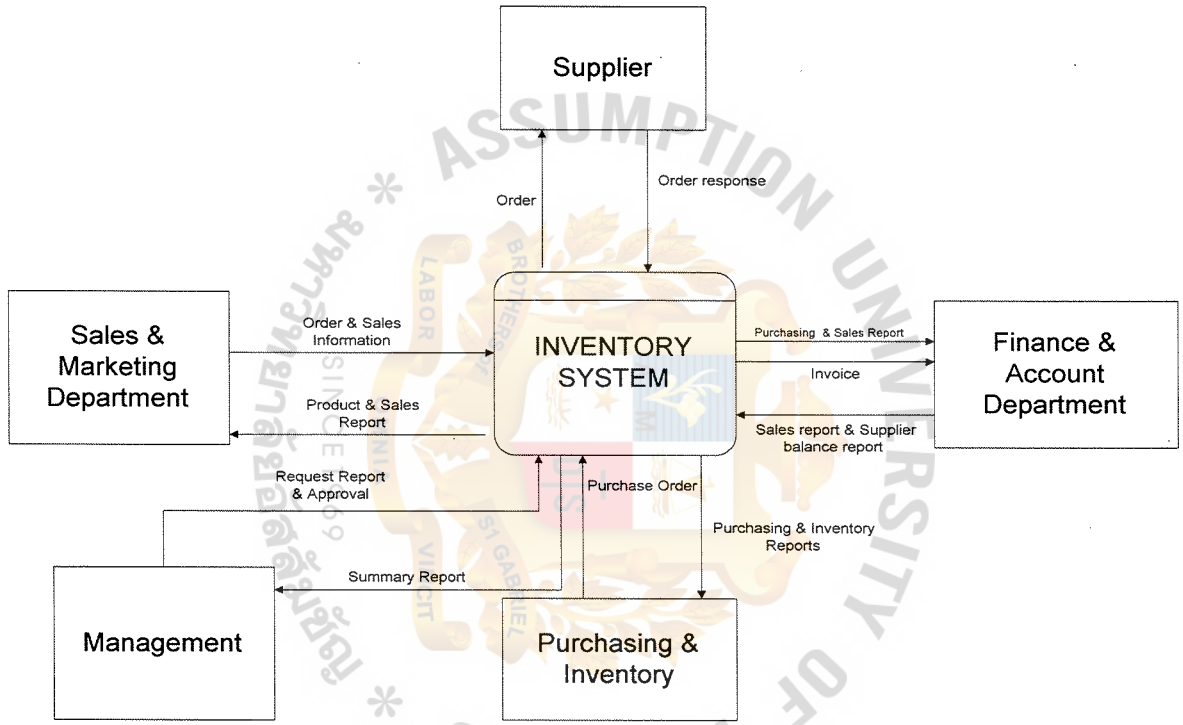

Figure 3.2. Proposed System Context Diagram.

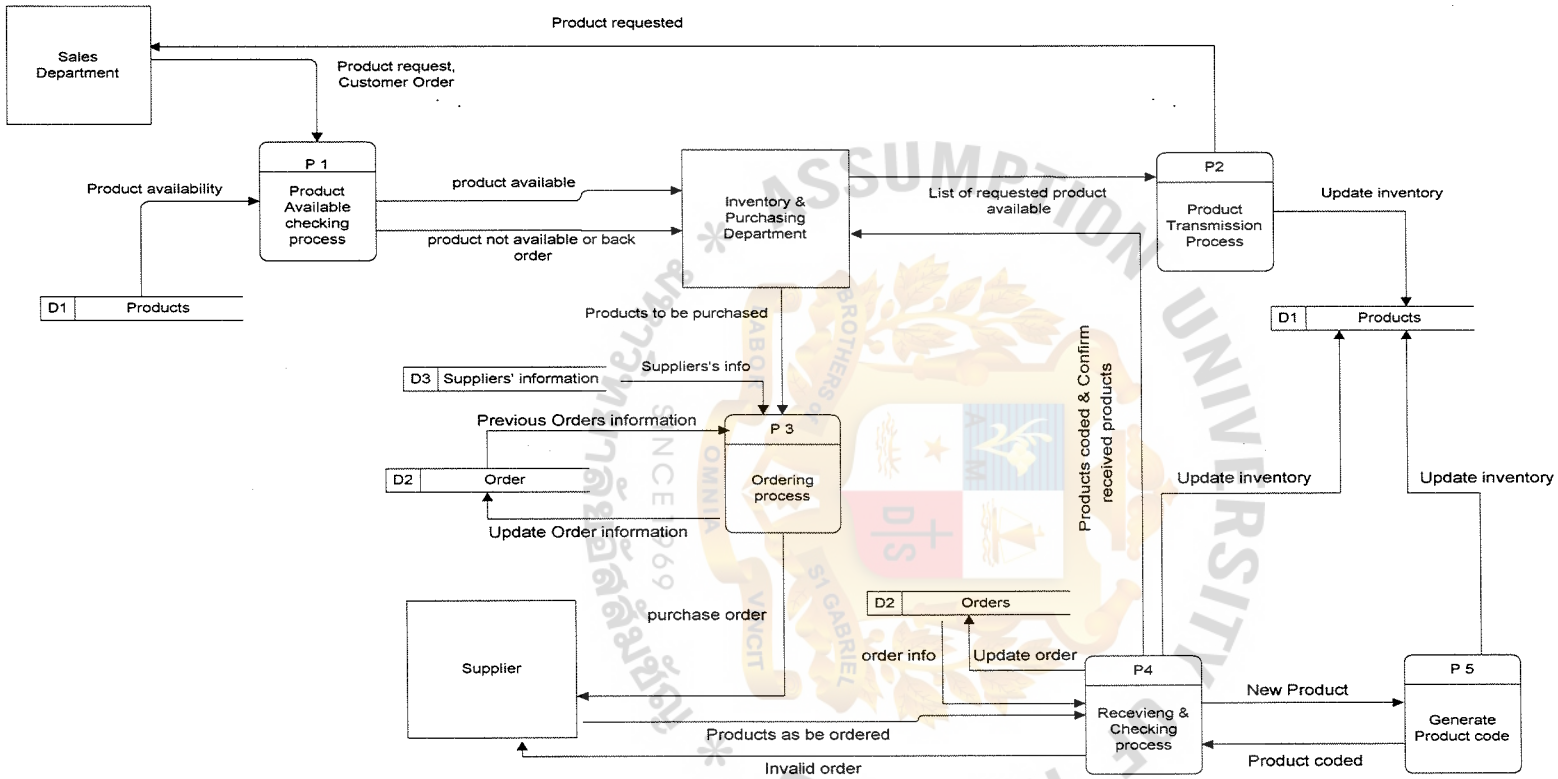

Figure 3.3. Data Flow Diagram Level 0.

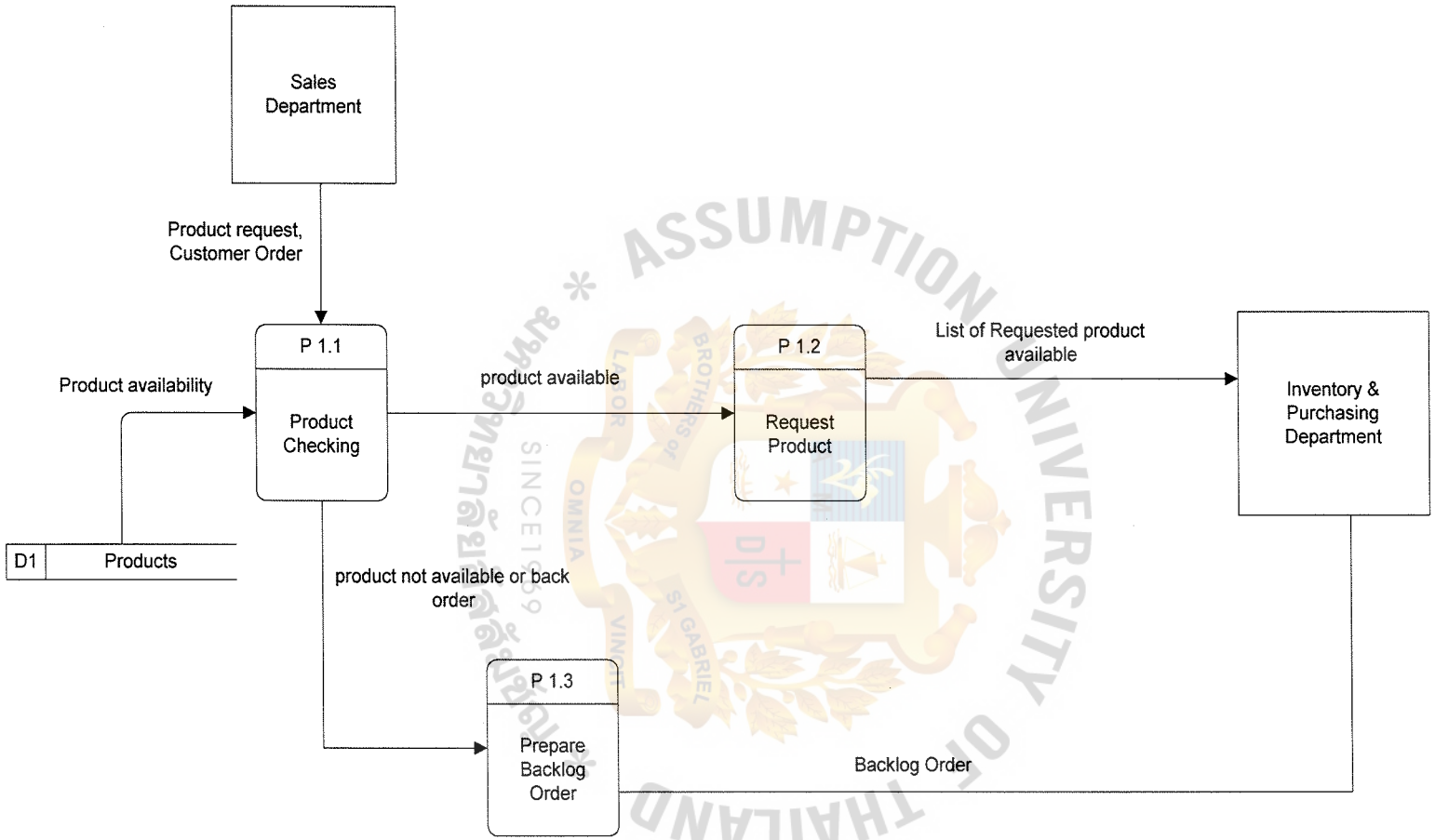

Figure 3.4. Data Flow Diagram Process 1 level 1.

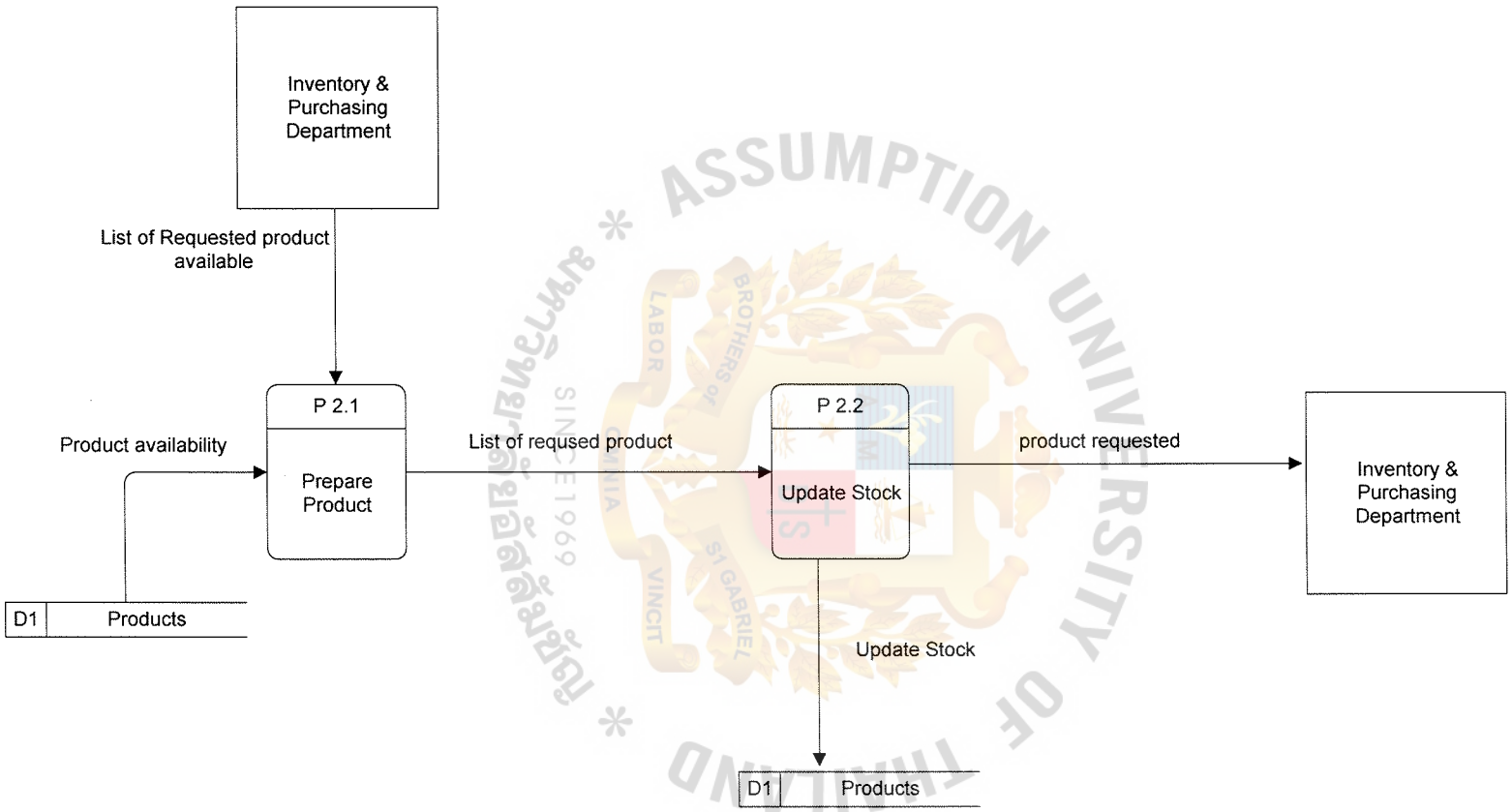

Figure 3.5. Data Flow Diagram Process 2 Level 1.

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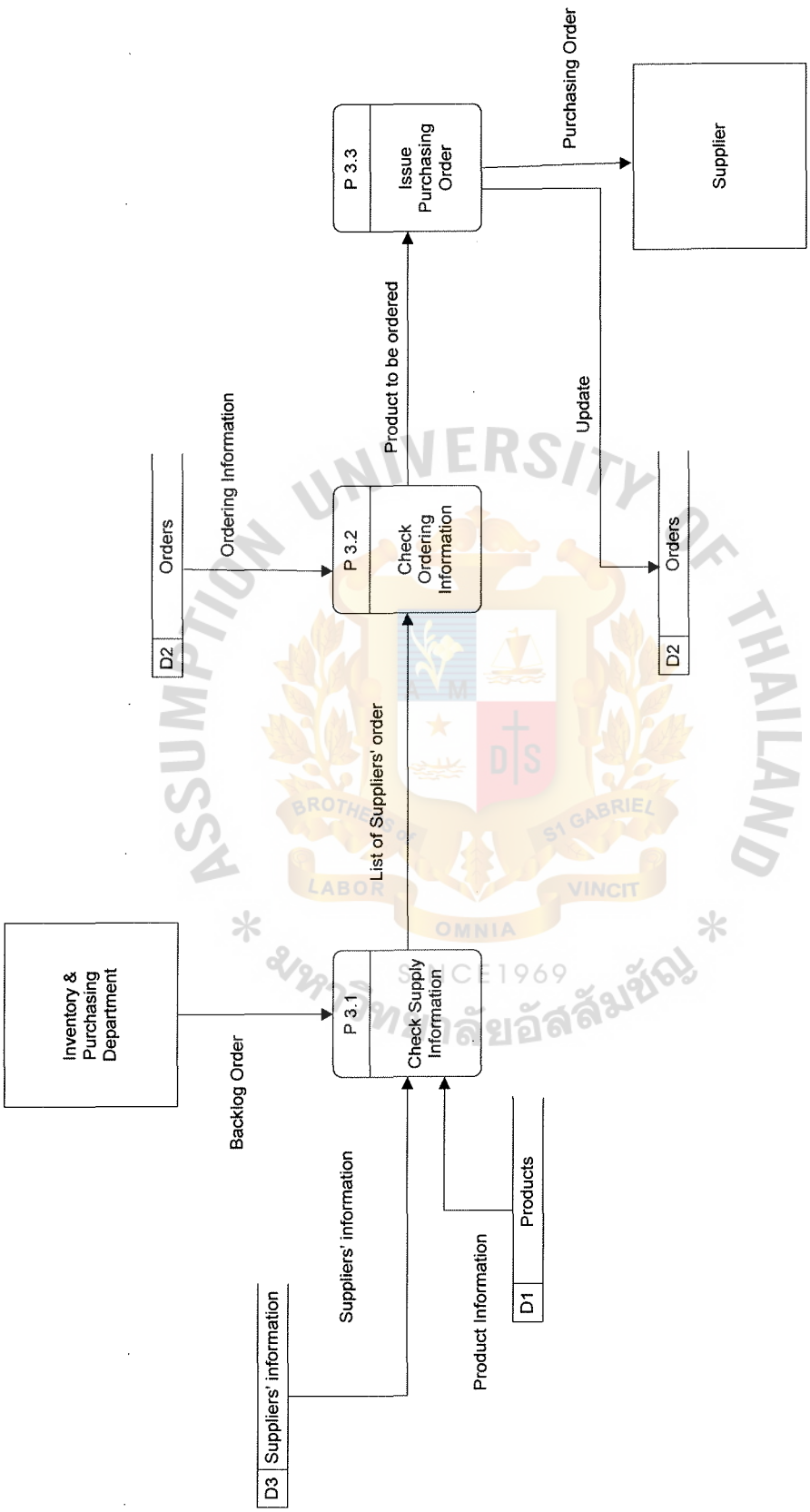

Figure 3.6. Data Flow Diagram Process 3 Level 1.

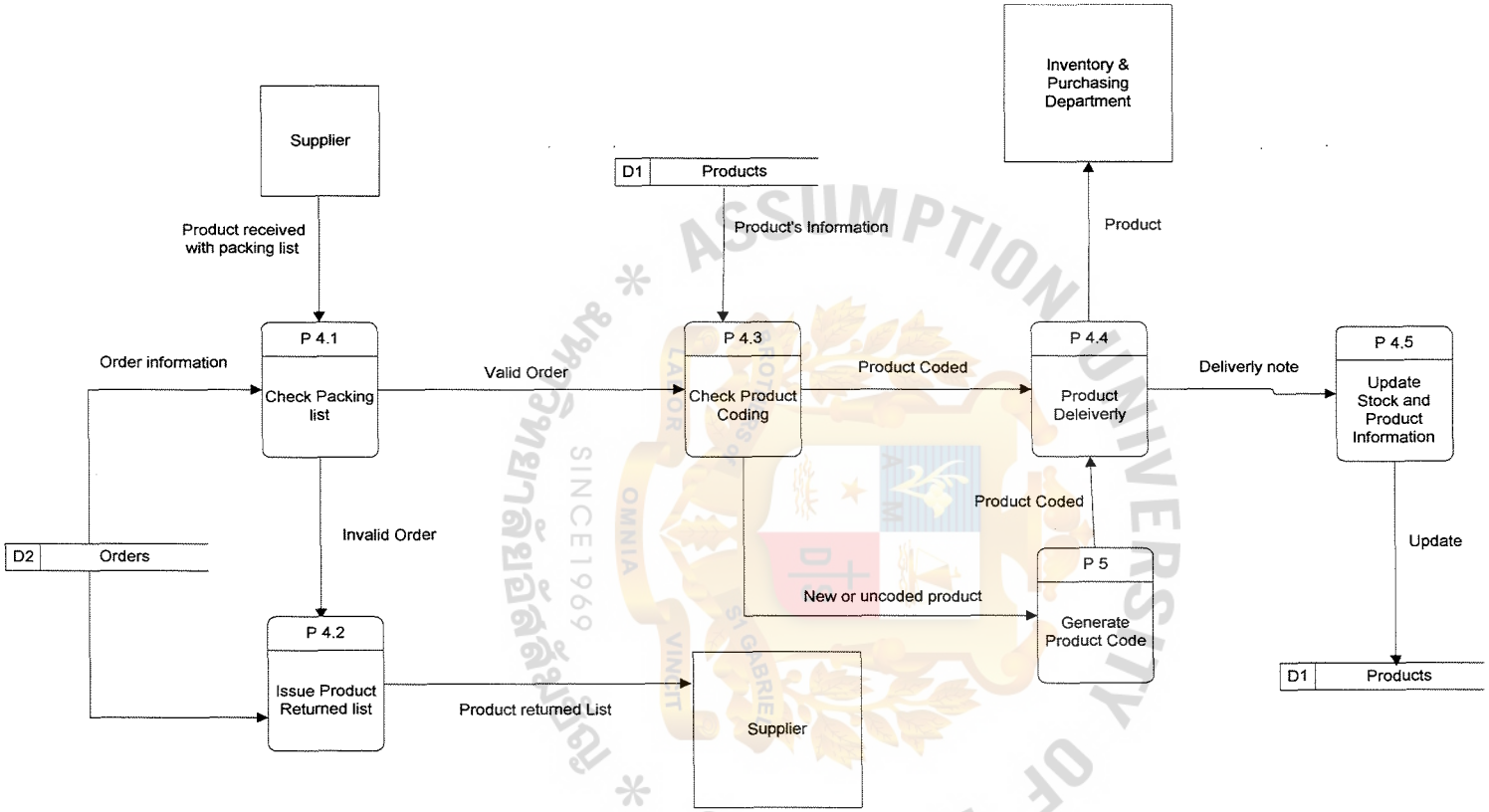

Figure 3.7. Data Flow Diagram Process 4 Level 1.

