Order Processing Management and Inventory Information for Garment Company

by

Mr. Panu Jittrapinate

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
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Project Title	Order Processing Management and Inventory Information for Garment Company
Name	Mr. Panu Jittrapinate
Project Advisor	Asst.Prof.Dr. Ouen Pin-ngern
Academic Year	July 2001

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 presents an understanding of Order Processing Management and Inventory Information for Garment Company, providing an overview of the company structure, process, workflow and data. From the preliminary analysis, investigated problems from the existing system of the company are: too much paper work is created because all information is kept by the filing system; difficulty and takes time in finding information such as Fabric and Accessories information when it is required; difficulty in evaluating worker performance because of no formal reports for checking; information is always lost and not update; the process is slow and has an error. All of the problems come form the process, which is done manually. As the existing is manual system; the cost of the system will seem to be increasing every year because of the growth of the company, so the company required more staff to operate the work.

To develop the system from the existing system, which is a manual system to the computerized system is the objective of the project. As the proposed system concentrates on computerizing the system, the company needs to investigate both hardware and software, which are high cost for the first year of investigation. However, the payback period will be covered in a next few years. To be the satisfied system, I used interviewing, observation methodology as tools to gather the information.

The evaluation of the project is done by the project manager and their staff. The project manager uses a white box testing and the staffs use black box testing methodology as tool to test the system.

To make it easy for users to use the program, the screen design and output design are more concentrate in being user friendly. The software program is created by web-based programming. All data and information are kept in the database server, Microsoft

SQL Server 2000, and are able to access through the web server, Microsoft Internet Information Server 5.0 on Microsoft Windows 2000 Advance server. In addition, the new proposed system is implemented by using the remote access system concept to connect all branches to the head office. It will reduce the number of administrative staffs, solve the problem of manual system and decrease the high maintenance cost.

As this project is completed, the management of the BubbleBee Garment Co., Ltd has plan to reengineer other parts of the system in the purpose of increasing the performance of the company.

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Order Processing Management and Inventory Information System is a project development for BubbleBee Garment Co., Ltd. All the services concerning gathering and generating information, transferring all the information to other parts of the company, calculating the cost of the pattern, issuing important documents such as purchasing order, quotation etc. are done manually. The problem of the existing system has to be analyzed and needs to be solved to provide more efficient service within the organization, the management decides to improve the order processing and inventory system. Computer Information System is a tool, which certainly helps me to find some ways to improve the Order Processing Management and Inventory Information System.

1.2 Objectives of the Project

The objective of the project is to reengineer the Order Processing Management and Inventory Information System from the manual system to be a computerized system. By studying the existing system, analyzing and evaluation the current problem, and designing the implementation of the new system, the result of the new system is an on line and real time system for all staffs to be able to operate their work and give service to other parts of the company in this information age.

1.3 Scope of the Project

An Order Processing Management and Inventory Information System involves the processing and collecting of all the important information, updating file, preparing document, making cost calculation and issuing important report. The project development is by using tool – Web base programming such as ASP, CGI etc. Microsoft SQL Server 2000 as Database Server and Remote Access System (RAS) for

networking. The system also will be an on-line system that could provide up-to-date information.

The project will cover major parts of Order Processing Management and Inventory Information System of BubbleBee Garment Co., Ltd., which are as follows:

(1) To collect all the information of the system.

Keeping customers information, suppliers information, products information, staffs information, inventory information

(2) To prepare cost of pattern

Calculating cost of pattern

(3) To issue document

(a) Issuing Purchasing Order report

(b) Issuing Quotation report

(c) Issuing Receipt report

(4) Generating monthly reports and requested reports

(a) Customer information report

(b) Supplier information report

(c) Pattern information report

(d) Fabric and Accessories information report

(f) Order information report

(5) To implement networking system

Implementing networking system both LAN and WAN

1.4 Deliverables

(1) Content

(2) Data Flow Diagram

(3) Networking System Diagram

(4) Entity Relationship Diagram

(5) Web Graphic User Interface

1.5 Project Plan

The plan or the schedule of this system development project is shown in Figure 1.1.

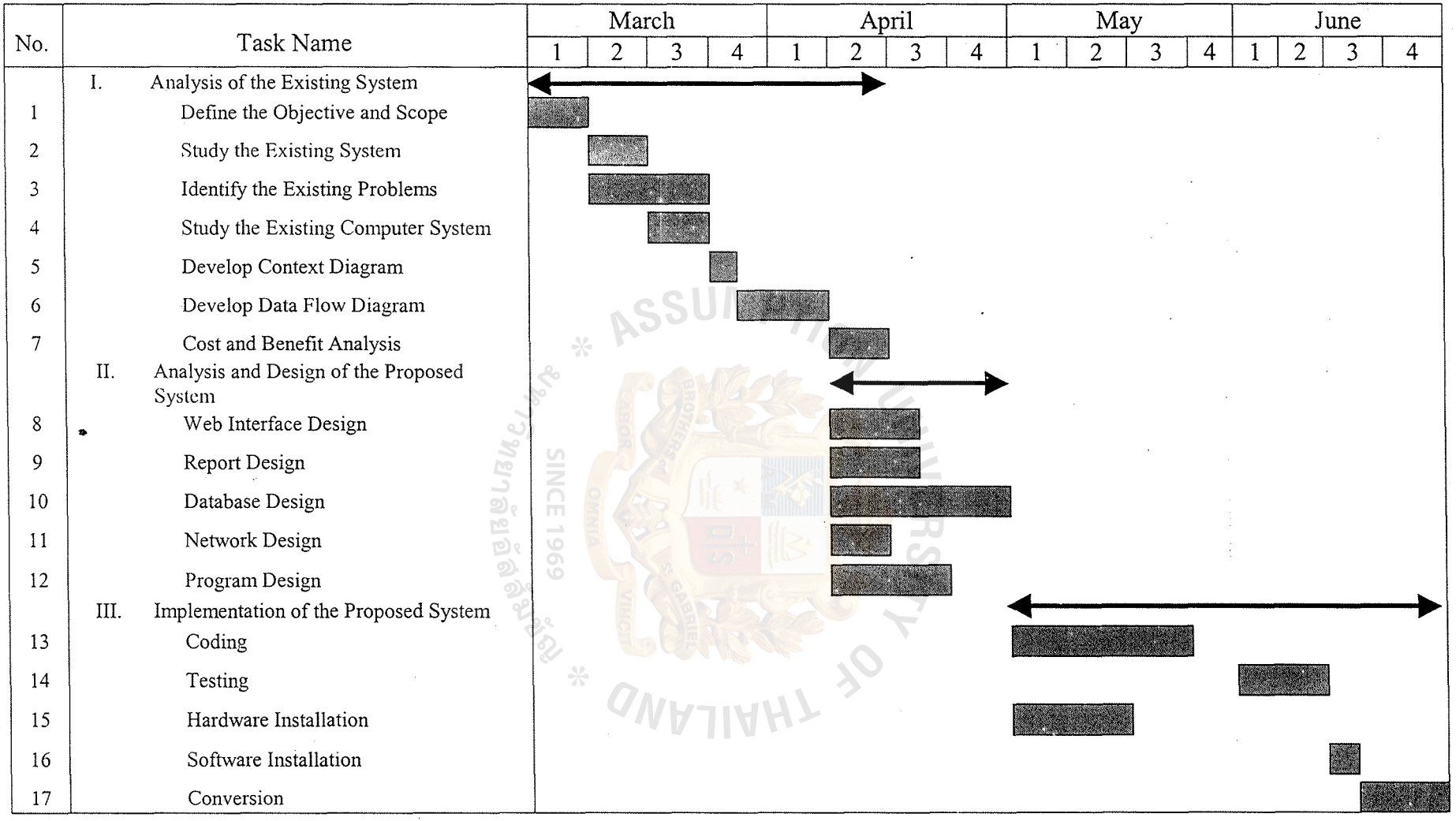

Figure 1.1. Project Plan of Order Processing Management and Inventory Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