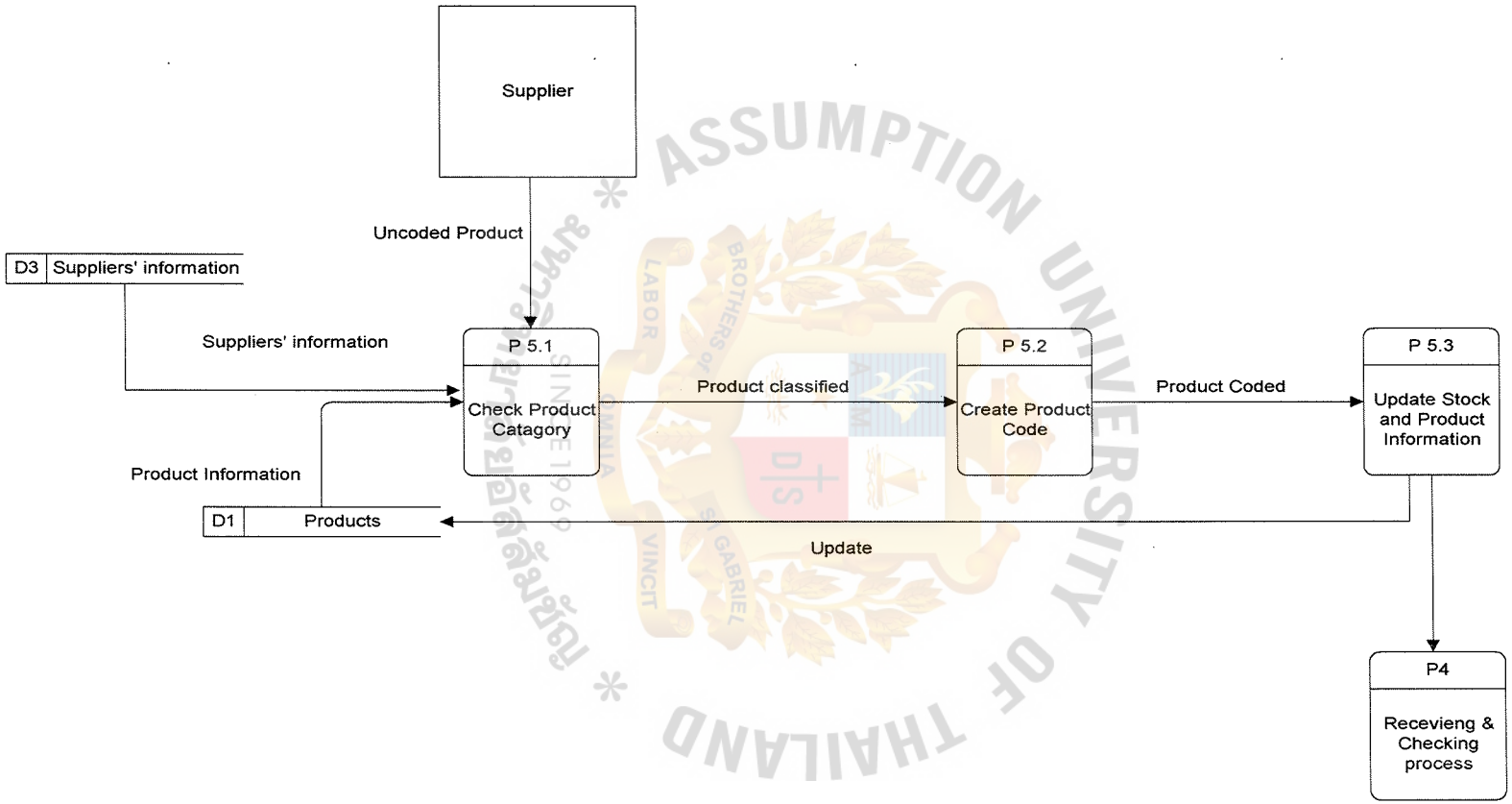

Figure 3.8. Data Flow Diagram Process 5 Level 1.

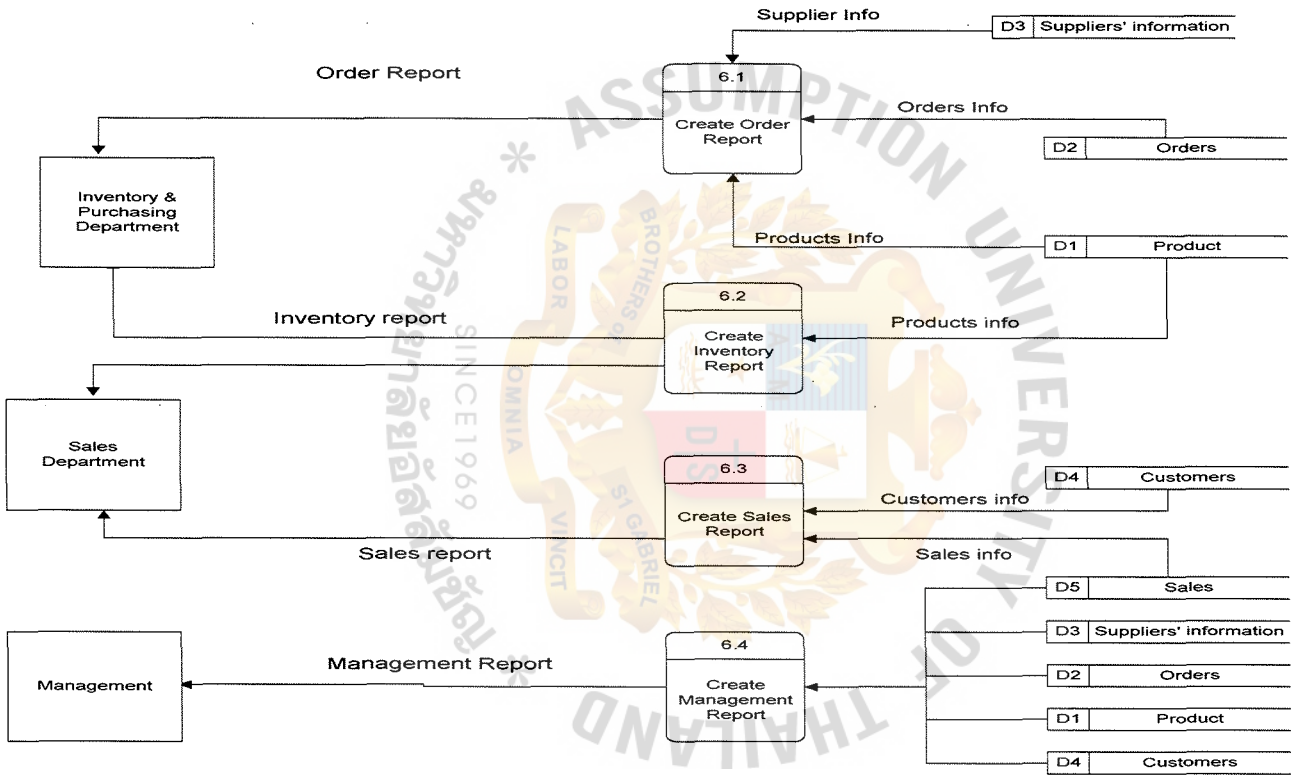

Figure 3.9. Data Flow Diagram Process 6 Level 1.

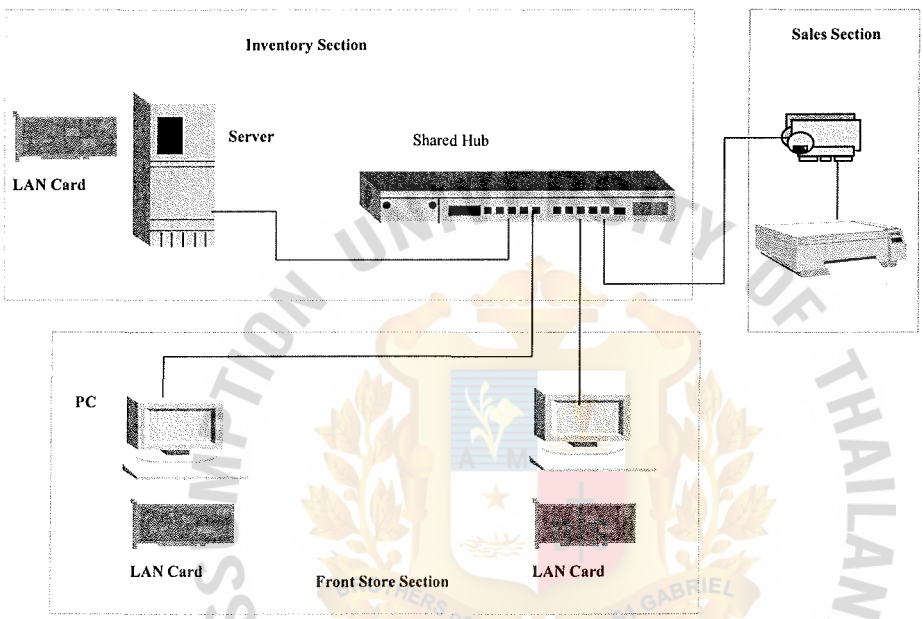

Figure 3.10. Hardware Configuration of Inventory System.

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IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation Schedule

The project implementation is setting up by using the parallel run concept. By this concept, the process will work together on both manual system and the computerized system for a period of time until the transition is completed. Therefore, it will take much time at the beginning for the user who do double jobs each day, the same for the old manual system and must get used to the new process of computerized system. However, the new process's design is based on the routine jobs of users so it will be easy to understand and do it correctly.

4.2 Program The System

This is the point at which application programs are written in order to perform whatever business are being computerized. The following sequences are the way to process programming:

(1) Study al of relevant documents to create data flow diagram, flow chart etc.

(2) Program final form of input and output forms. It shows how inputs go into the computer and how outputs come out from the computer.

(3) Program coding and debug each module of program until each modules can run properly.

(4) Connect each module of program and debug overall system again so that the system can operate as a complete application program.

(5) Documentation progarm

4.3 Test Plan and Results

It involves the testing of the program, a full system test and the program test. The testing involves the following subtasks:

(1) Testing each program module individually

(2) Data testing can be done by using the real data cover all possible cases and use data testing for interconnection program testing

(3) System testing being tested by running the whole system to make sure that the whole system runs properly and meet the user's requirement and satisfaction

(4) Back up and Restore testing being tested in case of system break down

4.4 Implementation the system

The implementation of the system includes:

(1) User Training: Introduce and train users to use the program for the input filling and the output generation

(2) Documentation: Creating the documents about system program and the way to operate it.

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V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Nowadays, we cannot refuse that computer has such a major role in our lives especially with comes to deal with loads of works. With abilities of computer, we can reduce both company's budget and mistakes in the long run. Such qualities that make computer so useful and powerful are its ability to work at high speed, ability to keep high volume of data, ability to work correctly and accurately, ability to connect to other computers worldwide and so on.

Book & Beyond Co.,ltd was a small bookshop that normally recorded data profile and proceeded information transactions manually that wasted time and create a lot of paper works. Now, they're considering transferring some of transaction to be computerized by comparing about cost analysis and return of investment in long term.

The proposed system was the computerize system which be developed for increasing organization's potential and reducing problems from last manual operation system. The system was created as a tool of increasing efficiency of data control, Timely and accurate information, decrease paper work, faster operation, sharing data among departments, reduce mistakes and error etc. Not only control data in each field, data of any fields can be shared and searched to be source of decision making for other department. One of the most important parts of this system is the executive summaries or reports which gather data necessary from the overall of the organization to be used by top management to support decision making.

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

Process	Existing System	Proposed System
Product Checking	30 mins.	3 mins.
Product Requested	10 mins.	3 mins.
Prepare Backlog Order	15 mins.	5 mins.
Update Stock	1 hour.	5 mins.
Check Supply Information	10 mins.	5 mins.
Issue Purchasing Order	20 mins.	5 mins.
Check Packing List	30 mins.	10 mins.
Generate Product Code	0 min.	5 mins.
Make Summary Report	30 mins.	5 mins.
Total	3 hours. 25 mins.	46 mins.

The proposed system integrates order process and inventory control process together to meet the user requirements which reduce response time and cost per transaction. The GUI interfaces allow users to enter, update, delete, inquiry and print report easily. The management can access the required information to support their decision making in the mean time. The time spent on each process of the proposed system compared with the existing system is shown in Table 5.1.

The proposed system facilitates the complexities of the order and inventory control process. All transaction will be performed under the software management to control process's queues and to avoid duplicate data. Thus, it enhances the company' s efficiency and reduces response time to execute operational processes.

5.2 Recommendations

The proposed system that has been developed on file server can share information with the other workstations by using local area network. The computerized system can reduce redundancy and inconsistency information. The stock items can be checked easier and the exact quantities can be known immediately by the computer than by the existing manual system.

The installation of the system is to be set up and run parallel with the existing system. The users will be trained to use and maintain the system until the system can completely operate and replace the existing system.

After the proposed system is applied, the company have to study further information about computerized and might have some adjustment to best fit with the user's requirements and their processes.

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APPENDIX A

DATA DICTIONARY

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Table A.1. Table of Data Dictionary.

Name	Meaning
Available product list	The list of products that remain in the stock
Backlog order	The list of products that have to be ordered
Cost	The cost that have been purchased of products
Customer ID	Customer Identification represents customer's name and detail information
Delivery note	Document issued for inventory department when sending goods
Invalid order	The packing list that have been mistaken
Inventory Report	Report shown the inventory status
Invoice	Document that used for transferring the stock value
Invoice list	List of document that used for transferring the stock value
Management report	Summary reports used for decision making support
Non available product list	The product that out of stock
Order ID	Order Identification represents order no: and detail information
Order Report	Report shown detail of ordering information
Packing list	The list of products' detail that sent from suppliers
Price	The price to be sold of products
Product	Things that are usually ordered for sale
Product classified	The product that have been categorized
Product coding	The coding used to identify the product
Product ID	Product Identification represents product's name and detail information
Product on hand	The amount of products that remain in the stock
Product requested	The list of product requested to be sold to customers
Purchase order ID	Purchase Order Identification represents purchase order number
Purchase order (con't)	and detail information of that Purchase order
Quantity	The amount of products
Returned list	The list of product that returned to suppliers
Sales Report	Report shown detail of sales information
Supplier	Business partner who supply products
Supplier ID	Supplier Identification represents supplier's name and detail information
Supply ID	Supply Identification represents supply no: and detail information
Uncoded product	Product that have no product code
Valid order	The packing list that have been approved

APPENDIX B

PROCESS SPECIFICATION

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Table B.1. Process Specification of Process 1.1.

Process Name	Product Checking
Data In:	Product Requested or Customer order Product Info
Data Out:	Product available list Product not available list
Process:	1. Receive Product requested list 2. Read Product available info 3. If product available, issue product requested that's available list 4. If product not available, issue product not available list
Attachment	Product Info

Table B.2. Process Specification of Process 1.2.

Process Name	Request Product
Data In:	Product Requested list
Data Out:	List of requested product available
Process:	1. Receive product requested list 2. Check product requested list 3. Issue product requested list
Attachment	Product Info

Table B.3. Process Specification of Process 1.3.

Process Name	Prepare Backlog order
Data In:	Product Requested that not available
Data Out:	Backlog Order
Process:	1. Receive Product Requested that not available 2. Process prepare backlog order 3. Issue Backlog order
Attachment	Product Info

Table B.4. Process Specification of Process 2.1.

Process Name	Product Checking
Data In:	List of requested product available Product Info
Data Out:	Product available list
Process:	1. Receive Product requested list 2. Read Profduct available info 3. Issue product available list
Attachment	Product Info

Table B.5. Process Specification of Process 2.2.

Process Name	Update Stock
Data In:	Product available list
Data Out:	Product requested that available
Process:	1. Receive Product available list 2. Prepare product requested 4. Update stock files
Attachment	Product Info

Table B.6. Process Specification of Process 3.

Process Name	Check supply Information
Data In:	Suppliers' information Product info Backlog Order
Data Out:	List of suppliers to be ordered
Process:	1. Receive Backlog order 2. Read Suppliers' information 3. Read Product information 4. Issue list of Suppliers to be order
Attachment	Suppliers' information Product Info

Table B.7. Process Specification of Process 3.2

Process Name	Check ordering Information
Data In:	Order Information List of suppliers to be ordered
Data Out:	List of products to be ordered
Process:	1. Receive list of suppliers to be ordered 2. Read previous ordering information 3. Issue list of products to be order
Attachment	Order information

Table B.8. Process Specification of Process 3.3.

Process Name	Issue purchasing order
Data In:	Product to be ordered
Data Out:	Purchasing order
Process:	1. Receive product to be ordered list 2. Check for supplier and product information 3. Issue Purchasing order 4. Update Order files
Attachment	Order information

Table B.9. Process Specification of Process 4.1.

Process Name	Check packing list
Data In:	Packing list Ordering information
Data Out:	Packing list approval Packing list not approval
Process:	1. Receive products with packing list 2. Check packing list with purchasing order 3. Approval or Not approval packing list
Attachment	Order information

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Table B.10. Process Specification of Process 4.2.

Process Name	Issue product returned list
Data In:	Packing list that not approved Ordering information
Data Out:	Product returned list
Process:	1. Receive Packing list that not approved 2. Check packing list with purchasing order 3. Issue product returned list
Attachment	Order information

Table B.11. Process Specification of Process 4.3.

Process Name	Check product coding
Data In:	Approved Packing list Product Info
Data Out:	Product arriving list New product to be coded
Process:	1. Receive approved Packing list 2. Read product information 3. Product coded ready to be sent 4. New product ready to be coding
Attachment	Product info

Table B.12. Process Specification of Process 4.4.

Process Name	Product delivery
Data In:	List of products to be delivered
Data Out:	Delivery note
Process:	1. Receive list of products to be delivered 2. Send products to inventory 3. Issue delivery notes

Table B.13. Process Specification of Process 4.5.

Process Name	Update stock and product
Data In:	Delivery notes
Data Out:	Product and inventory updated
Process:	1. Receive delivery notes 2. Update Product & Inventory
Attachment	Product info

Table B.14. Process Specification of Process 5.1.

Process Name	Check product category
Data In:	Product uncoded list Suppliers' information Product info
Data Out:	Product classified list
Process:	1. Receive product uncoded list 2. Categorized the list 3. Issue product categorized list
Attachment	Product info Suppliers' information

Table B.15. Process Specification of Process 5.2.

Process Name	Create product code
Data In:	Product categorized list
Data Out:	Product coding list
Process:	1. Receive product categorized list 2. Read suppliers' information 3. Read product information 4. Create product code 5. Issue product coding list
Attachment	Product info Suppliers' information

Table B.16. Process Specification of Process 5.3.

Process Name	Update stock and product
Data In:	Product coding list
Data Out:	Product and inventory updated
Process:	1. Receive product coding list 2. Update Product & Inventory
Attachment	Product info

Table B.17. Process Specification of Process 6.1.

Process Name	Create order report
Data In:	Suppliers' information Ordering information Product information
Data Out:	Order report
Process:	1. Read Suppliers' information 2. Read Ordering information 3. Read Product information 4. Generate order report
Attachment	Suppliers' information Ordering information Product information

Table B.18. Process Specification of Process 6.2.

Process Name	Create inventory report
Data In:	Product information
Data Out:	Inventory report
Process:	1. Read Product information 2. Generate inventory report
Attachment	Product information

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Table B.19. Process Specification of Process 6.3.

Process Name	Create order report
Data In:	Customers' information Sales' information
Data Out:	Sales report
Process:	1. Read Customers' information 2. Read Sales' information 3. Generate Sales report
Attachment	Customers' information Sales' information

Table B.20. Process Specification of Process 6.4.

Process Name	Create management report
Data In:	Suppliers' information Ordering information Product information Sales information Customers' information
Data Out:	Management report
Process:	1. Read Suppliers' information 2. Read Ordering information 3. Read Product information 4. Read Customers' information 5. Read Sales' information 6. Generate management report
Attachment	Suppliers' information Ordering information Product information Sales information Customers' information

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APPENDIX C

FILE LAYOUT

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Table C.1. Customer Table.

Field Name	Type	Description
Customer ID (PK)	Text(10)	Customer ID
Customer name	Text(50)	Customer Name
Customer address	Text(100)	Customer's address including House no:, street, province etc.
Telephone	Text(20)	Telephone Number
Fax	Text(20)	Fax Number

Table C.2. Order Table.

Field Name	Type	Description
Order ID (PK)	Text(10)	Order ID
Order Date	Date/Time	Order Date
Customer ID (FK)	Text(10)	Customer ID
Product ID (FK)	Text(10)	Product ID
Order Cost	Currency	Order Cost

Table C.3. Order_Product Table.

Field Name	Type	Description
Order Product ID (PK)	Text(10)	Order Product ID
Product ID (FK)	Text(10)	Product ID
Order ID (FK)	Text(10)	Order ID
Order unit price	Long Integer	Unit Price
Order Quantity	Integer	Quantity of order

Table C.4. Inventory Product Table.

Field Name	Type	Description
Product ID	Text(10)	Product ID
Product Name	Text(50)	Product Name
Units On hand	Long Integer	Units On hand
Unit_Price	Currency	Unit_Price

Table C.5. Purchase Order Table.

Field Name	Type	Description
Purchase Order ID (PK)	Text(10)	Purchase Order ID
Supplier ID (FK)	Text(10)	Supplier ID
Product ID (FK)	Text(10)	Product ID
Purchase Quantity	Integer	Quantity of Purchase
Purchase price	Currency	Price of purchase
Purchase Date	Date/Time	Purchase Date

Table C.6. Supplier Table.