BubbleBee Garment Co., Ltd (BBB) was established in 1996 by Ms. Wanna Anakethummakul. The company is located at 7 Krungkaseam Road, Pomprab, Bangkok 10100 and two branches at Bo Bae Market and Bo Bae Tower Market.

Recently, the company has 45 staffs, which consist of factory workers 30 persons, sale staff 10 and office staff 5 persons. The company business is producing the pajamas for sale and producing from the customer's requirements. Approximately 70% of the products are for sale in the country and 30% are exported to the foreign countries. The products of the company classified into 3 main categories are:

(1) Men's pajamas

(2) Women's pajamas

(3) Children's pajamas

The company's products under the brand name BBB are sold in several provinces of the country. By strict adherence to high quality standards, the company's products are widely recognized for their quality because of using high quality of materials and accessories. The company's quality policy is, "To provide products and service that meets customer's requirements."

All staffs are committed to systematically and continuously improve the quality of products and services. To achieve the business objective, the following are guidelines:

(1) To provide sufficient training to all staffs all time

(2) To improve the quality system through management review regularly

(3) To follow up source and develop advance technologies

The Organization chart of BubbleBee Garment Co., Ltd. is shown in Figure 2.1.

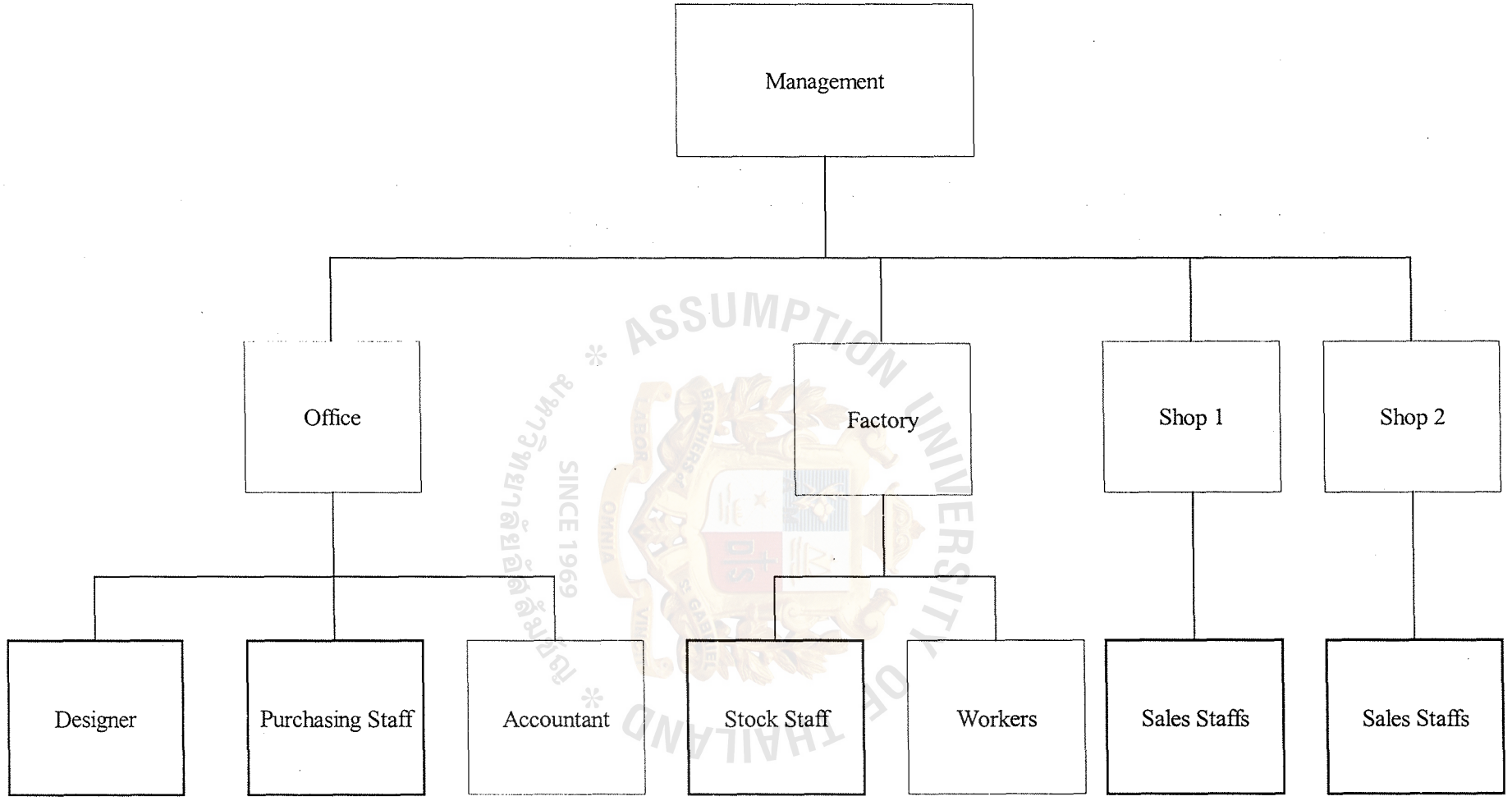

Figure 2.1. Organization Chart of BubbleBee Garment Co., Ltd.

2.1 Current Problems and Areas for Improvement

The system analysis is conducted through the systematic collection of facts and opinions relating to how current system works. The collection of data is based on primary sources of data, which are users of the system and the secondary sources of data, which are information of document and reports. The methods of gathering data are conducting personal interview and observation.

The problem of the existing system and area of improvements are:

(1) The process is slow and has error because every process is done manually.

(2) Too much paper works because all information is kept by the filing system.

(3) Difficult and slow search for information such as Fabric and Accessories information.

(4) No formal reports of sales record so cannot make sales forecast.

(5) Information is always lost.

(6) Incorrect price calculation.

(7) Non-update and inconsistency of information.

(8) Lack of Inventory Information.

(9) No database system for keeping information.

The improvement of the above problem areas will change all the processes to be computerized system. All the information will be kept in the database system. On line system will help the information to be more accurate and reliable.

2.2 Existing Computer System

The Existence of Order Processing Management and Inventory Information System for BubbleBee Garment Co., Ltd. is based on manual works. Recently, the company has only one computer used for creating general such as word and excels

documents, receiving and sending e-mail to customers. However, the existing system, which is manual system, performs the work:

(1) Receiving purchasing order from the customers by telephone, fax and e-mail.

(2) Filing all the information of fabric, accessories, supplier information and customer information. Sample of fabric and accessories are kept in the room without an index.

(3) Design the pattern, specify pattern detail and calculate cost of pattern by calculating from the cost of fabric per meter plus cost of accessories per set. Send the pattern details to the factory.

(4) Submitting quotation, fabric sample, accessories sample, and pattern sample to the customer.

(5) Receiving confirmed purchasing order and 60 percents of total cost for deposit.

(6) Purchase fabric and accessories according to the pattern details.

(7) Receiving fabric, accessories, and invoice from supplier, checking goods. If goods have no defect, send them to the factory.

(8) Checking and packaging product before delivery to customer.

(9) Accounting staff takes care of payment to suppliers and deposit money of customer.

The above functions of the exiting system are shown in the context and data flow diagrams in Appendix A.

III. THE PROPOSED SYSTEM

3.1 System Specification

During the system development, good communication with the users and fulfillment of their needs is very important. Users require the better performance and a more reliable system.

The functions of the proposed system are as follows:

(1) Select fabric and accessory sample system

The designer will request fabric and accessory sample from supplier. After designer receives the fabric and accessory sample, she will record all related information in the Fabric and accessory file database. For example, define the FbacNo to it and set location to keep the sample separated by suppliers.

However, if during requesting fabric and accessory sample, the designer found that it is a new supplier, the designer will request for the information such as supplier's name, address, and all necessary information. After receiving all the information, she will record in the Supplier file and the system automatically assigns supplier number.

(2) Design and evaluate pattern system

For new pattern the designer designs and implements the pattern, giving pattern detail, and save the satisfied design pattern as .pdf file (Acrobat File). The system will create a new pattern code and automatically calculate the cost of the pattern by retrieving the cost of the fabric per meter and the cost of accessories per set according to the details. Designer will record all related information about the pattern to the Pattern file database

such as Pattern Number, Pattern's name, Description, and other pattern details. Then, she will send the fabric and accessory sample, Pattern number to the purchasing staff for purchasing and to the factory for preparing the production.

(3) Purchasing system

When purchasing staff receives fabric and accessory sample, PatternNo from the designer, she is able to retrieve all related information about the pattern, fabric and accessory and supplier form related database. In the process of preparing the purchasing order, the computer system automatically assigns the new purchasing order number. Issuing and submitting purchasing orders to suppliers and distribute purchasing order number to factory and accountant staff.

(4) Checking fabric and accessory system

When the workers receive purchased fabric and accessory from the supplier, they will check the invoice with the purchasing order information by using purchasing order number, which is received from the purchasing staff. Workers send the supplier's invoice to account staff for preparing payment.

(5) Production system

The workers uses the Pattern number from the designer to retrieve all information of the pattern file database such as what involved fabric and accessory is. After finishing the production process, the stock staff distributes the finished pattern to Shop1 and Shop2 and records the finished quantity to the Pattern file database separated into stock, shop1 and shop2.

(6) Take Order system

Sales staffs receive order from customer. They will check customer's information, if it is a new customer; the staff needs to add the new customer information into the system. The system will automatically generate Customer number for the customer and key in customer's information to the Customer file database. Sales staffs determine the customer's purchasing order related to Pattern Number.

Sales staffs record the order information to the Order file database and order details information to the Order details file database. The system automatically creates delivery note by using all related information about the order from all related database. After, they send the delivery note to accountant staff form create invoice and send finished pattern and delivery note to the customer.

3.2 System Design

The importance of system design is good user interface design. After having a good system design, coding and testing is important as program design. Data flow diagram provides a description of the data flow. The data flow diagram of the proposed system are provided in Appendix B.

A data dictionary is a document that supports the proposed data flow diagrams. It contains all terms and their definition for all data flow, data store and all related systems. Data dictionary is provided in Appendix E.

The important thing that is used to interface between user and computer are screen design. The screen design are login screen, main menu screen, customer information screen, suppliers information screen, fabric and accessories information screen, pattern information screen, purchasing order screen, and so on.

The output reports are the reports in the forms printed out documents. Such reports are generated from the reports screens and user interface screen.

The input and output design are in Appendix C.

Data file and Database design are the most important in the system design. The database design is a relational database design and entity relationship diagram and the relation schema can be seen in Appendix F.

Process specifications and structure charts are tools, which helps in programming design. The structure charts and process specification are shown in Appendix D.

3.3 Feasibility and Cost-Benefit Analysis

During the system selection and procurement phases of system design, there are three candidates that sent the proposal to the company. To analyze the alternative solutions, the system analyst uses Candidate Systems Matrix, which is a useful tool for documenting the similarities and differences between candidate systems being considered. The Candidate Systems Matrix is shown in Table 3.1. The system analyst also uses Feasibility Analysis Matrix, which is used to evaluate and rank candidate systems. The Feasibility Analysis Matrix is shown in Table 3.2. Moreover, the system analyst uses three ways to measure cost effectiveness:

(a) Payback analysis to define how long it will take for system to pay for itself.

(b) Return-on-investment and net present value analyses to determine the profitability of a system

(c) Net present value analysis to compare alternatives with different lifetimes

Table 3.1. Candidate System Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
Portion of System Computerized Brief description of the portion of the system that would be computerized in this candidate	VMS software package from MIC solutions would be purchased and customized to satisfy order processing required functionality	Order processing management and inventory system in relation to process fulfillment	Same as Candidate 2.
Benefits Brief description of the business benefits that would be realized for this candidate	This solution can be implemented quickly because it's a purchased solution	Fully supports user required business processes, more efficient interaction of user and support system scalability.	Same as Candidate 2.
Server and Workstations A description of the servers and workstations needed to support this candidate.	Pentium III 766 MHz, Microsoft Windows NT servers, Microsoft windows NT Workstation (clients)	Pentium III 833 MHz, Microsoft Windows 2000 Advance of Server, Microsoft Windows 2000 Professional.	Same as Candidate 1.
Software Tools Needed. Software tools needed to design and build the candidate (e.g., database management system, emulators, operating systems, languages, etc.). Not generally applicable if applications software packages are to be purchased.	Microsoft Visual Basic 6, Microsoft Access for customization of package to provide report writing and integration.	Web based programming by CGI script such as ASP, Perl, PHP and JSP, Internet Explorer, IIS (Internet Information Server)	Microsoft Visual Basic 6, Microsoft SQL 2000 for customization of package to provide report writing and integration.
Application Software A description of the software to be purchased, built, accessed, or some combination of these techniques.	Package Solution	Custom Solution	Same as Candidate 2
Method of Data Processing Generally some combination of: on line, batch, deferred batch, remote batch, and real-time.	Stand Alone	Client/ Server	Same as Candidate 2
Output Devices and Implication. A description of output devices that would be used, special output	1. HP 4000 TN department laser printers 2. Epson LQ 2071 dot matrix printer	Same as Candidate 1	Same as Candidate 1

Table 3.1. Candidate System Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
requirements (e.g., network, preprinted forms, etc.), and output considerations (e.g., timing constraints)			
Input Devices and Implications A description of input methods to be used, input devices (e.g., keyboard, mouse, etc.), special input requirements (e.g., new or revised forms from which data would be input), and input considerations (e.g., timing of actual inputs).	1. Office Jet G55 Scanner and Printer 2. Keyboard and mouse	1. Acer 320 P Scanner 2. Keyboard and Mouse	Same as Candidate 1
Storage Devices and Implications Brief description of what data would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized.	-	1. Compaq 12/24 GB DAT drive 2. MS SQL 2000 Server DBMS.	Same as Candidate 2
Network Devices and Implications Brief description of what network devices should be implemented for support intercommunication of the company.	-	1. WebRamp 310i 2. SMC Hub 16 ports	1. Cisco Router 1720 2. Cisco Switch 2924 XL

Table 3.2. Feasibility System Matrix.