Field Name	Type	Description
Supplier ID (PK)	Text(10)	Supplier ID
Supplier name	Text(50)	Supplier Name
Supplier address	Text(100)	Supplier's address including House no:, street, province etc.
Telephone	Text(20)	Telephone Number
Fax	Text(20)	Fax Number

Table C.7. Supply Table.

Field Name	Type	Description
Supply ID (PK)	Text(10)	Supply ID
Supplier ID (FK)	Text(10)	Supplier ID
Product ID (FK)	Text(10)	Product ID
Supply Quantity	Integer	Quantity of supply
Supply Date	Date/Time	Date of supply

APPENDIX D

DATABASE DESIGN

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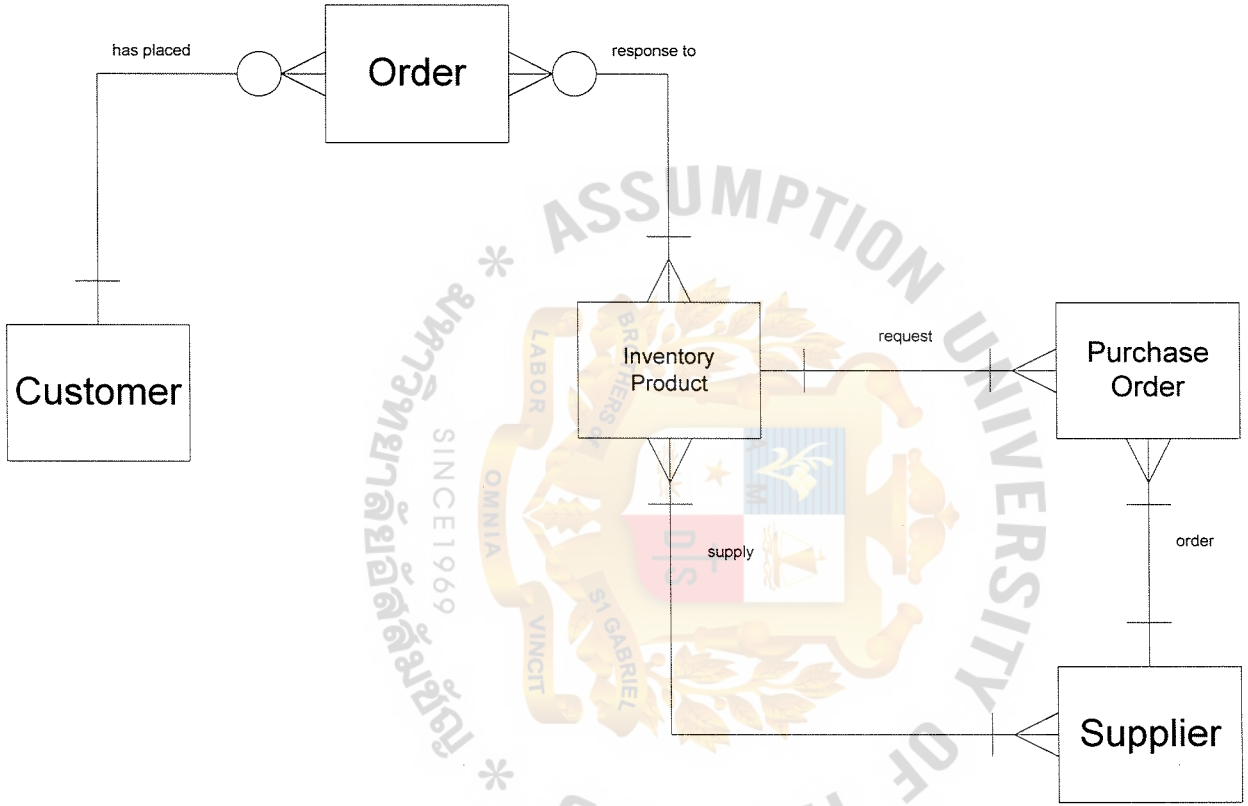

Figure D.1. Context Data Model of Inventory System.

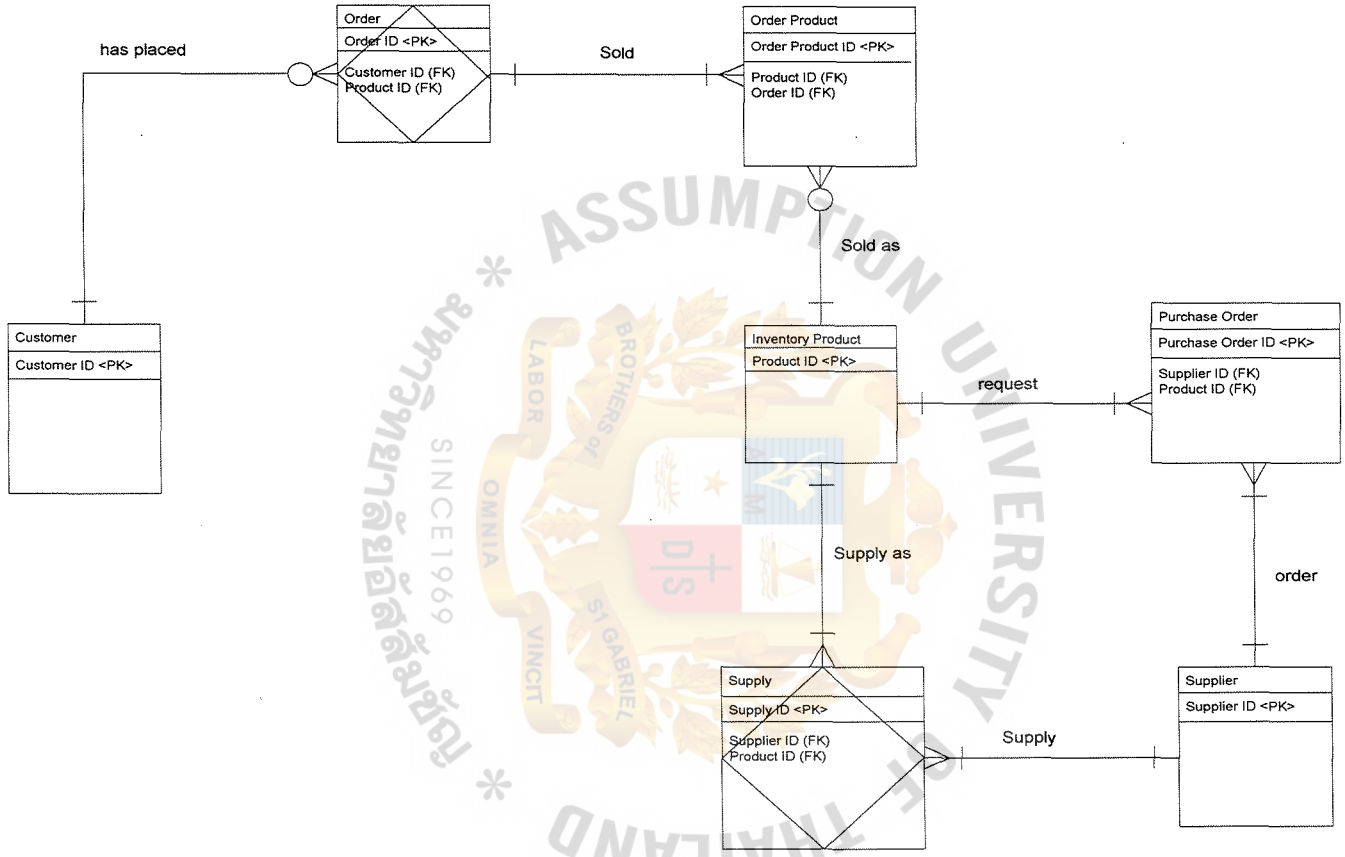

Figure D.2. Key Based Data Model.

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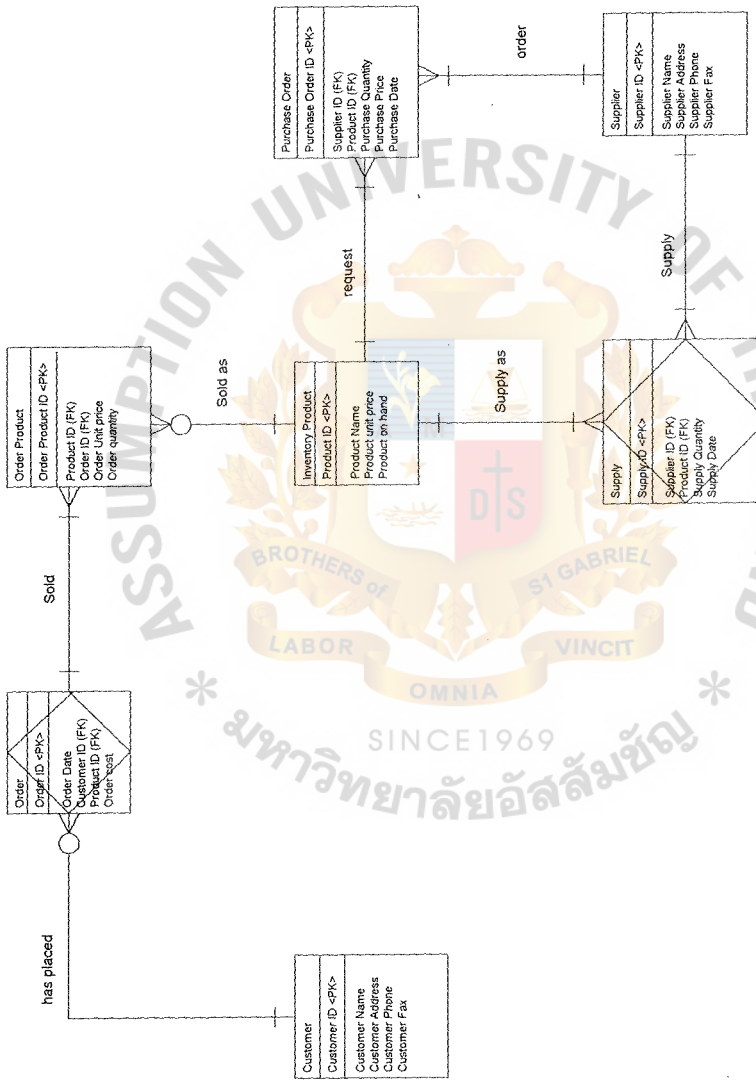

Figure D.3. ER Diagram with Attribute Data Model.

APPENDIX E

INTERFACE DESIGN

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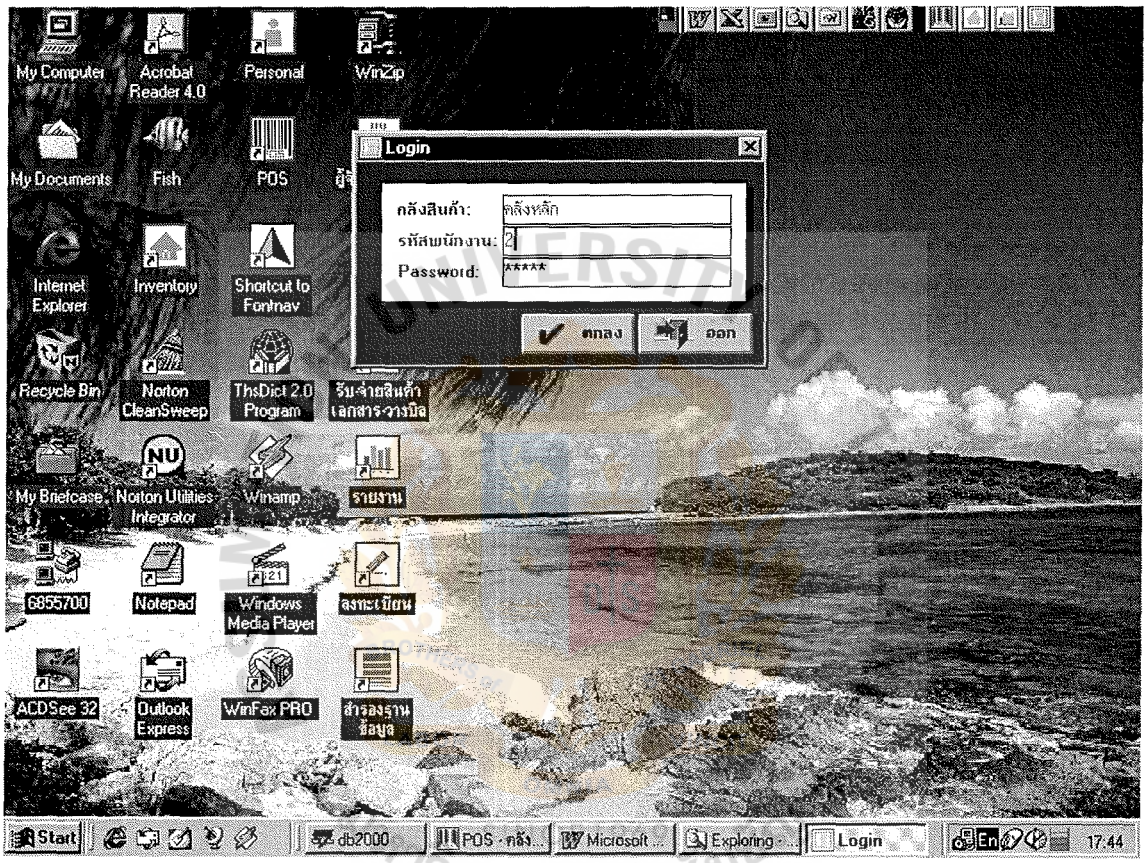

Figure E.1. Log in Screen.

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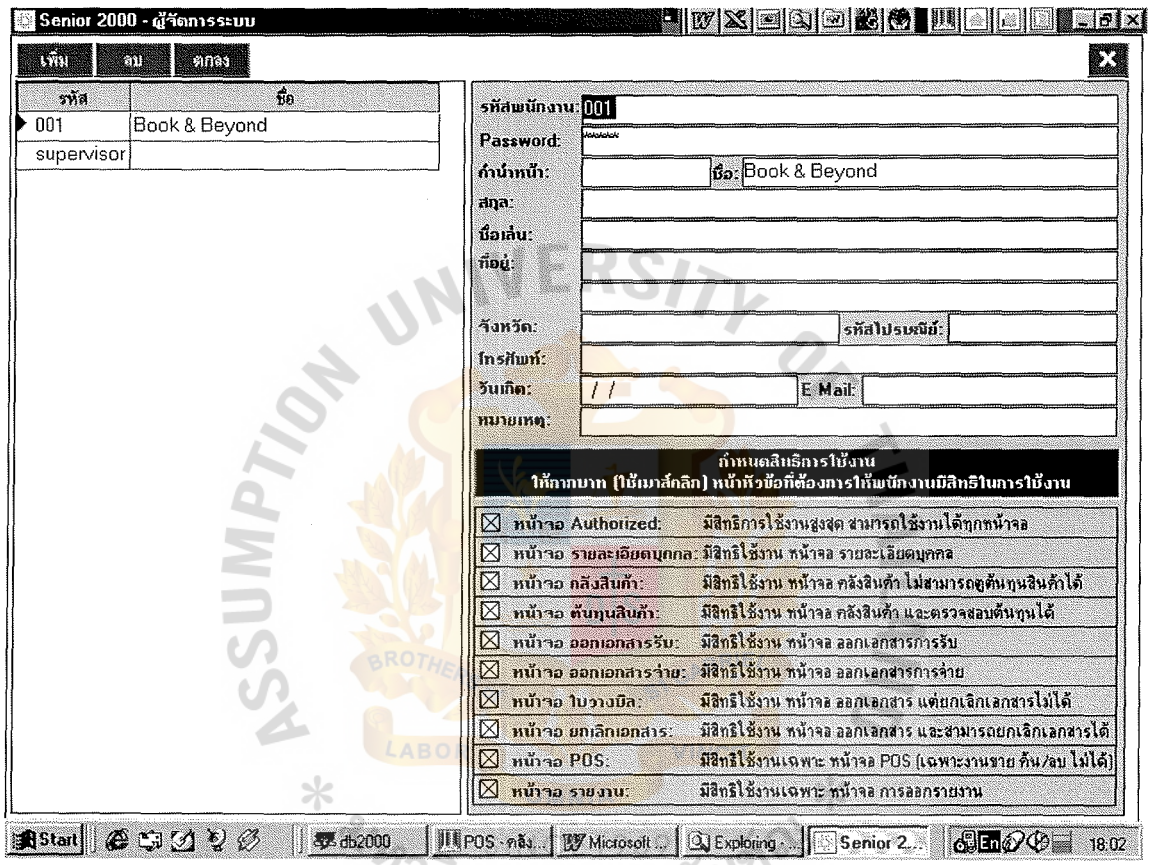

Figure E.2. Security Screen.

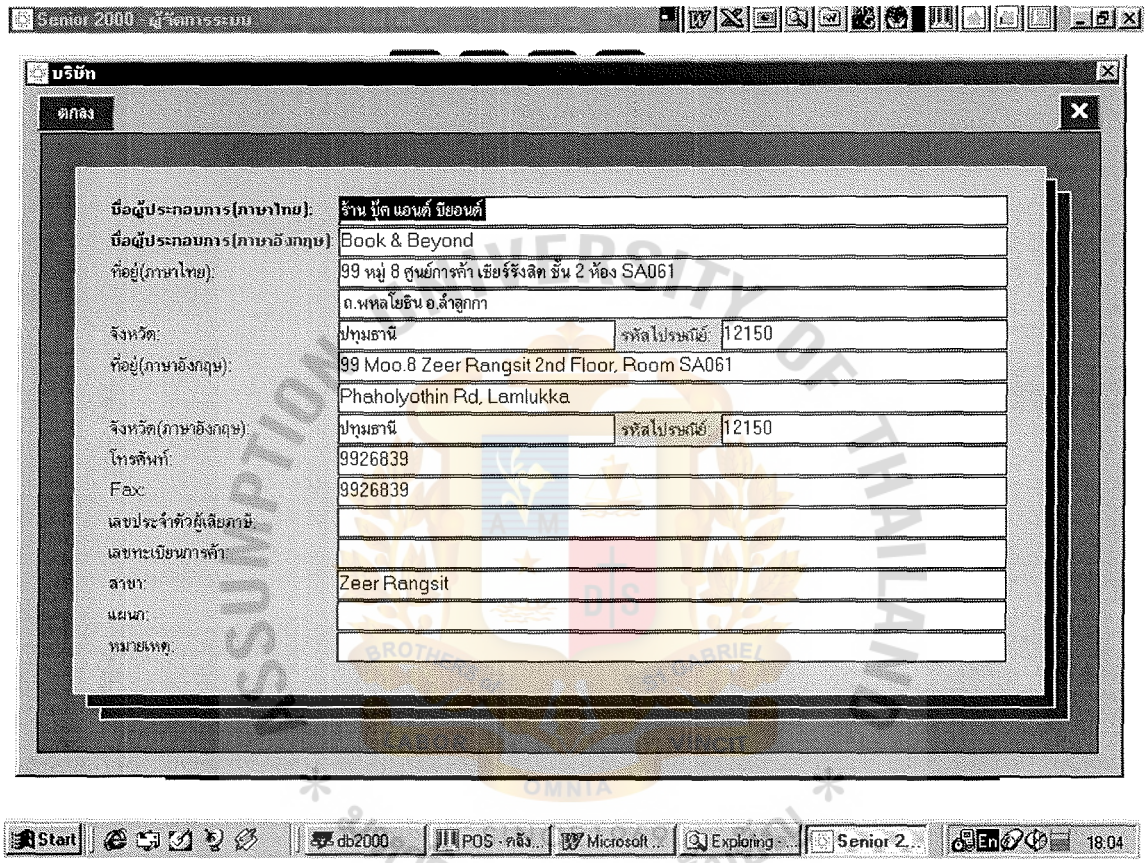

Figure E.3. Company Information Input Screen.

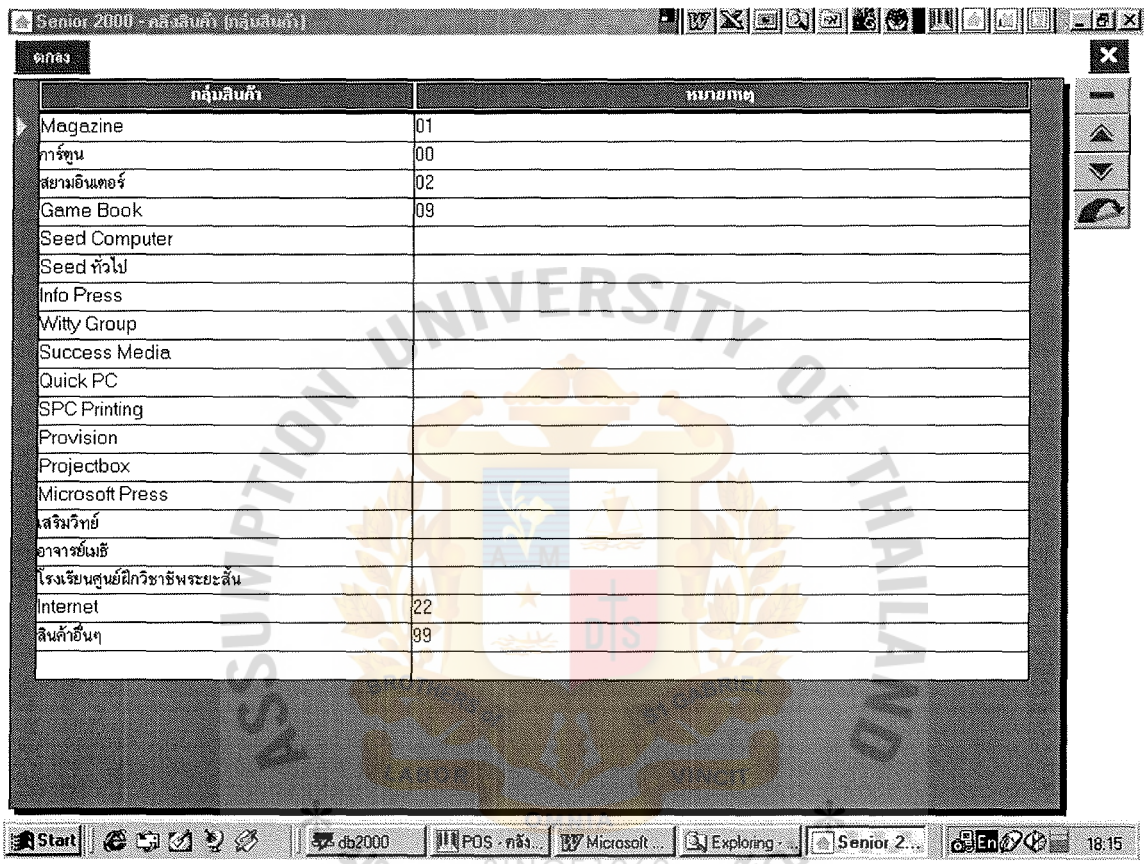

Figure E.4. Product Group Create Screen.