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
Operational Feasibility Functionality. A description of to what degree the candidate would benefit the organization and how well the system would work. Political. A description of how well received this solution would be from both user management, user, and organization perspective.	30%	Only supports partial requirements system and current business processes would have to be modified to take advantage of software functionality Score: 60	Fully supports user required functionality Score: 100	Same as candidate 2 Score: 100
Technical Feasibility Technology. An assessment of the maturity, availability (or ability to acquire), and desirability of the computer technology needed to support this candidate. Expertise. An assessment of the technical expertise needed to develop, operate, and maintain the candidate system.	30%	Current production of VMS package is version 1 and does not well known in the market. Maturity of product is risk and technical support service charge is quite expensive. Score: 50	After consulting with the programmer who wrote the web based programming has indicated that it is easier for scalability of the program and web based programming trend to be more popular than Visual basic programming. Score: 95	Visual basic programming is although able to convert to web based but it is not comfortable and requires the specific knowledge. Score: 75
Economic Feasibility Cost to develop: Payback period (discounted): Net Present value:	30%	Approximately 420,000 Baht Approximately 4.39 Years Approximately 492,100 Baht Score: 60	Approximately 656,000 Baht Approximately 2.81 Years Approximately 670,436 Baht Score: 95	Approximately 526,000 Baht Approximately 3.69 Years Approximately 580,075 Baht Score: 80
Schedule Feasibility An assessment of how long the solution will take to design and implement.	10%	Less than 2 months Score: 90	2-3 months Score: 85	4-6 months Score: 75
Ranking		60	95.5	84

Payback Period Analysis for Candidate 1

Table 3.3. Payback Period Analysis for Candidate 1, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development cost:	-420,000					
Operation & maintenance cost:		-20,000	-20,000	-20,000	-20,000	-20,000
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs over lifetime (adjusted to present value):	-420,000	-17,860	-15,940	-14,240	-12,720	-11,340
Cumulative time-adjusted costs over lifetime	-420,000	-437,860	-453,800	-468,040	-480,760	-492,100
Benefit derived from operation of new system:	0	120,000	140,000	160,000	170,000	200,000
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted benefits (adjusted to present value):	0	107,160	111,580	113,920	108,120	113,400
Cumulative time-adjusted benefits over lifetime:	0	107,160	218,740	332,660	440,780	554,180
Cumulative time-adjusted costs + benefits:	-420,000	-330,700	-235,060	-135,380	-39,980	62,080

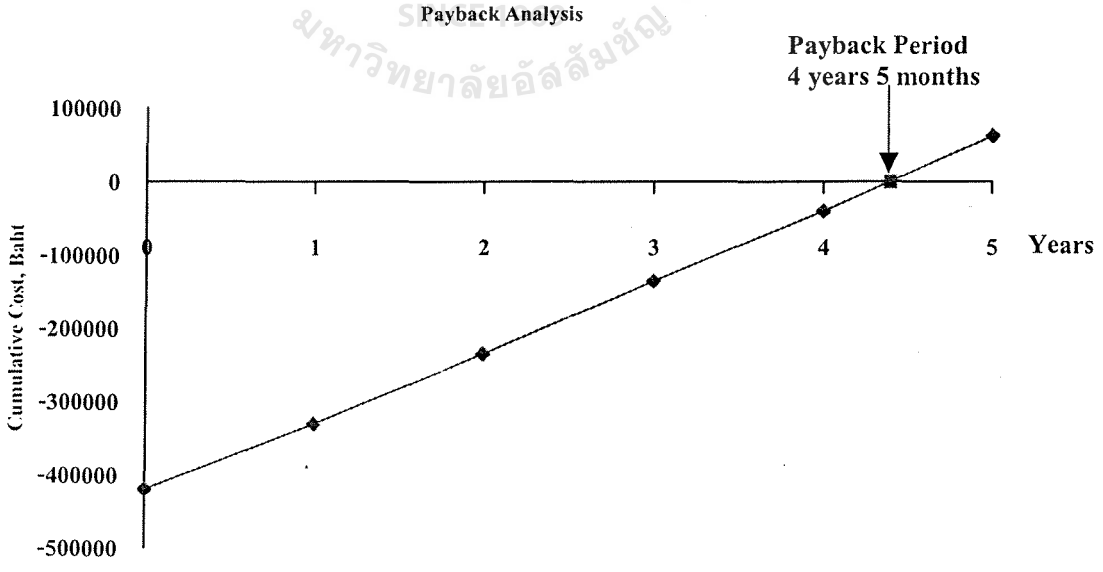

Figure 3.1. Payback Period Analysis for Candidate 1.

Payback Period:

= Last Year of Last of Negative cash flow difference + Cumulative difference last negative year / Absolute value of cumulative difference

$$= 4 + \frac{(39{,}980)}{(39{,}980+62{,}080)}$$

= 4.39 Years

= 4 years 5 months

Table 3.4. Net Present Value Analysis for Candidate 1, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Development cost:	-420,000						
Operation & maintenance cost:		-20,000	-20,000	-20,000	-20,000	-20,000	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual costs:	-420,000	-17,860	-15,940	-14,240	-12,720	-11,340	
							-492,100
Benefit derived from operation of new system:	0	120,000	140,000	160,000	170,000	200,000	
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual costs:	0	107,160	111,580	113,920	108,120	113,400	
Total Present value of lifetime benefits							554,180
NET PRESENT VALUE OF THIS ALTERNATIVE							62,080

Return-on-Investment Analysis

ROI = (Estimated lifetime benefits – Estimated lifetime costs) / Estimated lifetime costs

The estimated lifetime benefits minus estimated lifetime costs equal

554,180 – 492,100 = 62,080

Therefore, the ROI is:

ROI = 62,080/492,100 = 0.126 x 100 =12.6%

An average ROI = 2.52 percent per years.

Payback Period Analysis for Candidate 2

Table 3.5. Payback Period Analysis for Candidate 2, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development cost:	-656,000					
Operation & maintenance cost:					-12,000	-12,000
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs over lifetime (adjusted to present value):	-656,000	0	0	0	-7,632	-6,804
Cumulative time-adjusted costs over lifetime	-656,000	-656,000	-656,000	-656,000	-663,632	-670,436
Benefit derived from operation of new system:	0	260,000	300,000	320,000	350,000	380,000
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted benefits (adjusted to present value):	0	232,180	239,100	227,840	222,600	215,460
Cumulative time-adjusted benefits over lifetime:	0	232,180	471,280	699,120	921,720	1,137,180
Cumulative time-adjusted costs + benefits:	-656,000	-423,820	-184,720	43,120	258,088	466,744

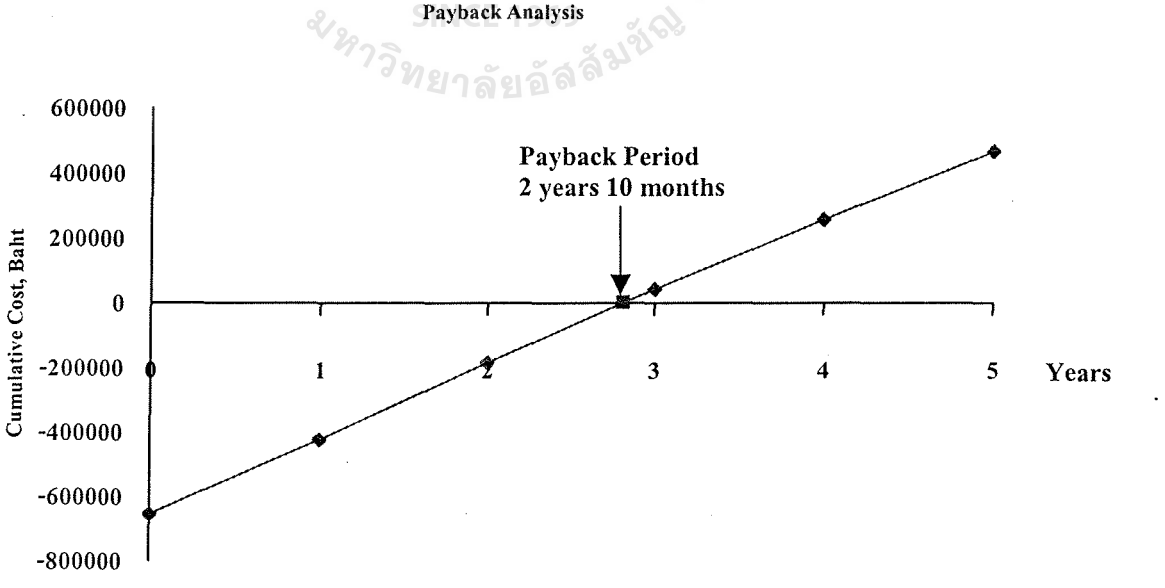

Figure 3.2. Payback Period Analysis for Candidate 2.

Payback Period:

= Last Year of Last of Negative cash flow difference + Cumulative difference last negative year / Absolute value of cumulative difference

$$= 2 + \frac{(184{,}720)}{(184{,}720+43{,}120)}$$

= 2.81 Years

= 2 years 10 months

Table 3.6. Net Present Value Analysis for Candidate 2, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Development cost:	-656,000						
Operation & maintenance cost:					-12,000	-12,000	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual costs:	-656,000	0	0	0	-7,632	-6,804	
							-670,436
Benefit derived from operation of new system:	0	260,000	300,000	320,000	350,000	380,000	
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual costs:	0	232,180	239,100	227,840	222,600	215,460	
Total Present value of lifetime benefits							1,137,180
NET PRESENT VALUE OF THIS ALTERNATIVE							466,744

Return-on-Investment Analysis

ROI = (Estimated lifetime benefits – Estimated lifetime costs) / Estimated lifetime costs

The estimated lifetime benefits minus estimated lifetime costs equal

1,137,180– 670,436 = 466,744

Therefore, the ROI is

ROI = 466,744/670,436 = 0.696 x 100 = 69.6%

An average ROI = 14 percent per years.

Payback Period Analysis for Candidate 3

Table 3.7. Payback Period Analysis for Candidate 3, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development cost:	-526,000					
Operation & maintenance cost:		-15,000	-15,000	-15,000	-15,000	-15,000
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs over lifetime (adjusted to present value):	-526,000	-13,395	-11,955	-10,680	-9,540	-8,505
Cumulative time-adjusted costs over lifetime	-526,000	-539,395	-551,350	-562,030	-571,570	-580,075
Benefit derived from operation of new system:	0	160,000	200,000	220,000	250,000	280,000
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted benefits (adjusted to present value):	0	142,880	159,400	156,640	159,000	158,760
Cumulative time-adjusted benefits over lifetime:	0	142,880	302,280	458,920	617,920	776,680
Cumulative time-adjusted costs + benefits:	-526,000	-396,515	-249,070	-103,110	46,350	196,605

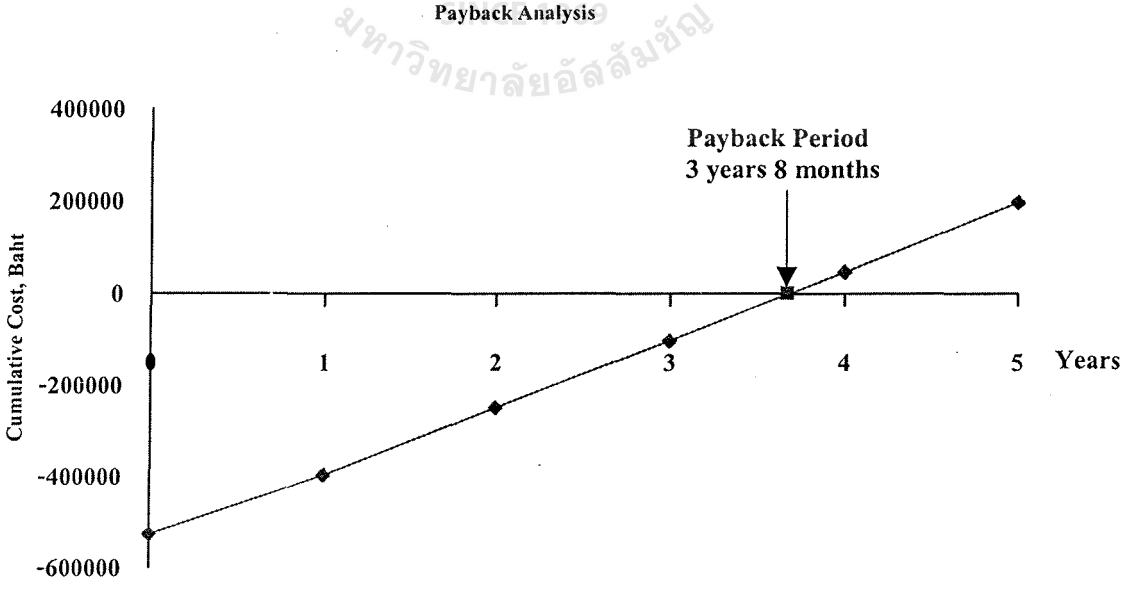

Figure 3.3. Payback Period Analysis for Candidate 3.