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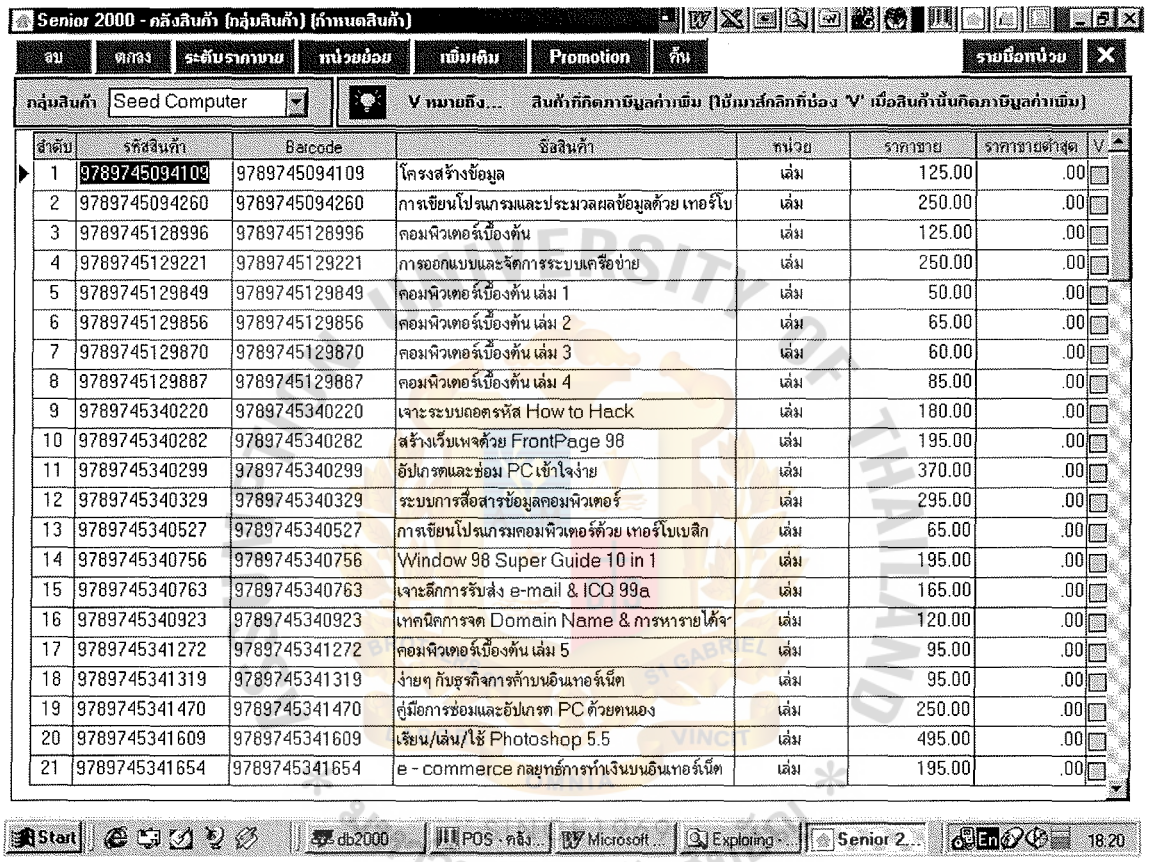

Figure E.5. Product Information Screen.

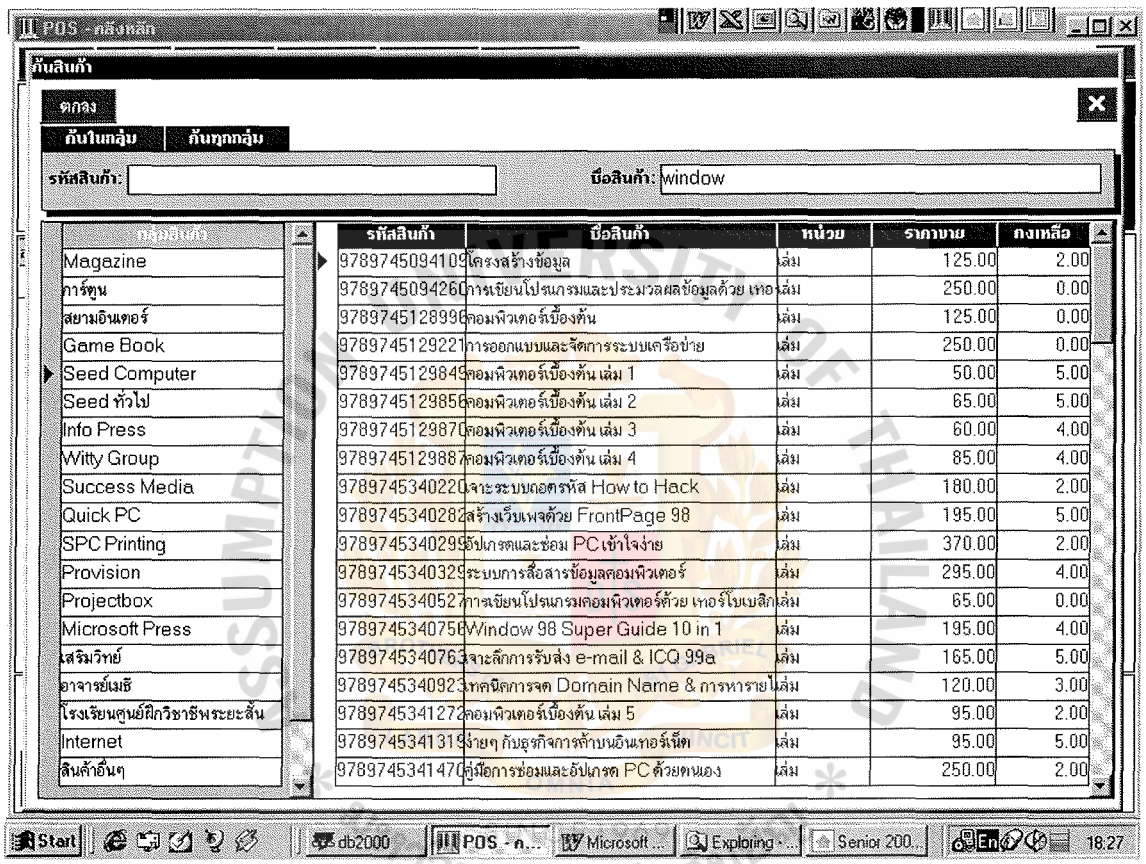

Figure E.6. Search Product Screen.

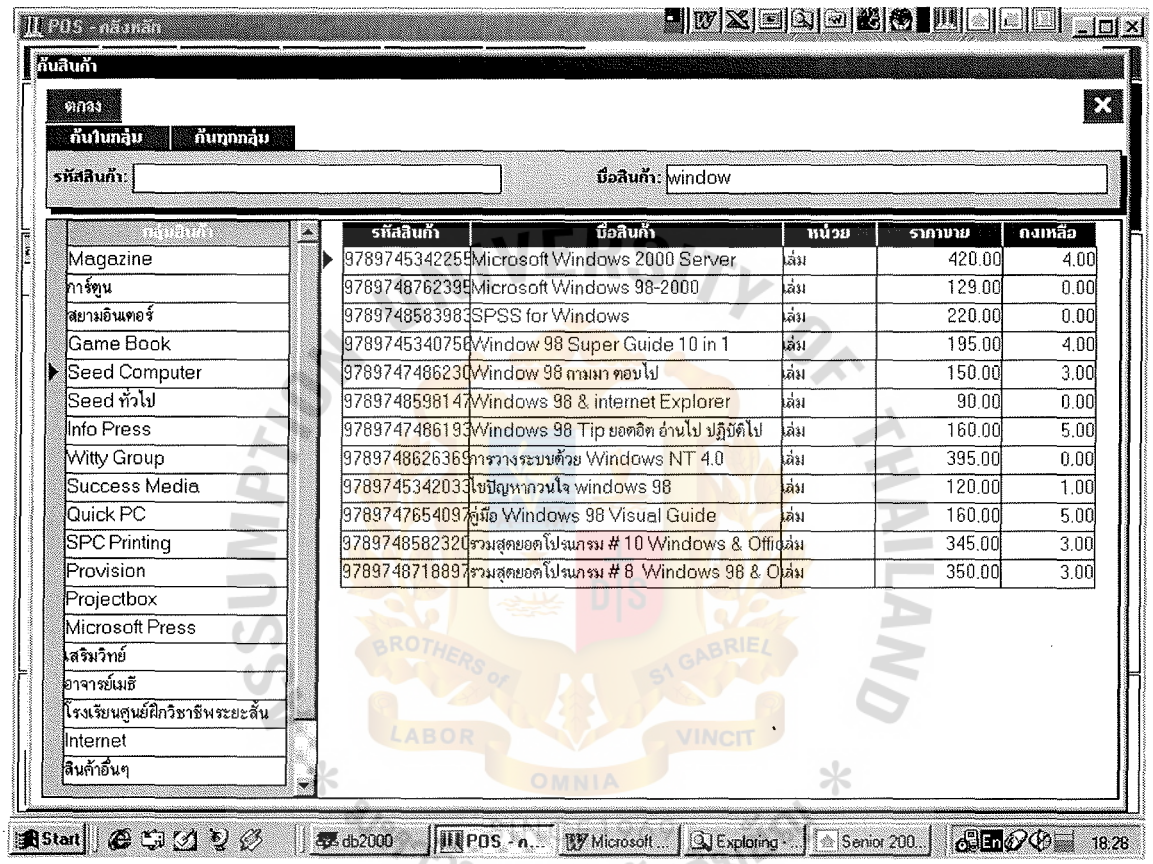

Figure E.7. Search Result Screen.

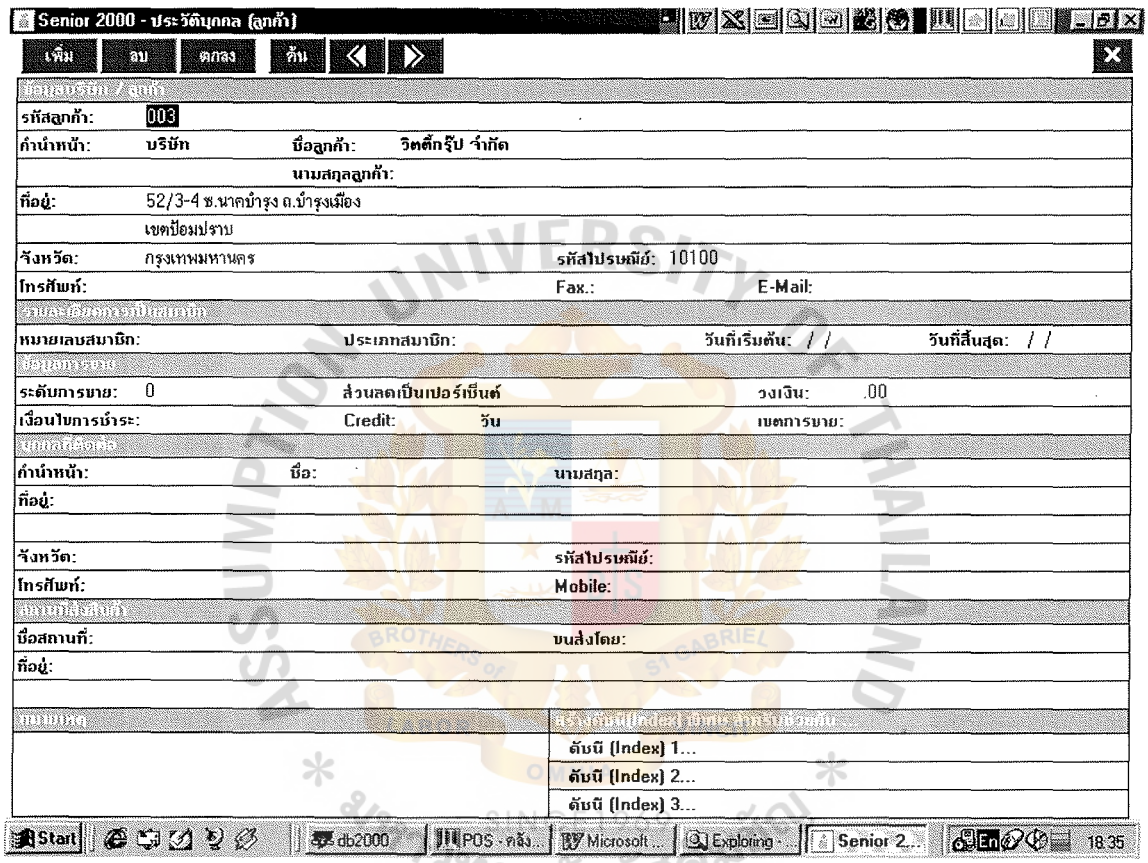

Figure E.8. Customer Information Screen.

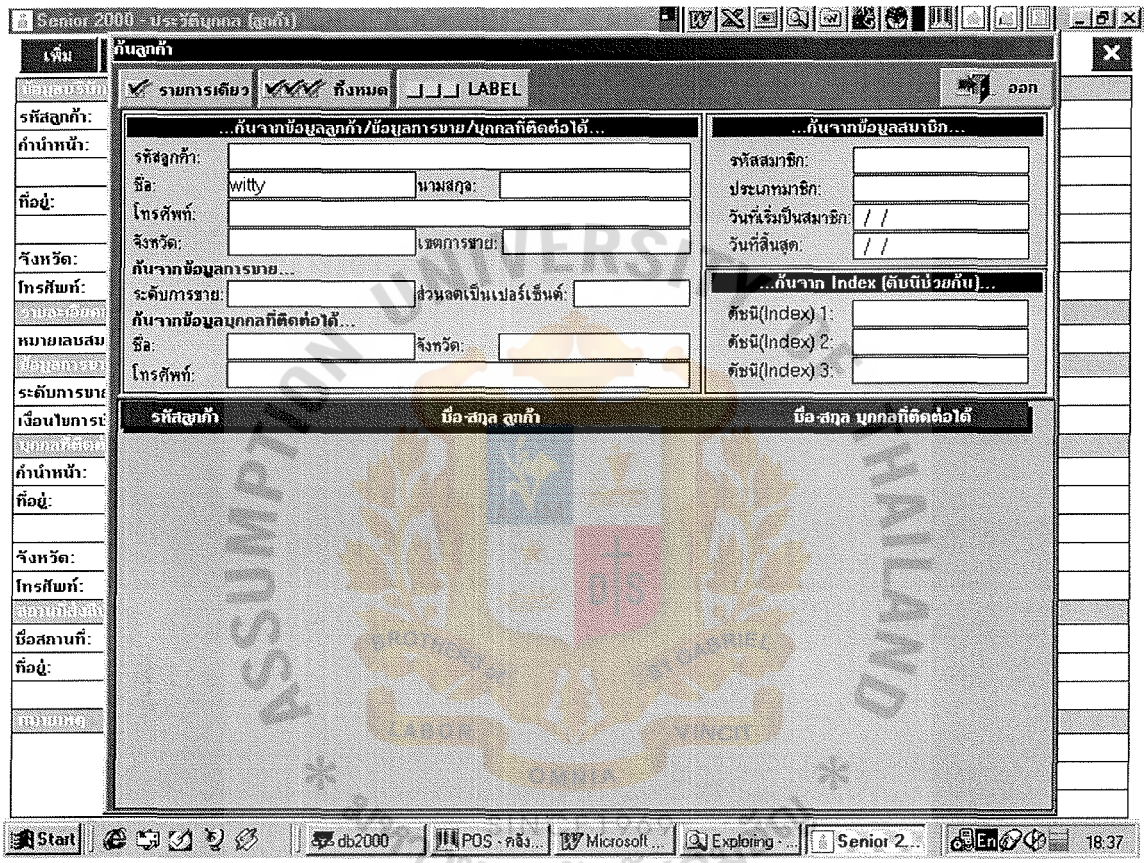

Figure E.9. Customer Searching Screen.

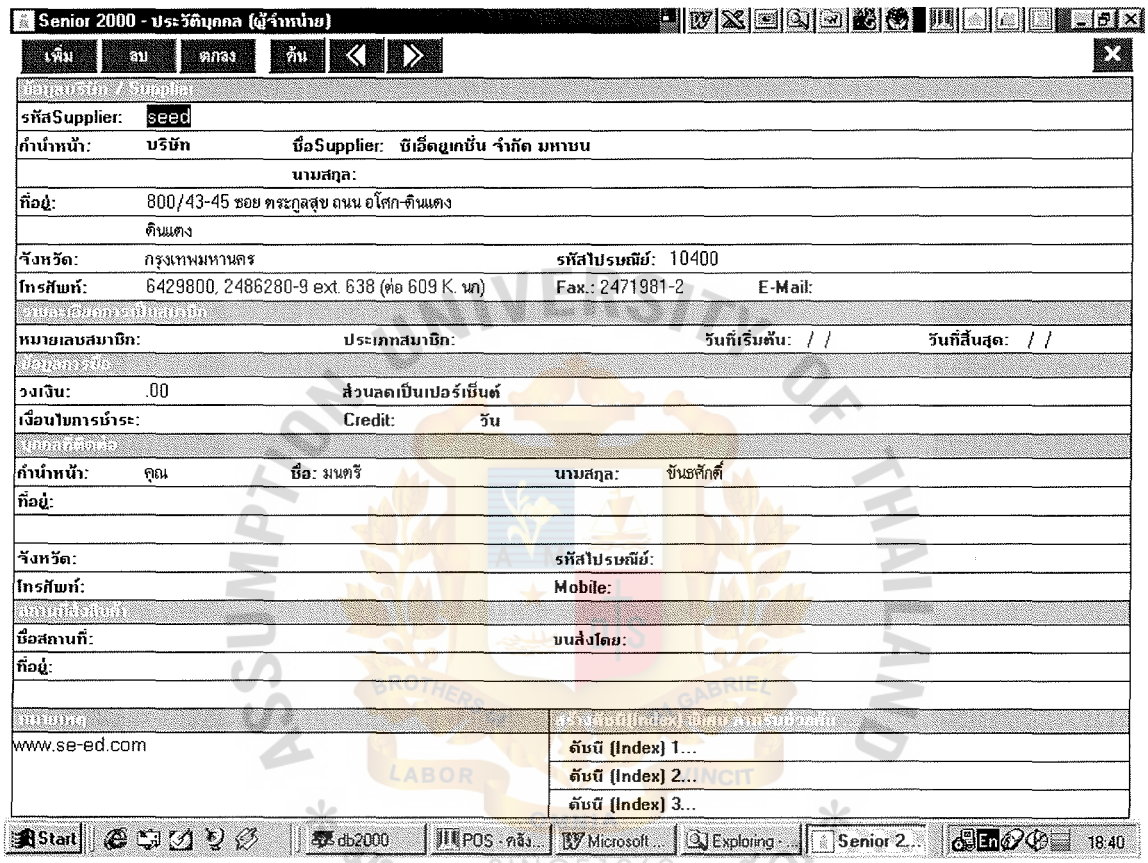

Figure E.10. Supplier Information Screen.

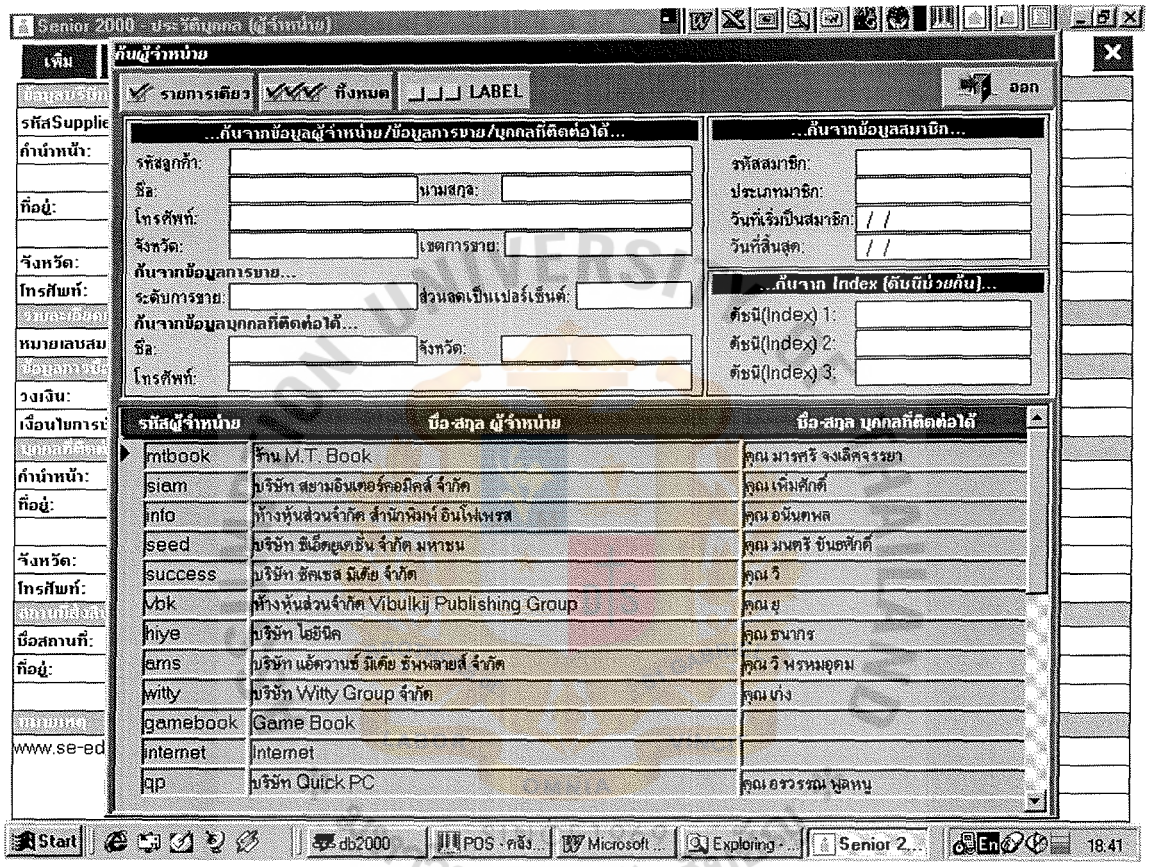

Figure E.11. Supplier Searching Screen.