Payback Period:

= Last Year of Last of Negative cash flow difference + Cumulative difference last negative year / Absolute value of cumulative difference

$$= 3 + \frac{(103,110)}{(103,110+46,350)}$$

= 3.69 Years

= 3 years 8 months

Table 3.8. Net Present Value Analysis for Candidate 3, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Development cost:	-526,000						
Operation & maintenance cost:		-15,000	-15,000	-15,000	-15,000	-15,000	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual costs:	-526,000	-13,395	-11,955	-10,680	- 9,540	-8,505	
							-580,075
Benefit derived from operation of new system:	0	160,000	200,000	220,000	250,000	280,000	
Discount factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual costs:	0	142,880	159,400	156,640	159,000	158,760	
Total Present value of lifetime benefits							776,680
NET PRESENT VALUE OF THIS ALTERNATIVE							196,605

Return-on-Investment Analysis

ROI = (Estimated lifetime benefits – Estimated lifetime costs) / Estimated lifetime costs

The estimated lifetime benefits minus estimated lifetime costs equal

776,680 – 580,075 = 196,605

Therefore, the ROI is

ROI = 196,605/580,075 = 0.338 x 100 = 33.8%

An average ROI = 6.76 percent per years

3.4 Hardware and Software Requirements

After analyzing the candidate solution, the system analysis found that the solution of candidate 2 met the company requirements. Therefore, the system development of Order Processing Management and Inventory System Information for BubbleBee Garment Co., Ltd. is based on Client/Server model and web based programming. There will be 2 Server, 4 clients located at Main Office, 1 client located at factory, 2 clients located at shops and 1 client for management. The database logic function will perform at the server and application processing will be done on both client and server. The network configuration of organization is shown in Figure 3.4.

3.4.1 Hardware Configuration

Table 3.9. The Hardware Specification for the Server.

Description	Qty
Compaq Proliant ML350T - Intel Pentium III 833 MHz, 512K, Dual CPUs, L2 cache - 133 MHz Bus design - 4 MB VDO Memory - Compaq NC3163 Fast Ethernet NIC PCO 10/100 - Total Slot: 2x64 bit PCI, 4x32 bit PCI, 1 ISA - Integrated Dual Channel Wide Ultra 2 SCSI Adapter - 1.44 MB FDD, 52 IDX CD-ROM - 30 GB Wide Ultra2 HDD - 350W Power Supply - Compaq 17 " Monitor - Mouse and Keyboard	2 Sets

Table 3.10. The Hardware Specification for the Clients.

Description	Qty
Powell Adonis C7700 - CPU Intel Celeron 370-pin based system running at 700 MHz - SDRAM Memory 128 K up to 512 K - 10 GB Ultra DMA/66 HDD - 1.44 MB FDD, 52 IDX CD-ROM - NIC LAN card 10/100 - SVGV Monitor 15 " Powell - PS/2 Mouse Port and PS/2 Keyboard and 2 USB Ports - Mouse and Keyboard - Speaker 120 W	8 Sets

Table 3.11. The Hardware Specification for the Printer.

Description	Qty
1. HP 4000 TN printer - For Printing reports 2. Epson LQ 2071 dot matrix printer - For Printing pattern, quotation and purchasing order	1 Unit 1 Unit

Table 3.12. The Hardware Specification for the Networking Devices.

Description	Qty
1. SMC Hub 16 Ports Non Manageable 2. WebRamp 310i - Integrated analog router and 4 port Ethernet Hub - Remote dial-in - VPN and access control - 1 internet 56 K Modems - 2 external modem conection 3. Aztech External Modem 56.6 V.90	1 Unit 1 Unit 2 Units

Table 3.13. The Hardware Specification for Other Accessories.

Description	Qty
1.UPS (Uninterrupted Power Supply) for power shortage 2.Acer Presia Scanner 3.Compaq 12/24 GB DAT drive	1 Unit 1 Unit 1 Unit

3.4.2 Software Configuration

Table 3.14. The Software Specification.

Software Type	Name
- Operating System	Windows 2000 Advance Server with service pack 1 (for server) Windows 2000 Professional with service pack 1 (for clients)
- Utilities Program	Web-base programming by CGI script (ASP, PER, PHP and est.) Crystal Report MS SQL 2000 Microsoft Exchange 2000

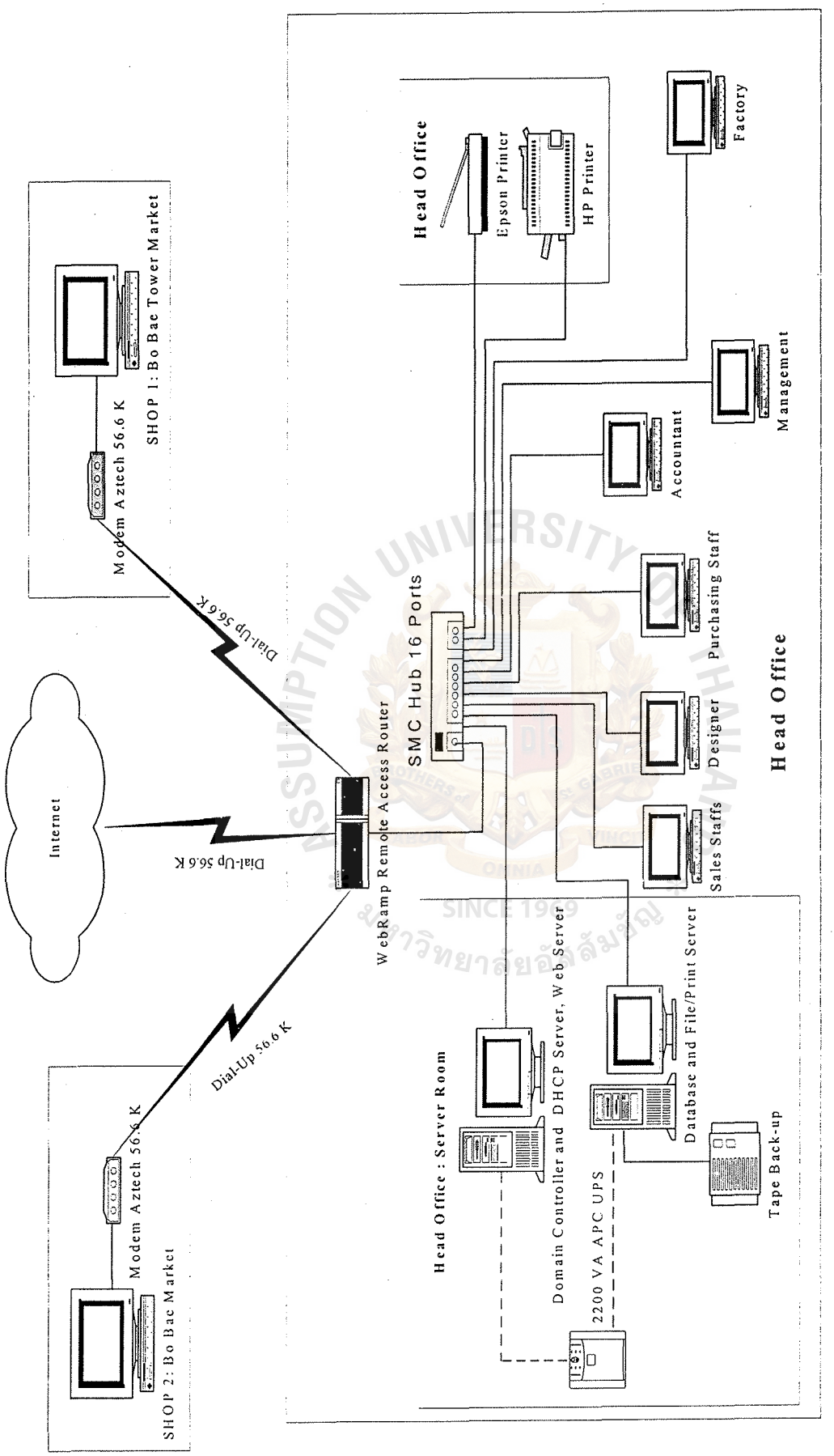

Figure 3.4. Networking Configuration.

3.5 System Cost Evaluation and Comparison

A comparison between the cost of the existing system and the proposed system is needed to decide whether the project is feasible and reasonable to continue to develop the proposed system.

All businesses are the same in one respect: they exist to make a profit. In the final analysis, the only reason for a business to buy a computer is to increase profits and perform work. In considering the cost analysis, we need to consider both the tangible and the intangible costs.

Tangible costs are the cost of hardware, software, employee salaries, and system development cost of the proposed system. The estimated cost of the manual system in 5 years is shown in Table 3.16, the estimated cost of the proposed system in 5 years is shown in Table 3.18 and the Comparison of both systems is shown in Table 3.19.

The staff cost of the proposed system will be increased lower than that of the existing system. By using the existing system (manual system), the organization needs to hire more staff each year in the purpose of increasing performance. But in the proposed system, those costs will be reduced. To analyze the cost/benefit, we need to calculate both those of the existing system and of the proposed system. Only tangible cost/benefits are analyzed here because intangible benefit such as increase speed of work, improve management decision making, more reliable data, etc. are in the proposed system that will definitely increase the organization's morale of the staffs.

Table 3.15. Manual System Cost Analysis, Baht.

Cost Items		Years				
		1	2	3	4	5
Fixed Cost						
Typewriter		13,000	-	-	-	-
Calculators		15,600	-	-	-	-
Total Fixed Cost		28,600	-	-	-	-
Operating Cost						
Salary Cost:						
Sale Staff		120,000	132,000	151,800	182,160	227,700
Stock office		18,000	19,800	22,770	27,324	34,155
Accountant		24,000	26,400	30,360	36,432	45,540
Designer		12,000	13,200	15,180	18,216	22,770
Purchasing Staff		24,000	26,400	30,360	36,432	45,540
Worker		240,000	264,000	303,600	364,320	455,400
Total monthly salary Cost		438,000	481,800	554,070	664,884	831,105
Total Annual Salary Cost		5,256,000	5,781,600	6,648,840	7,978,608	9,973,260
Office Supplies & Miscellaneous Cost:						
Stationary	Per Annual	5,000	6,500	8,775	12,285	17,813
Paper	Per Annual	16,000	20,800	28,080	39,312	57,002
Utility	Per Annual	16,000	20,800	28,080	39,312	57,002
Miscellaneous	Per Annual	6,000	7,800	10,530	14,742	21,376
Total Annual Operating Cost		43,000	55,900	75,465	105,651	153,194
Total Manual System Cost		5,327,600	5,837,500	6,724,305	8,084,259	10,126,454

Table 3.16. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	5,327,600	5,327,600
2	5,837,500	11,165,100
3	6,724,305	17,889,405
4	8,084,259	25,973,664
5	10,126,454	36,100,118
Total	36,100,118	-

Table 3.17. Computerized System Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Computer Server Cost (96,850x2)	38,740	38,740	38,740	38,740	38,740
Workstation Cost (28,500x8)	45,600	45,600	45,600	45,600	45,600
Network Devices Cost	13,050	13,050	13,050	13,050	13,050
Printers Cost	11,110	11,110	11,110	11,110	11,110
UPS Cost	1,000	1,000	1,000	1,000	1,000
Scanner Cost	1,700	1,700	1,700	1,700	1,700
Total Hardware Cost	111,200	111,200	111,200	111,200	111,200
Maintenance Cost	-	-	-	12,000	12,000
Software Cost	50,000	-	-	-	-
Implementation Cost:					
Training Cost	25,000	-	-	-	-
Set up free Cost	25,000	-	-	-	-
Total Implementation Cost	50,000	-	-	-	-
Total Fixed Cost	211,200	111,200	111,200	123,200	123,200
Operating Cost					
Sale Staff	130,000	131,300	132,613	133,939	135,279
Stock officer	11,000	11,110	11,221	11,333	11,447
Accountant	13,000	13,130	13,261	13,394	13,528
Designer	13,000	13,130	13,261	13,394	13,528
Purchasing Staff	13,000	13,130	13,261	13,394	13,528
Worker	300,000	303,000	306,030	309,090	312,181
Total Monthly Salary Cost	480,000	484,800	489,648	494,544	499,490
Total Annual Salary Cost	5,760,000	5,817,600	5,875,776	5,934,534	5,993,879
Office Supplies & Miscellaneous:					
Stationary Per Annual	7,000	6,650	6,318	6,002	5,702
Paper Per Annual	8,000	7,600	7,220	6,859	6,516
Utility Per Annual	12,000	11,400	10,830	10,289	9,774
Miscellaneous Per Annual	6,500	6,175	5,866	5,573	5,294
Total Cost Per Month	33,500	31,825	30,234	28,722	27,286
Total Annual Cost	402,000	381,900	362,805	344,665	327,432
Total Operating Cost	6,162,000	6,199,500	6,238,581	6,279,199	6,321,311
Total Computerized System Cost	6,373,200	6,310,700	6,349,781	6,402,399	6,444,511

Table 3.18. Five Years Accumulated Computerized System Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	6,373,200	6,373,200
2	6,310,700	12,683,900
3	6,349,781	19,033,681
4	6,402,399	25,436,080
5	6,444,511	31,880,590
Total	31,880,590	-

Table 3.19. The Comparison of the System Costs, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	5,327,600	6,373,200
2	11,165,100	12,683,900
3	17,889,405	19,033,681
4	25,973,664	25,436,080
5	36,100,118	31,880,590

3.5.1 Break-Even Point Analysis

The method of the comparison between the costs of the manual system and the costs of the computerized system is shown in Table 3.19. The point where the manual system costs and computerized system costs interest is called break-even point. At break-event point, it represents that the current costs are equal to the proposed cost, any point beyond the break-event point is the benefit of paying less cost for using the new proposed system, or in another word, it is the point to show the time when the new proposed system will save the company's cost, and that saving cost will be in the long run.