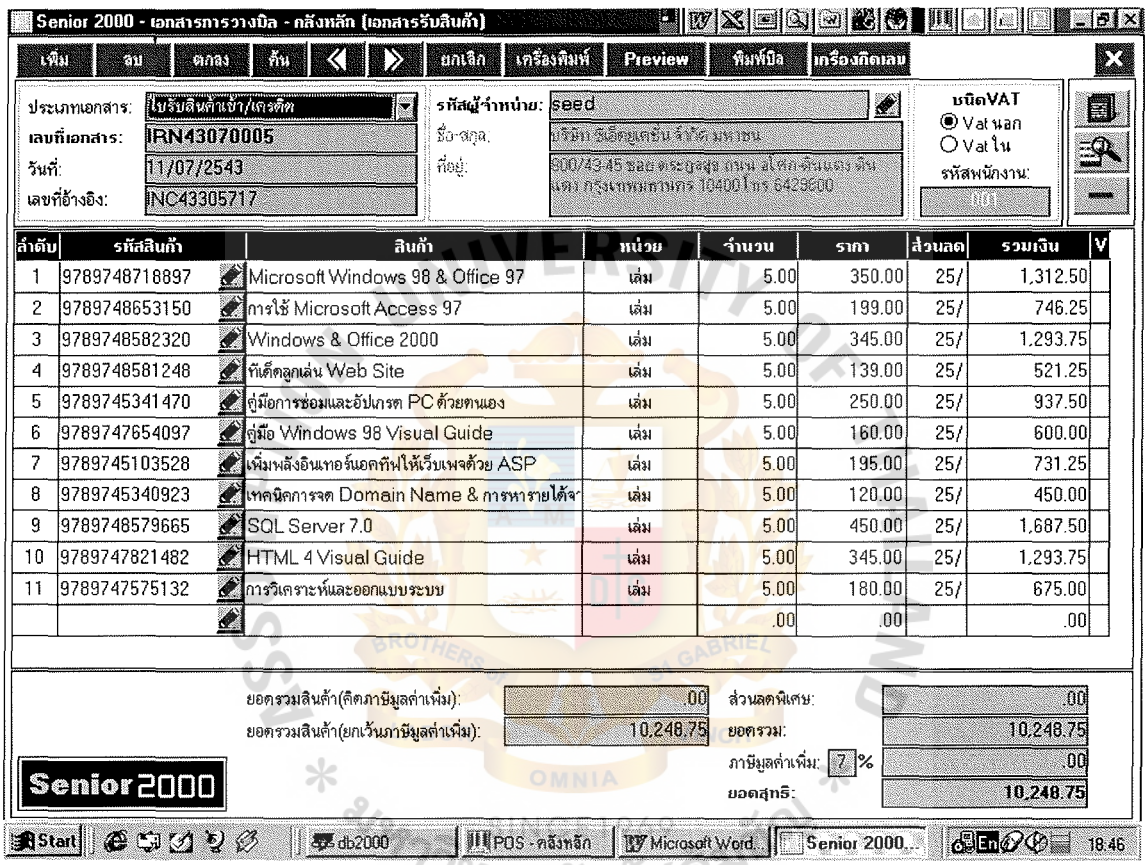

Figure E.12. Input Form of Product Received Screen.

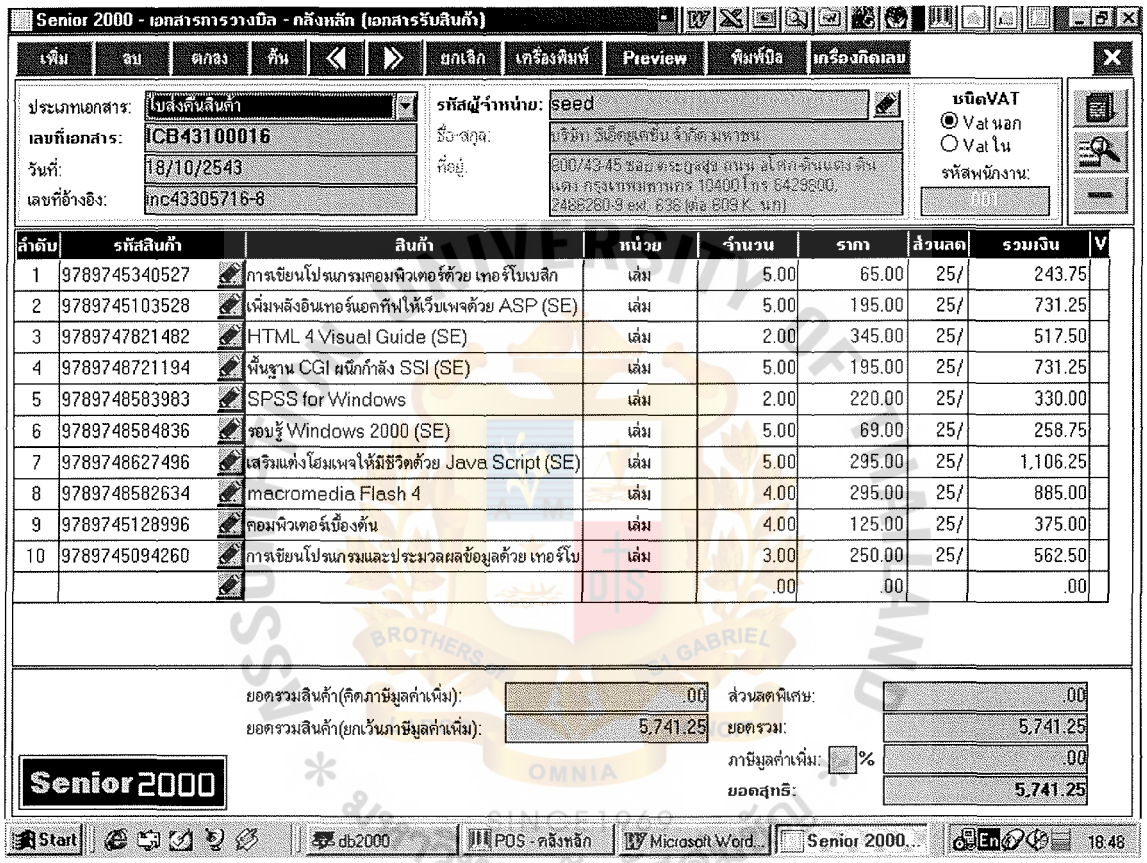

Figure E.13. Input Form of Product Returned Screen.

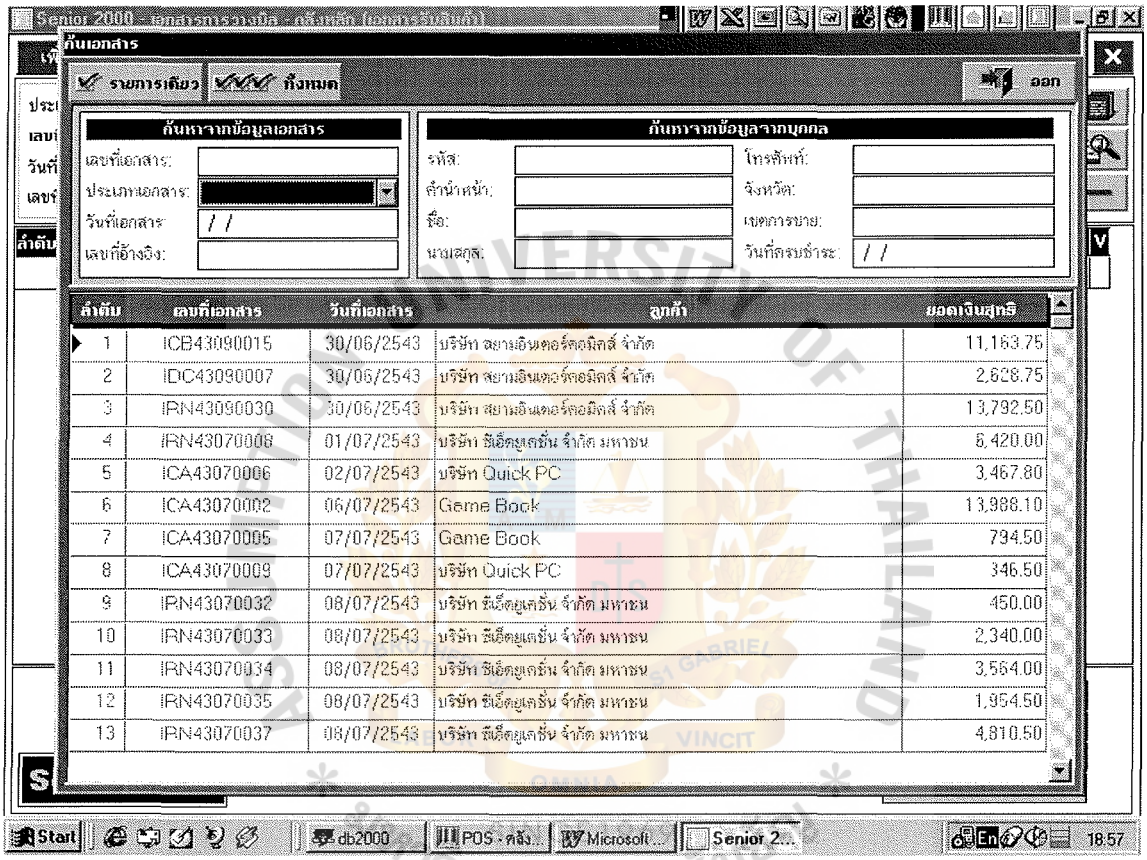

Figure E.14. Document Searching Screen.

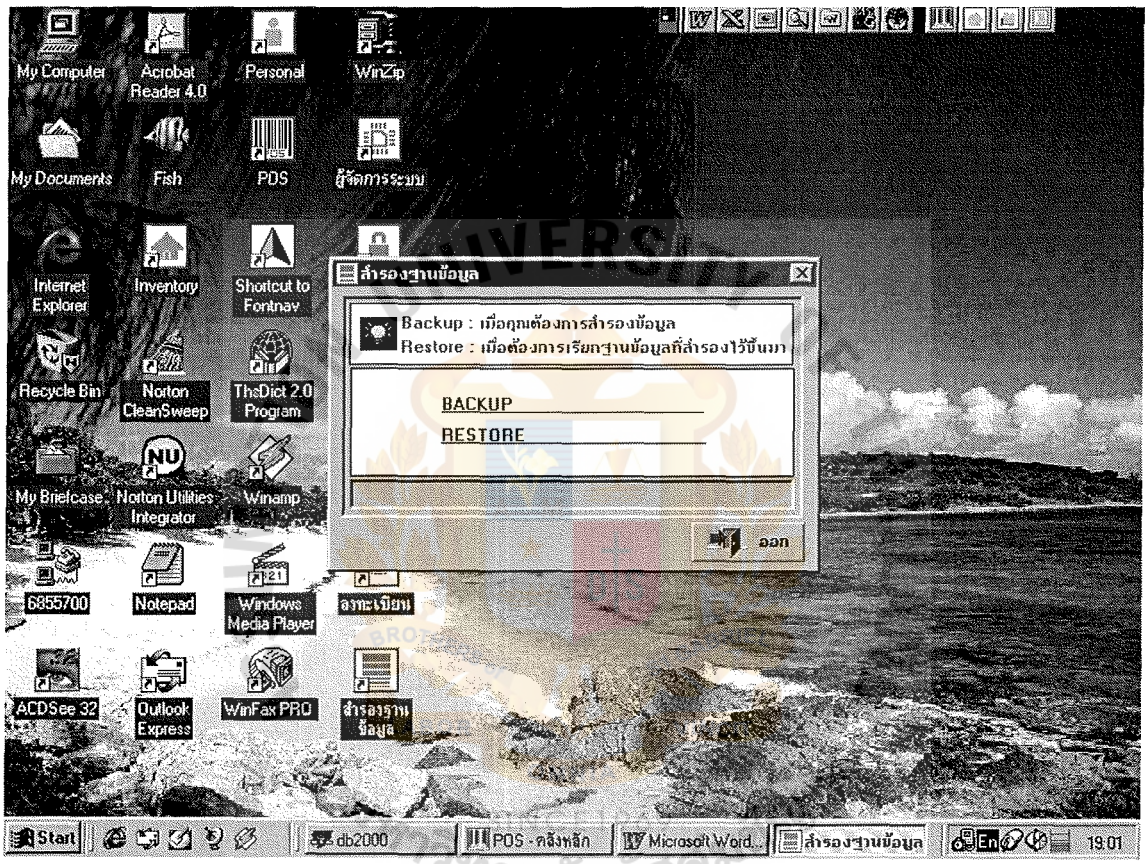

Figure E.15. Backup and Restore Function Screen.

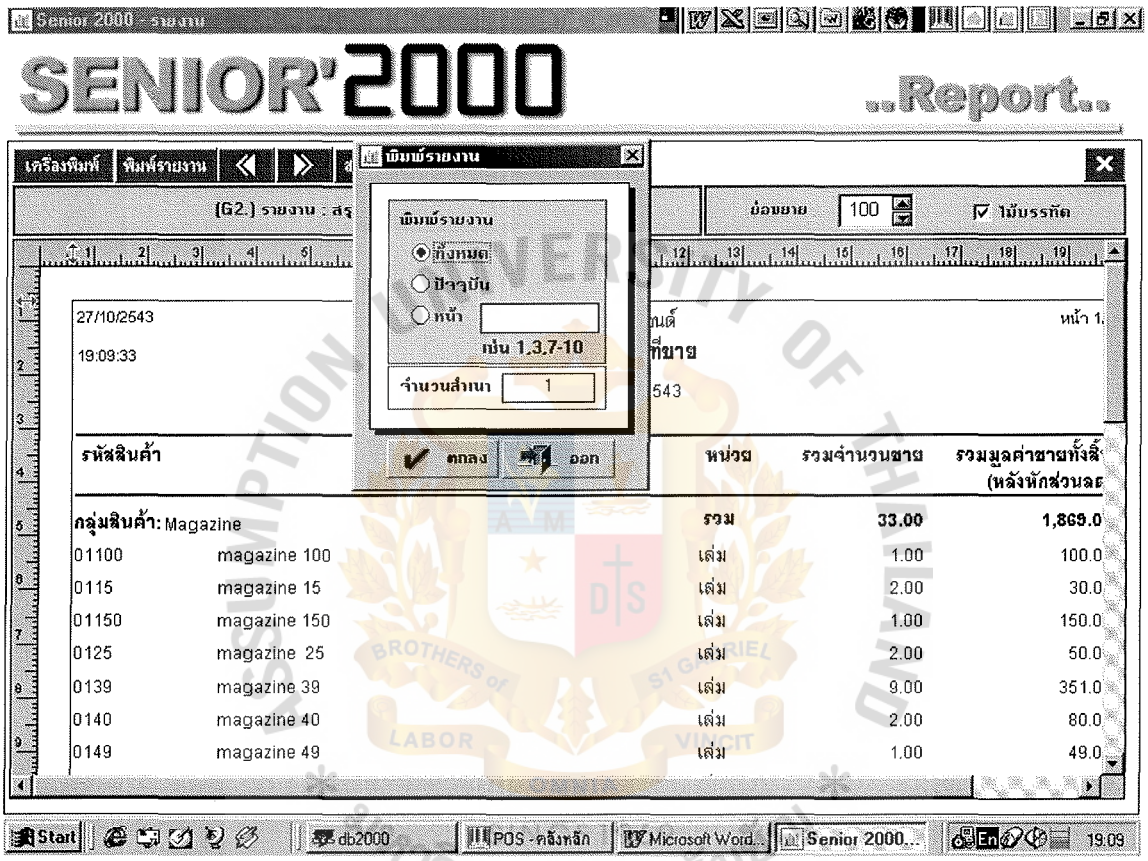

Figure E.16. Printing Request Screen.

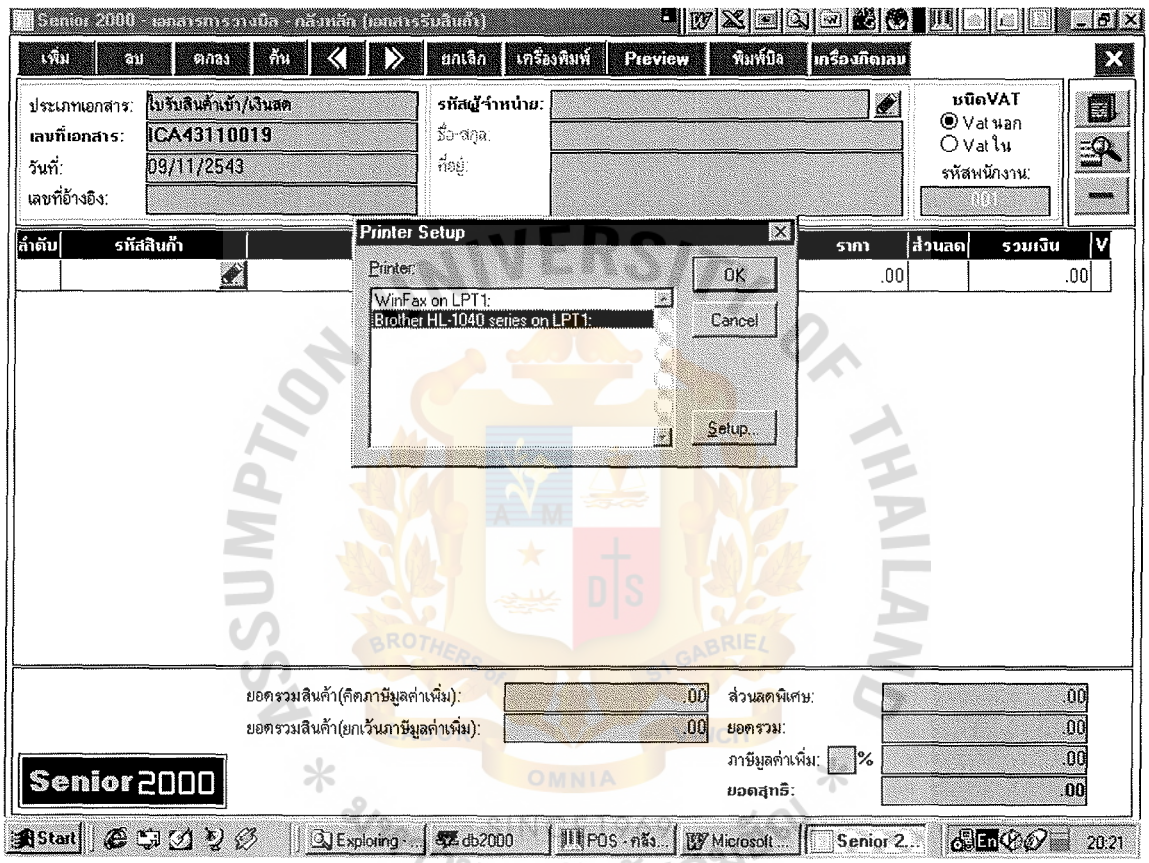

Figure E.17. Printer Setup Screen.

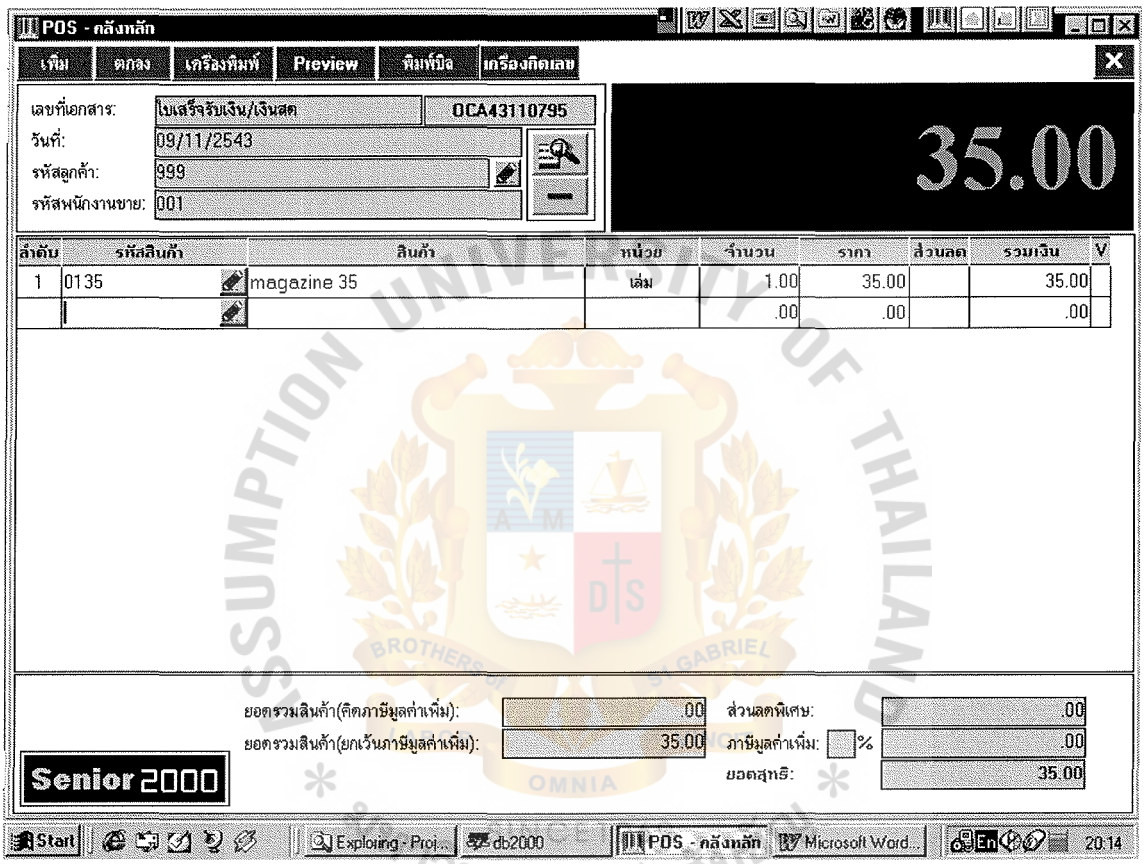

Figure E.18. Point of Sales Screen.

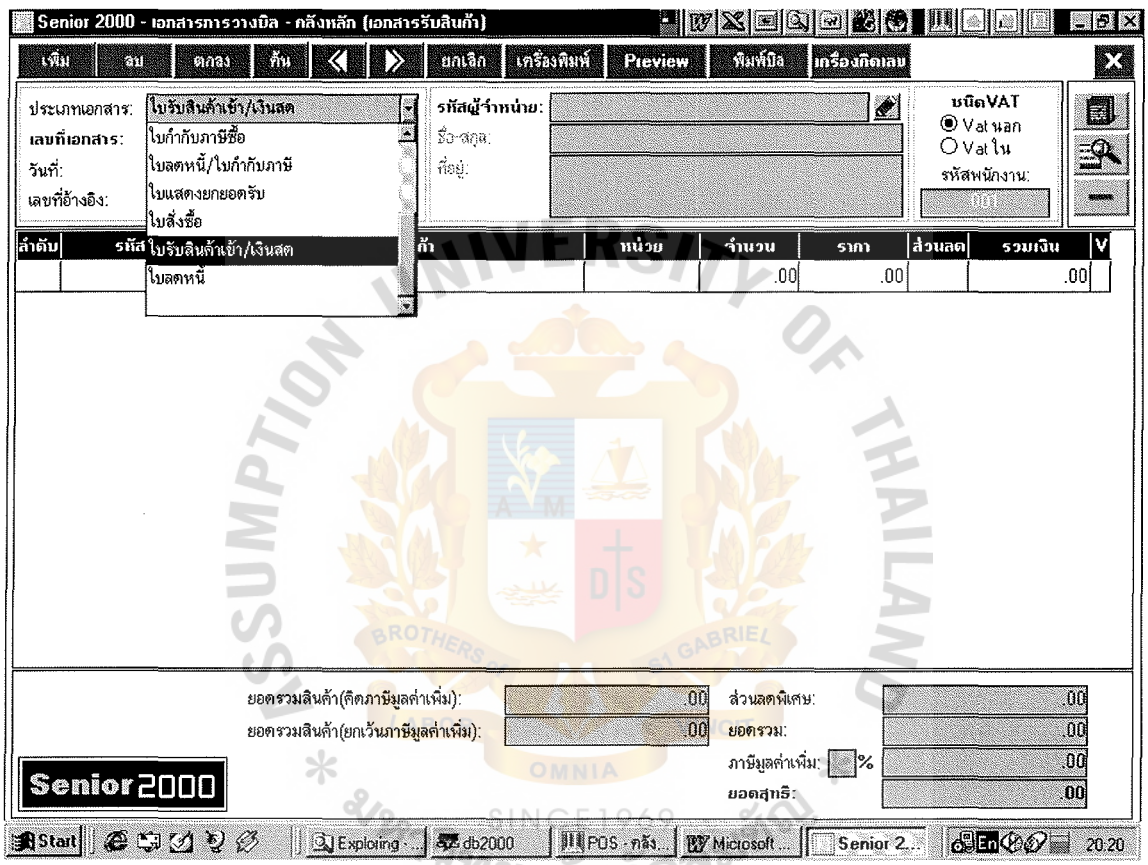

Figure E.19. Billing Screen.

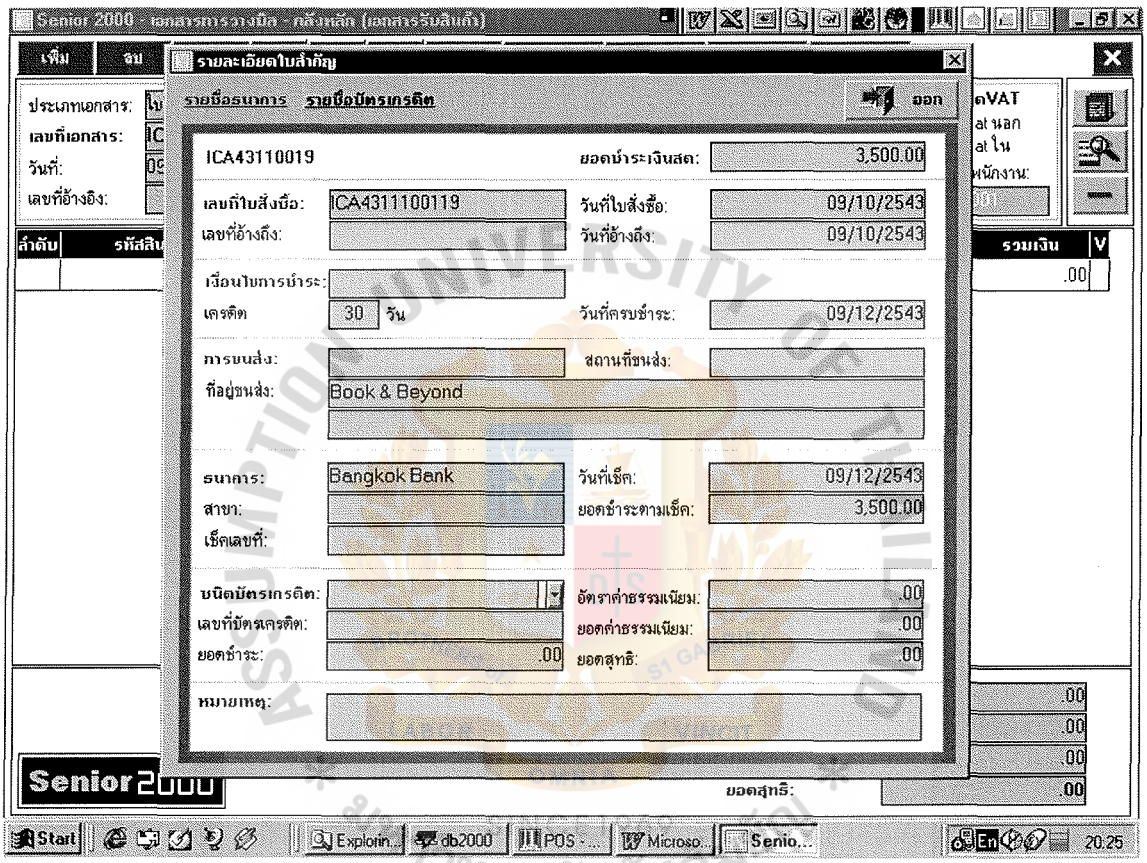

Figure E.20. Billing Detail Screen.

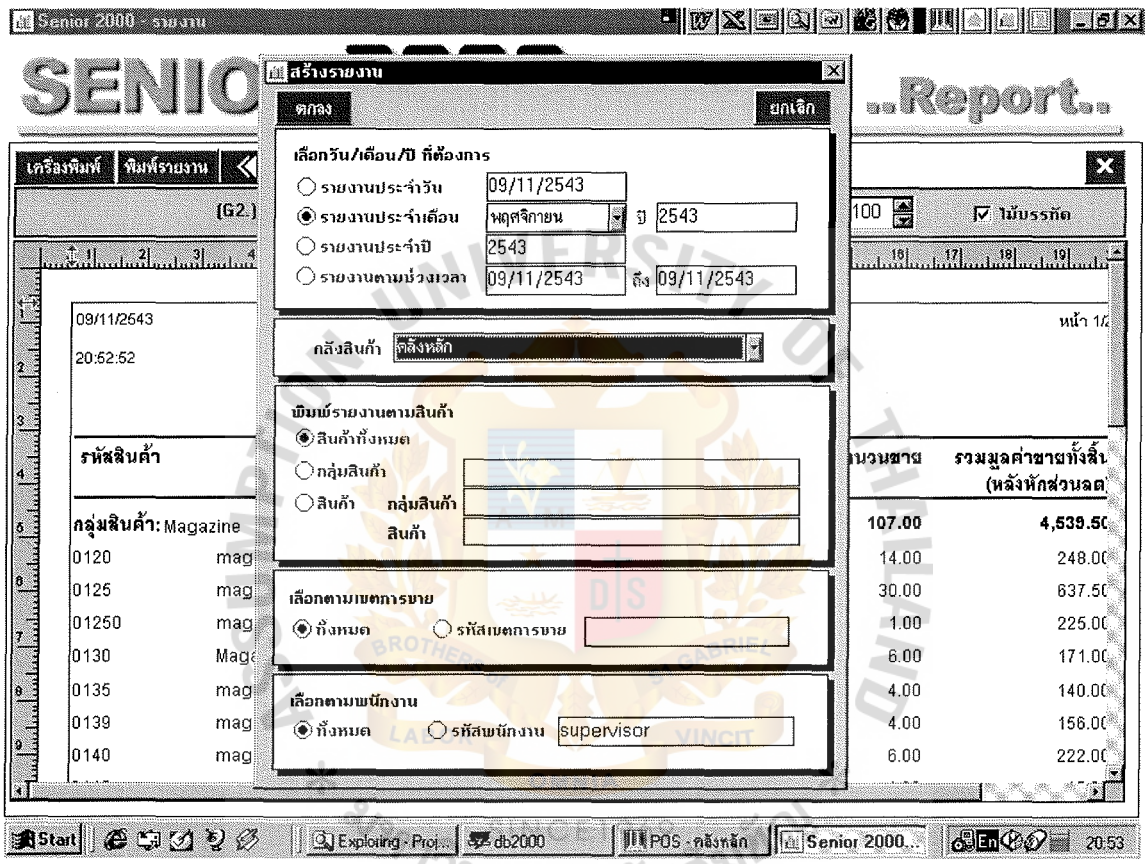

Figure E.21. Report Creating Screen.

APPENDIX F

REPORT DESIGN

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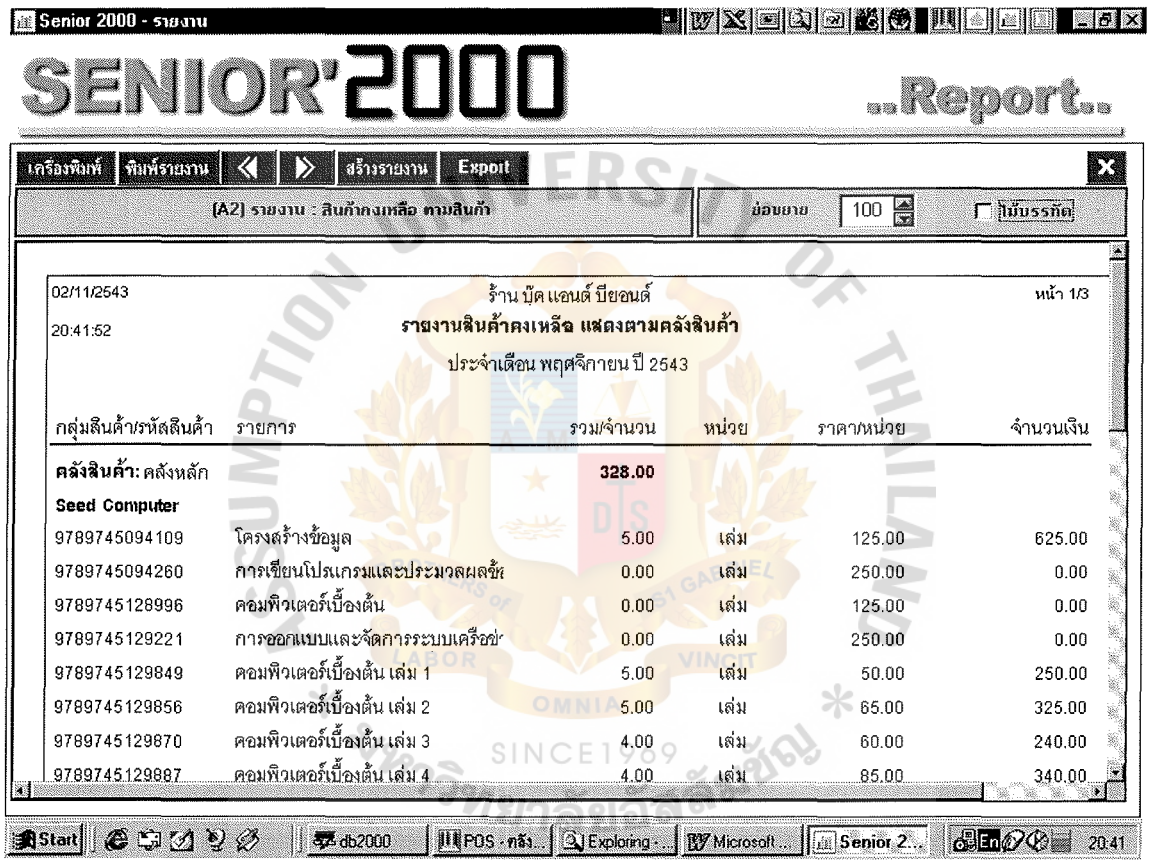

Figure F.1. Inventory Report.

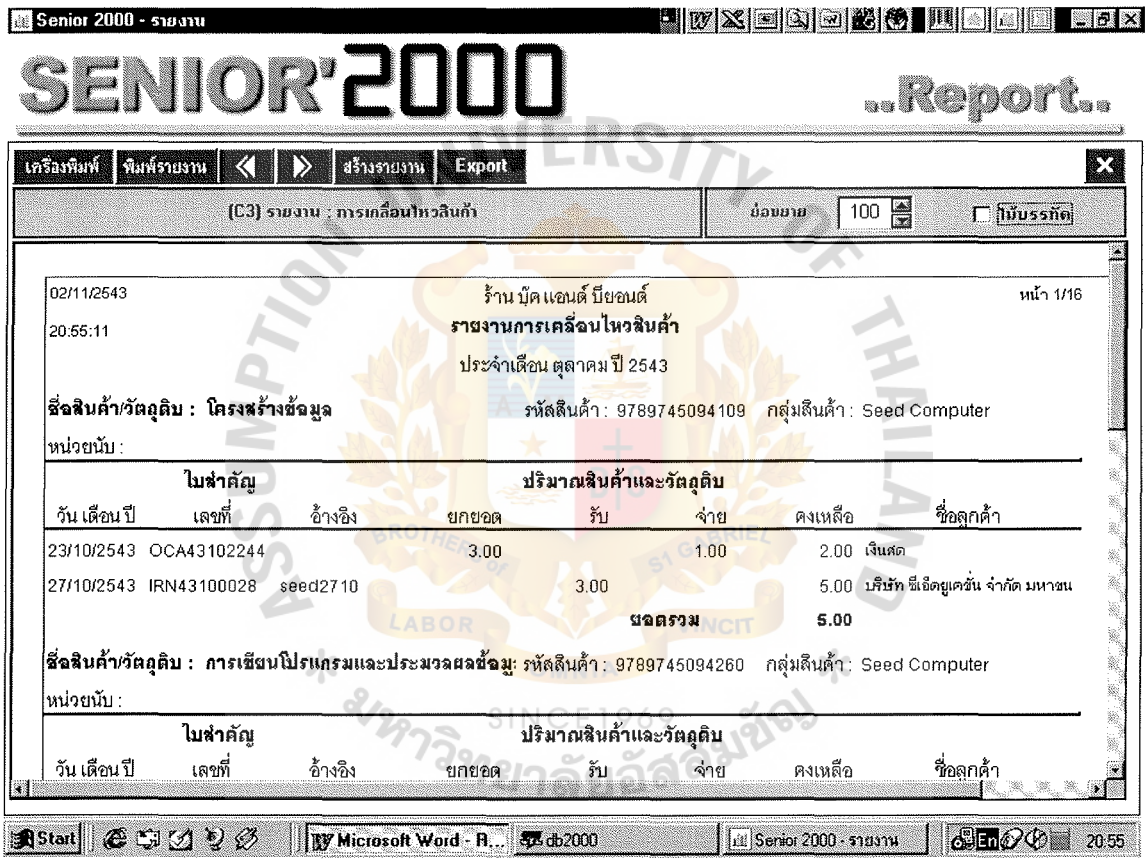

Figure F.2. Report of Product Movement.

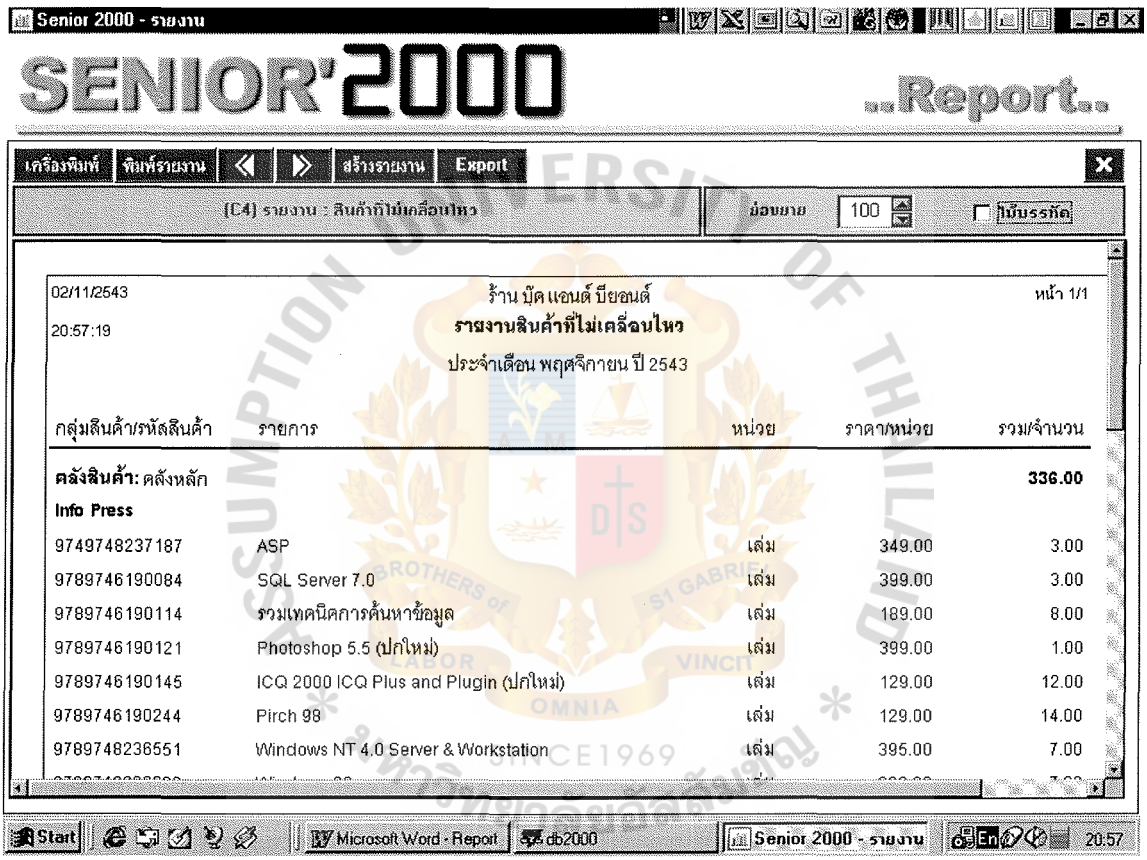

Figure F.3. Report of Non-Movement Product.

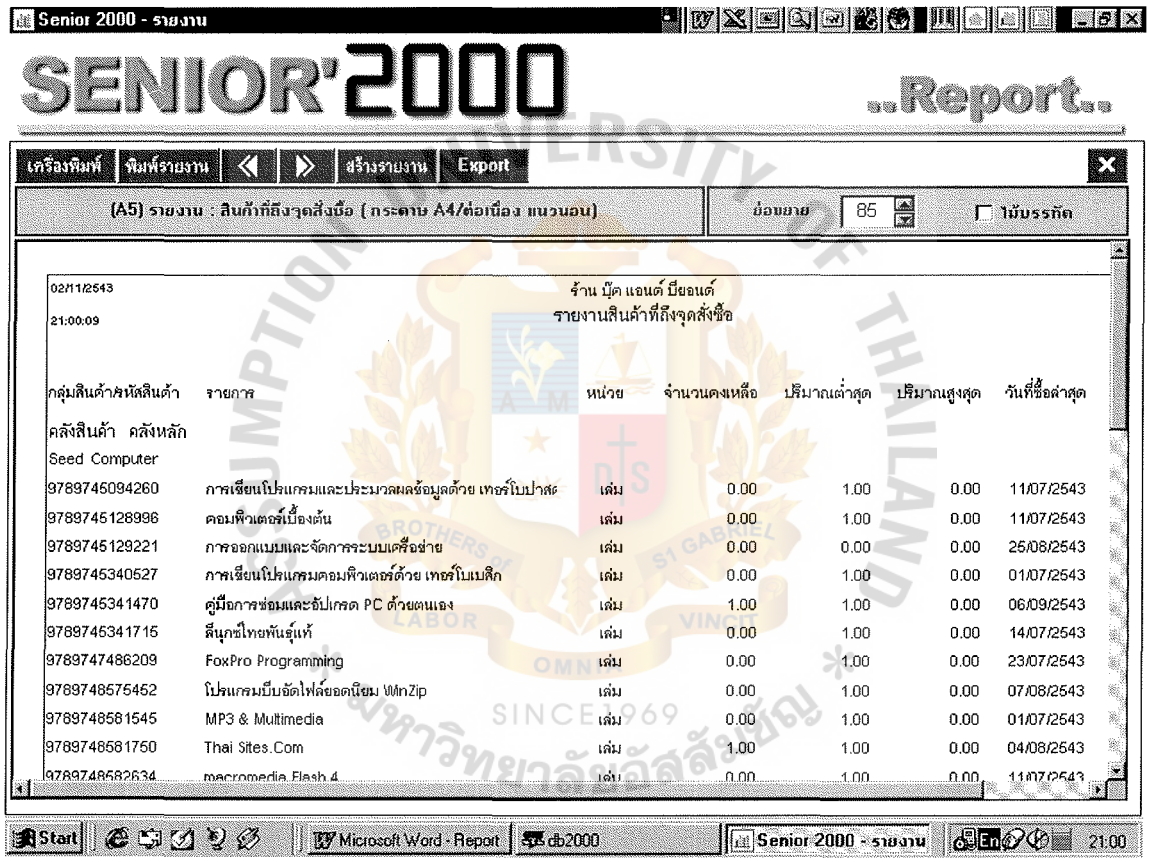

Figure F.4. Report of Purchase Order Point.

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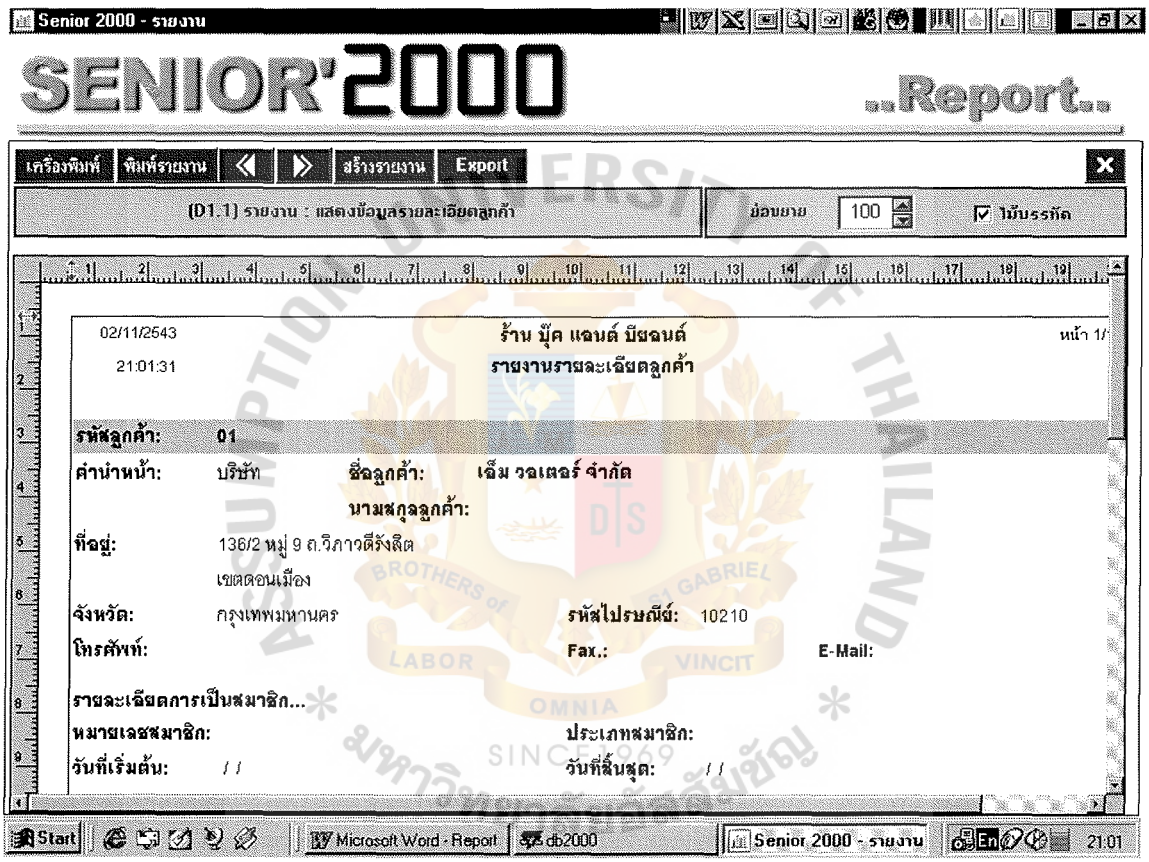

Figure F.5. Report of Customer Information.

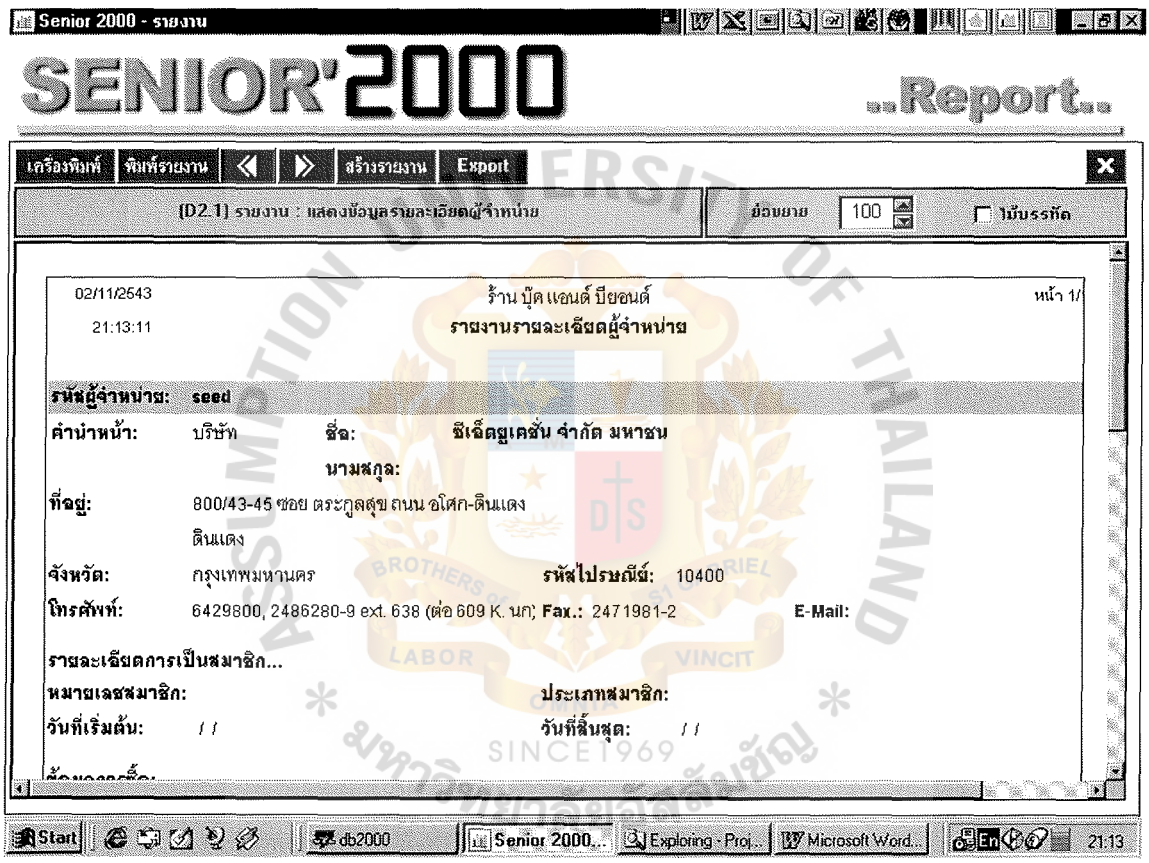

Figure F.6. Report of Supplier Information.

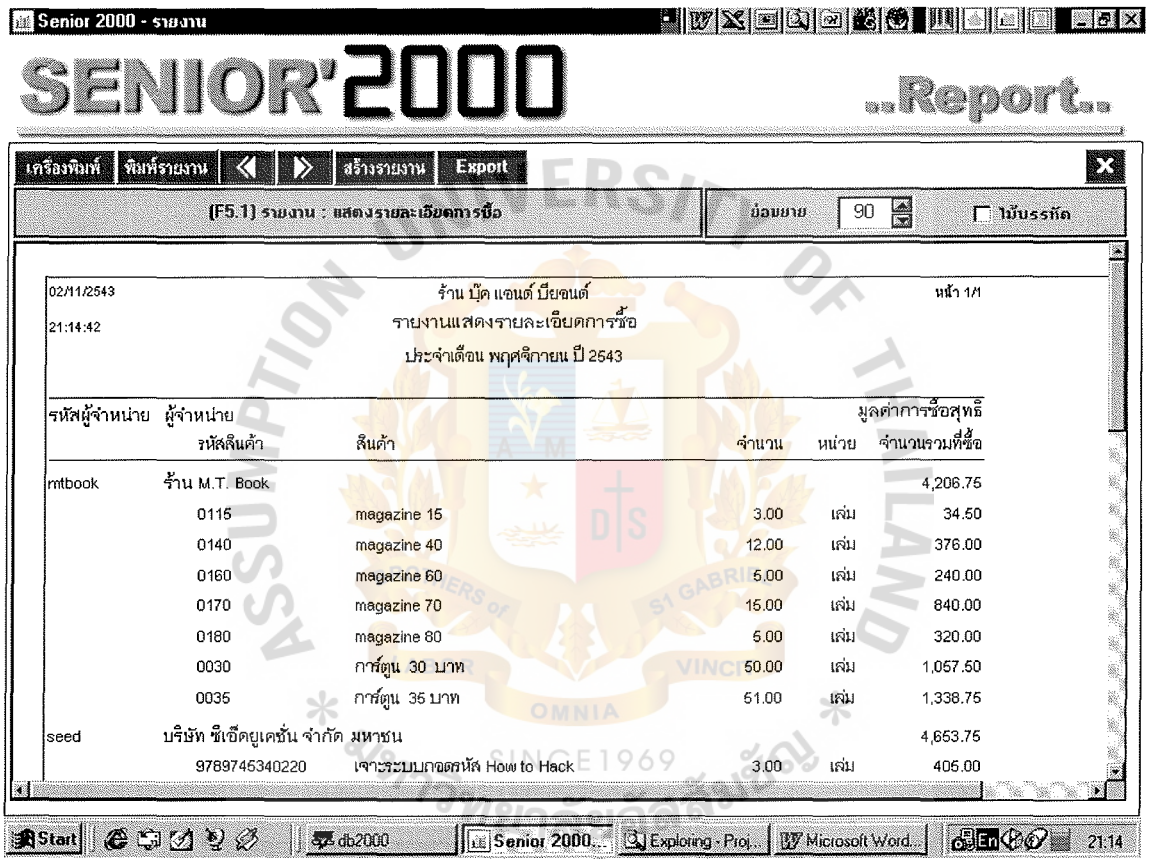

Figure F.7. Report of Purchase Order.

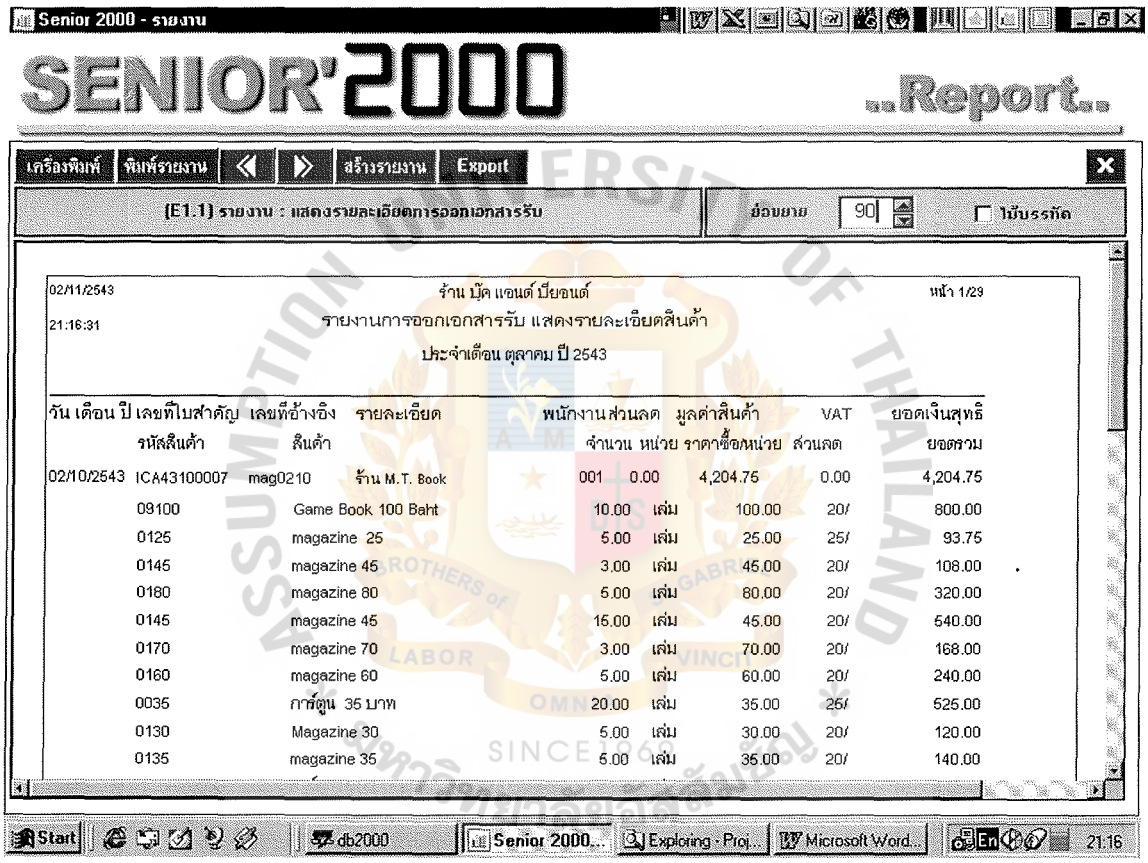

Figure F.8. Report of Product Received.

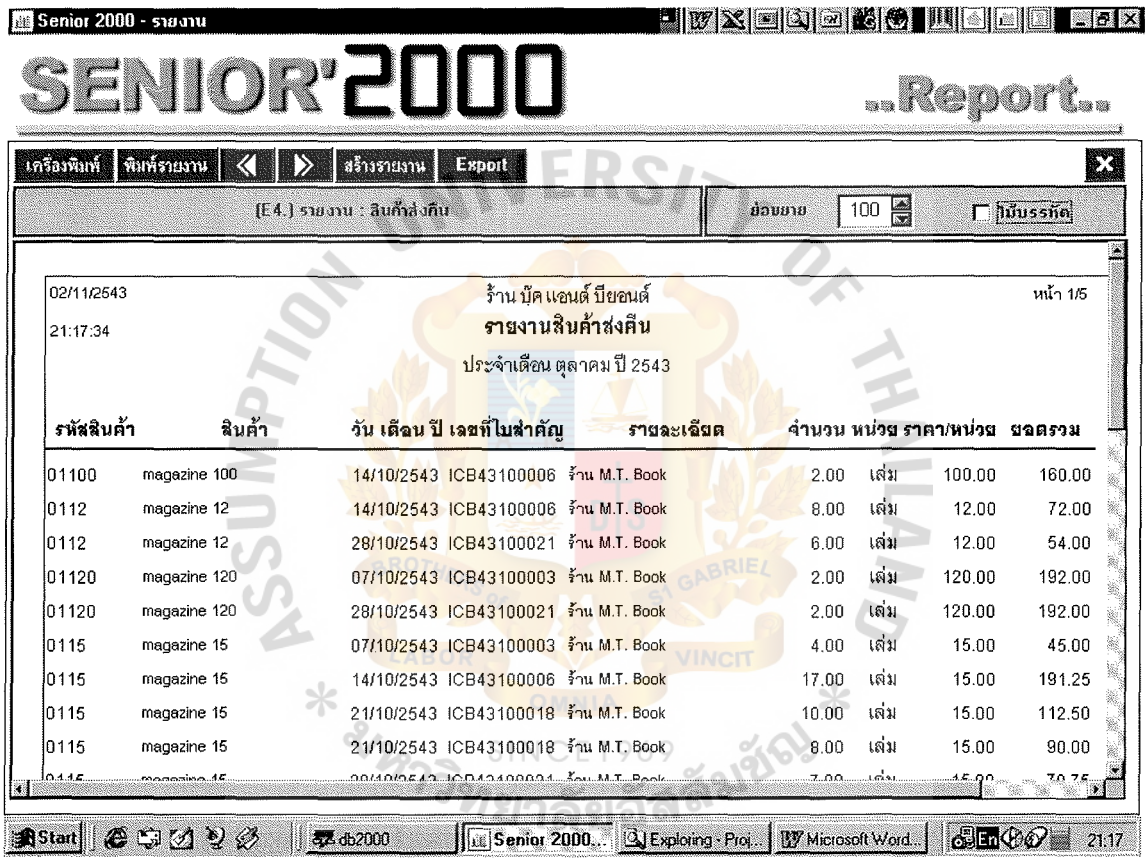

Figure F.9. Report of Product Returned.

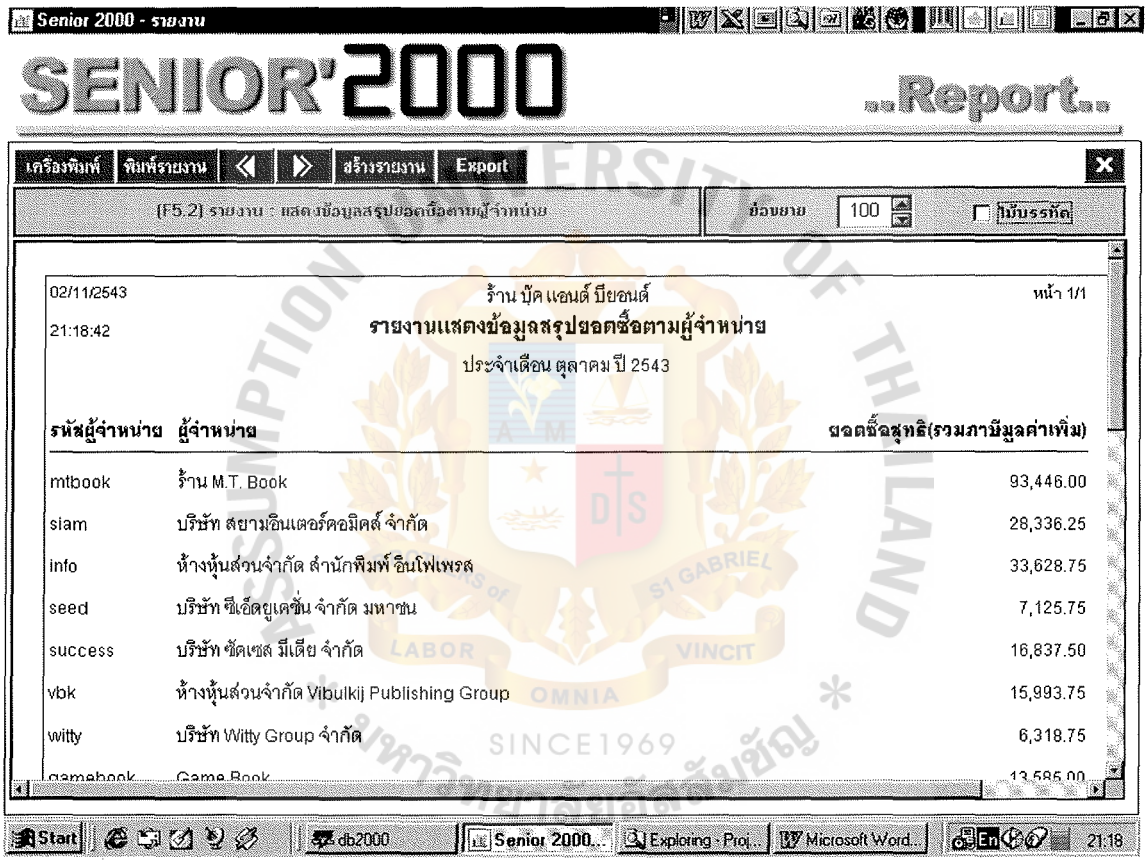

Figure F.10. Report of Purchasing Order Summary.

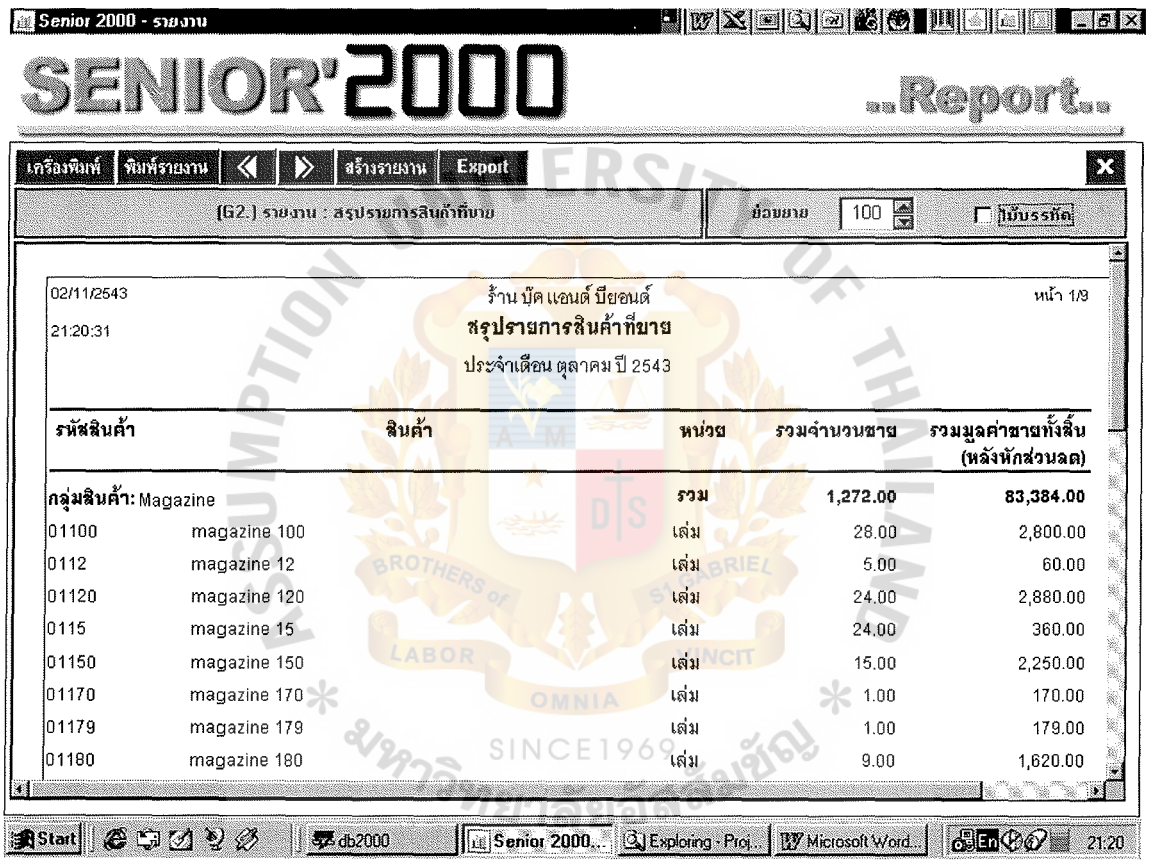

Figure F.11. Sales Report Summary.

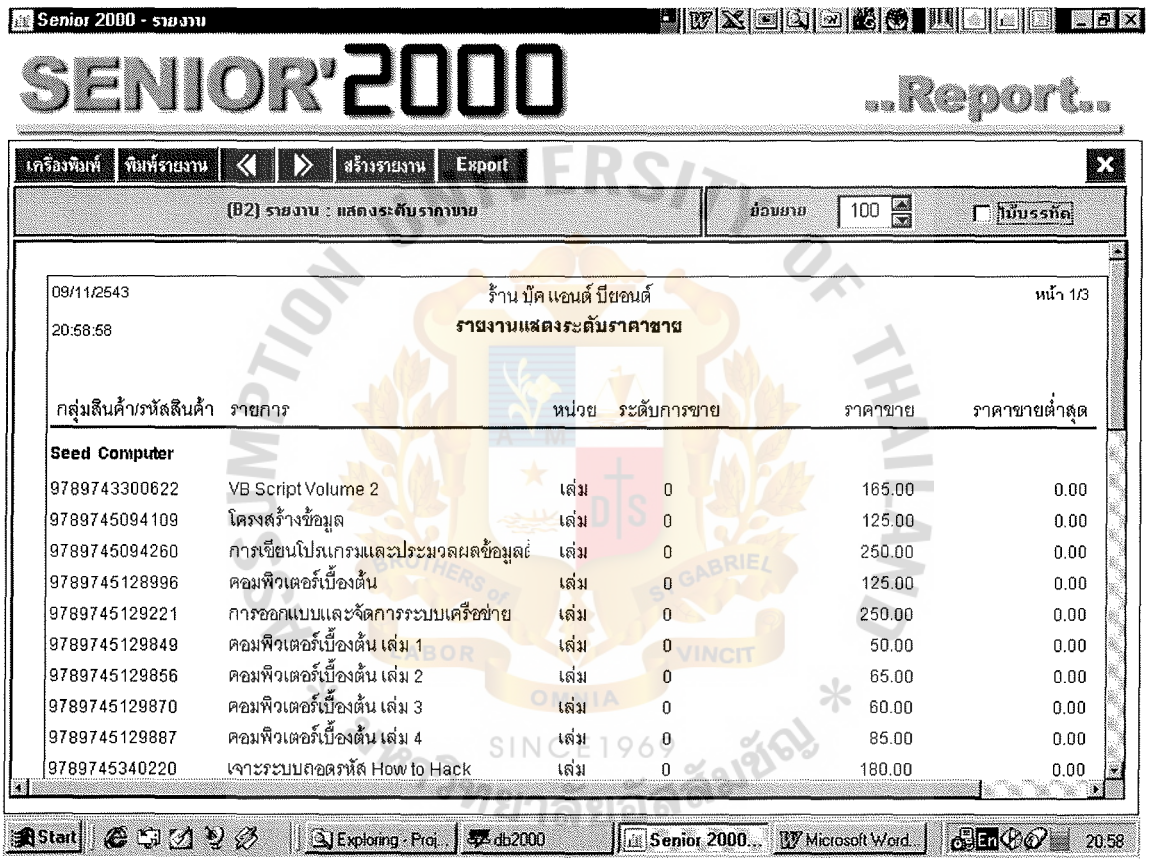

Figure F.12. Report of Selling Price.

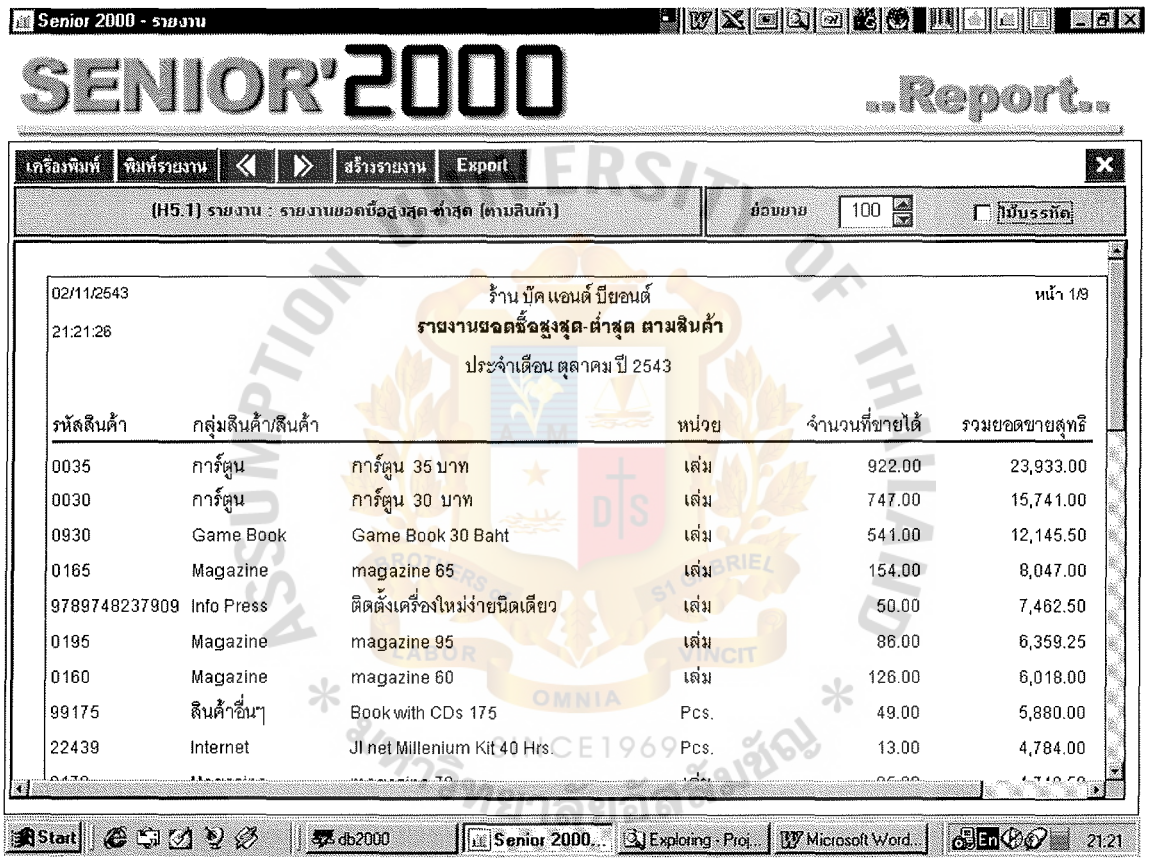

Figure F.13. Sales Report by Product.

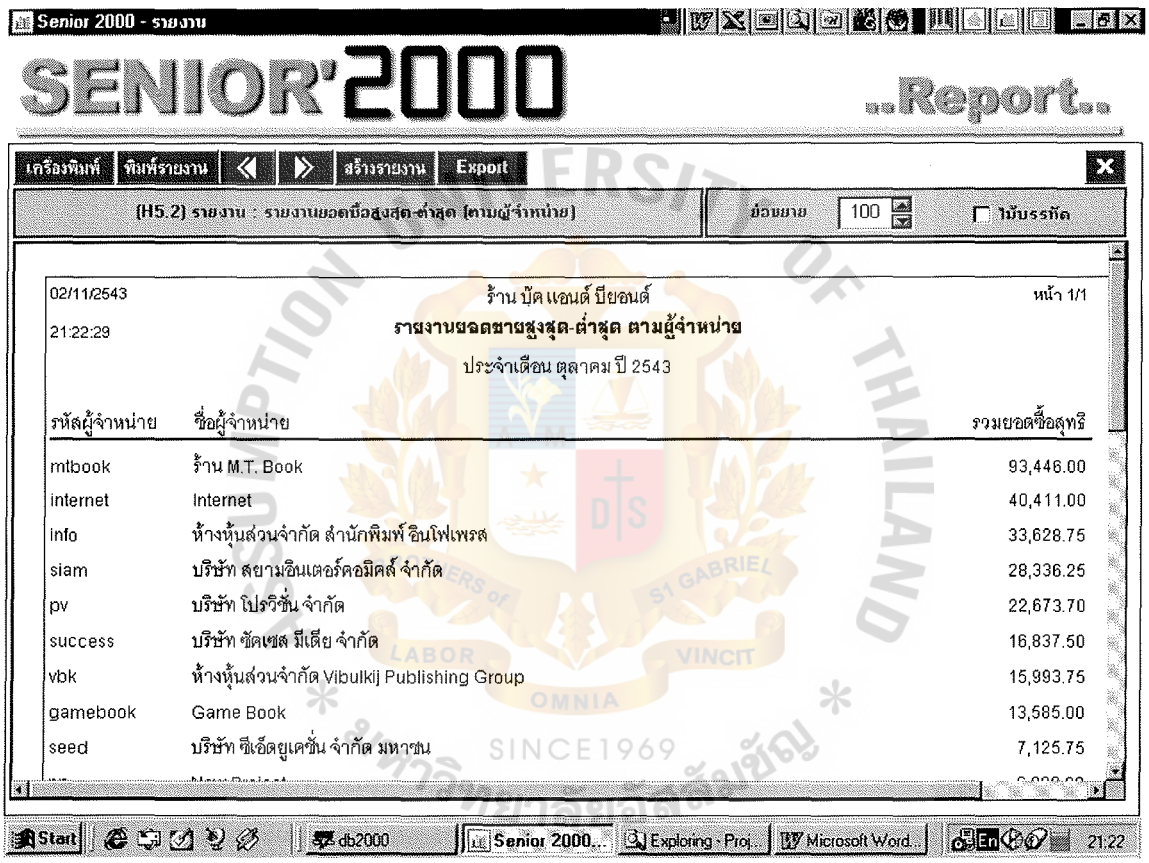

Figure F.14. Sales Report by Supplier.

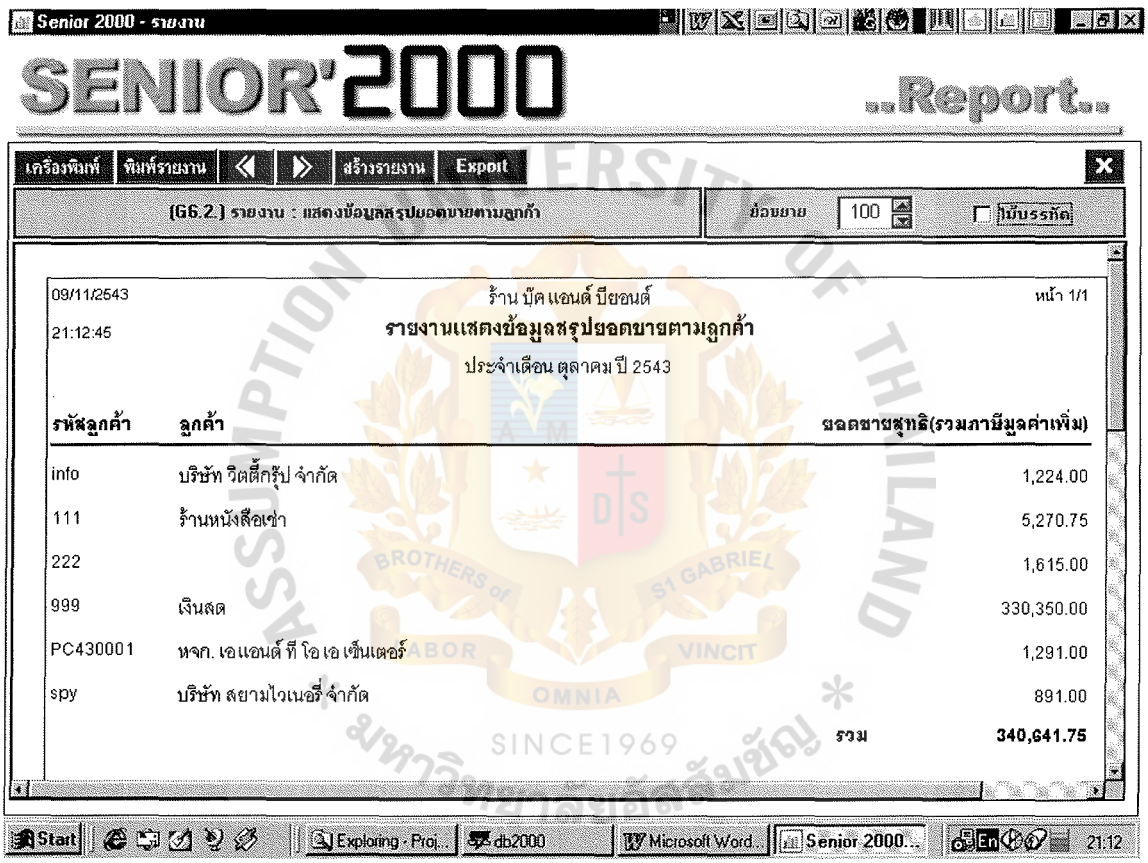

Figure F.15. Sales Report by Customers.

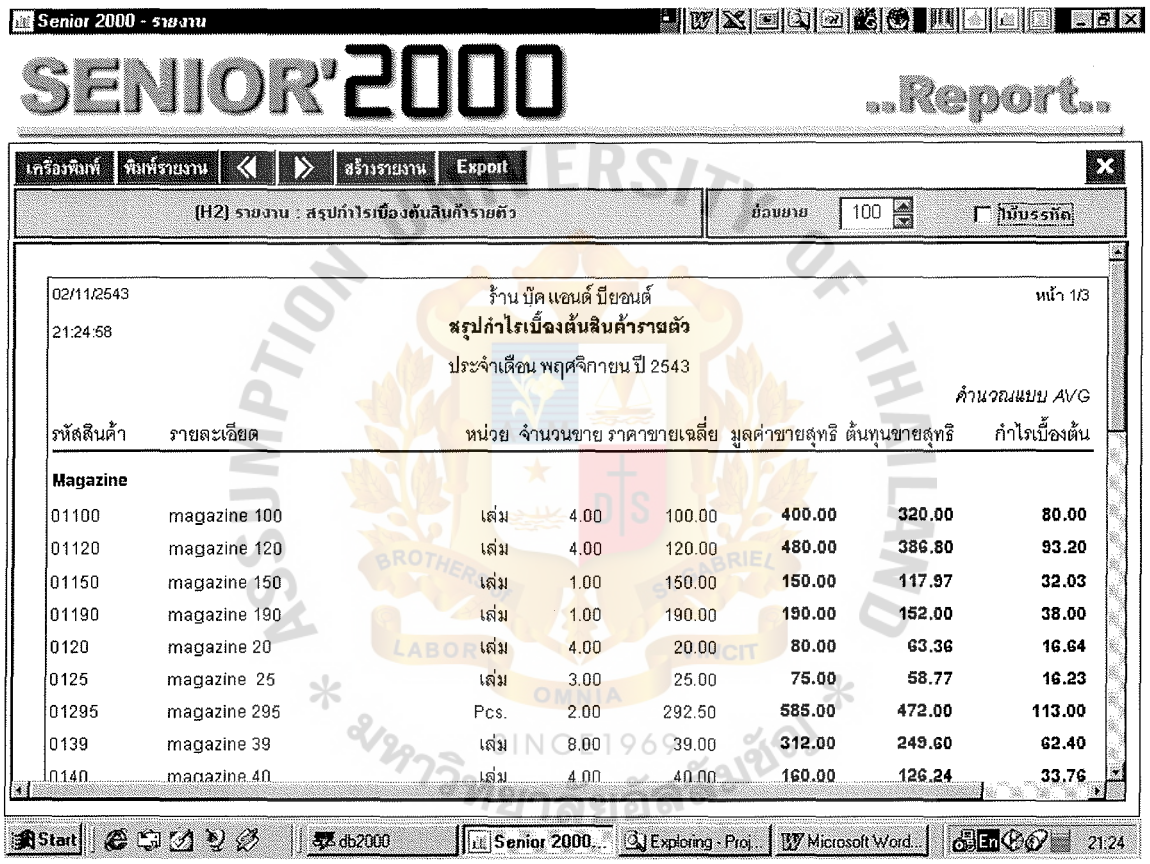

Figure F.16. Gross Profit Report.

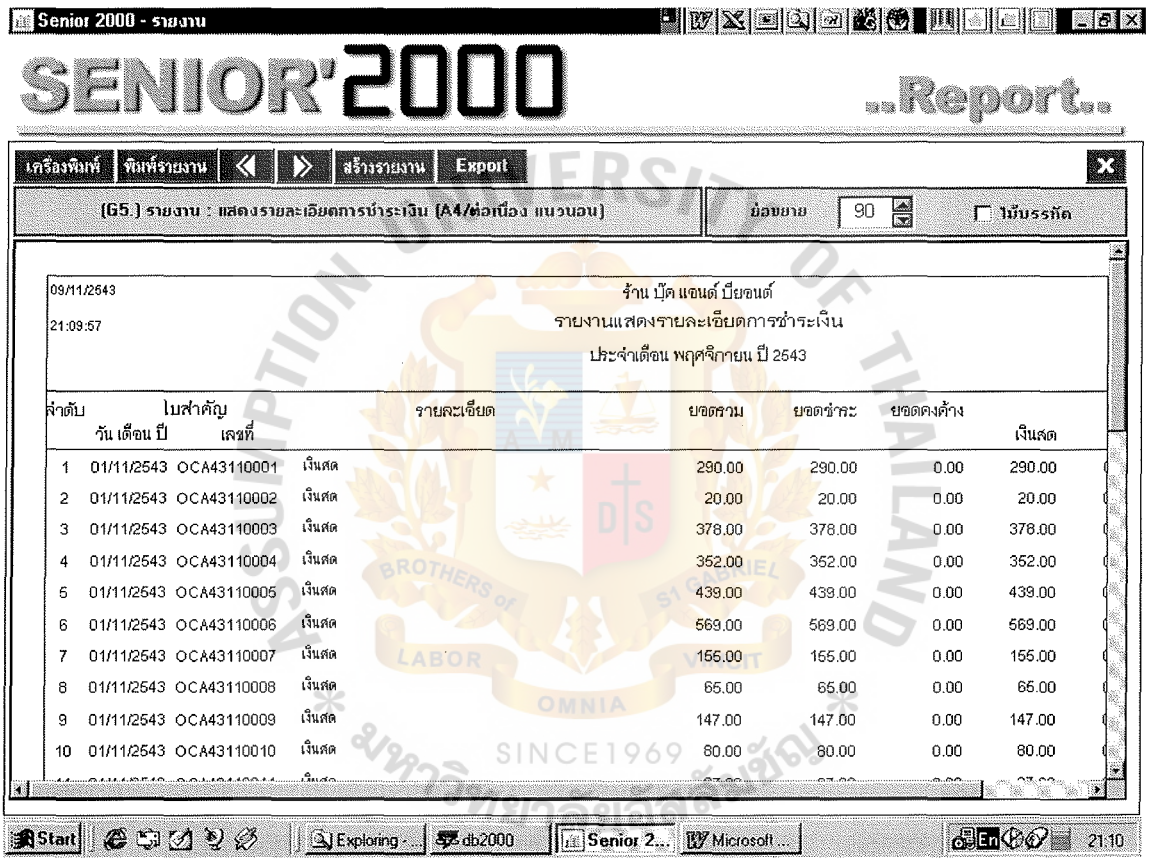

Figure F.17. Payment Report.

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