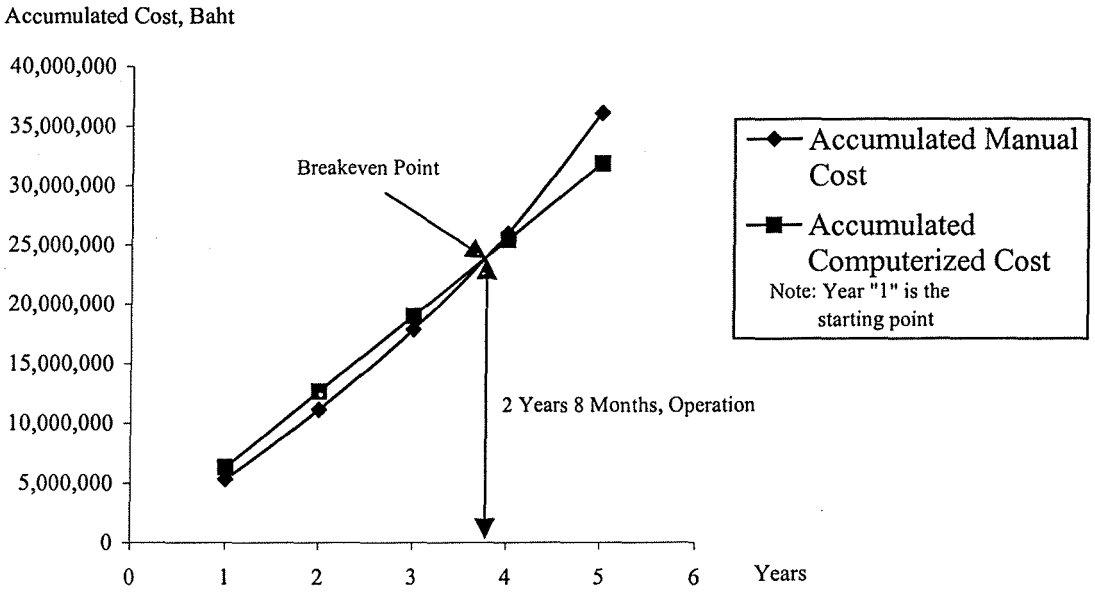

Figure 3.5. Break-Even Point Analysis.

3.5.2 Proposed System Performance Parameter Improvement

Table 3.20. The Comparison of the Performance Parameter Improvement.

Operation	Existing System	Proposed System
Search Information	Approximately 20-30 mins	Approximately 3 mins
Issued Report	Approximately 2-3 days	Approximately 5 mins
Issued Document	Approximately 20 mins	Approximately 5 mins
Cost Calculation	Approximately 25 mins	Approximately 5 mins
Total	Approximately 2-3 days	Approximately 18 mins

The proposed system provides less operation time than the existing system because of the following reasons:

(1) Search Information: Because of all related information are kept in separate place manually. Therefore; it is difficult to find the information; however; the proposed system will keep all information in the database which have

the query and index for searching information so, it will take only a few minute to find the required information.

(2) Issued Report: According to the information are kept by manual system so, some information are not update and some are incorrect. Therefore, It takes time for staffs to recheck the information before issue the report. On the other hand, in the proposed system, the information will be kept in the database and will be updated automatically when the users do the transactions. So, it will take less time than the existing system.

(3) Issued Document: Because in the existing system, staffs have to write the document by hand writing or type by the typewriter so, it take a lot of time for creating the documents. However, the proposed system will be able to generate all necessary documents automatically so, it will take less time than the existing system.

(4) Cost Calculation: Because when staffs calculate cost of the patterns, they may use the wrong cost to calculate because the cost of fabric and accessory always change. Therefore, it take time to check the last update cost before calculate the patterns. However, in the proposed system, all information are kept in the database and always updates so, staffs do not have to check the cost again. Therefore, it will take less time than the existing system.

In conclusion, the existing system is manual system so, it take a lot of time when process the operations. However, the proposed system is computerized system so, it tale less time than the existing system.

3.6 Securities and Control

The security and control are necessary to evaluate the effectiveness and efficiency of the system. The system will be vulnerable to loss or harm if there is weakness in the security system. The possible loss or harm to the computing system is an unauthorized user modified, deleted and changes of data, which will affect confidentiality, and integrity of the data. The basic of protection should be to consider the major assistance the computing system may offer, that is, hardware, software and data.

Physical security means as machine security. One major physical control is the restrict access to sensitive areas. Since these items are so easy to move and are in such high demand, they are prime targets for theft. The protection of these can be locking the machine to a table or within a cabinet designed for the purpose. In addition to those kinds, the interruption of services due to electricity loss is also important. To protect some parts of the machine from electricity shut down, UPS have to be installed.

In the project development, the next security control provided will be protecting or against unauthorized access. The user will be asked for user login and password for the authority to access in the system, which controlled by Active directory (AD) and Group Policy of Microsoft Windows 2000 Advance Server.

The database security is also an important issue in the system. The administrator of the system will set an authorized level of each login name and password.
For the purpose of giving an authority to user to access data; for example, generating report section can only retrieve data for preparing report but not have an authority to modify, delete or change the database. For database integrity, database element integrity such as field checks, access control and change logs are applied.

The program securities are those controls that are imbedded in the software of the specific application system. They are usually implemented during the programming of

the system. The important section of program security can be divided into three different categories: Validating input data, testing the proper execution of the program and other control.

Possible virus threats should be prevented. Virus detection program should be installed in all clients' computers and server. The floppy disk from unknown sources should not be used. Weekly file backup should be carried out.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

Project implementation is the planned and orderly conversion from a current existing system to the new proposed information system. The final design should be evaluated first to make sure that the new proposed system can meet the desired goals and objectives, and then the other remaining processes will be performed. The typical processes of the Project Implementation are:

4.1.1 System Analysis

To conduct the feasibility study of the existing system, the following activities are required: evaluate the problem, analyze user requirement, prepare draft of the proposed system, evaluate and validate the logical design and logical design specification.

4.1.2 System Design

Designing the system input and output needs database, files and structure design, programming and technical design specification.

4.1.3 System Implementation

4.1.4 System Implementation involves the following:

(1) Briefing the objective and benefits of the new system to users

(2) Software acquisition, development and installation

(3) Hardware acquisition and installation

(4) Site preparation

(5) Data preparation, Creating Database System

(6) Testing program and debugging

(7) Personnel training

(8) Conversion

(9) System testing to determine the success of the conversion

4.2 Project Implementation Schedule

The plan or the schedule of this system development project is shown in Figure 1.1.

4.3 Test Plan and Result

4.3.1 Coding

We use Web base programming such as CGI script, ASP script, PHP script, JSP script and etc. to develop the program and use SQL for generating and creating reports via crystal reports wizard.

4.3.2 Testing

System testing is important for knowing the reliability and efficiency of the performance of the system. Testing will be performed throughout the system development. The system will cover the new hardware, programming and etc.

We are concerned with the unit testing, program integration test and system integration test. First, we have to test each unit or program module. White box testing technique is done in unit testing to ensure complete converge. If the entire program module is clear of error, we have to combine the module into the program and test it. White box testing and Black box testing techniques are done for integration testing. The last step of testing is system integration test, which tests the entire system.

System testing tests both the validity and invalidity of data. Error routines and normal processing routines are tested. Updating and deleting the database correctness of procedures are invoked when these are tested.

The software will be tested against correctness, reliability, efficiency, integrity, usability, maintainability and flexibility.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The developed project will help the user to easily keep, retrieve, and edit the information. The manual system takes time and causes loss of data, and many mistakes. So, an Order Processing Management and Inventory Information System is developed to improve reliability, accuracy of data, performance of work within the department and other related departments. Moreover, the system will allow all the remote branches to connect to the head office by remote access system to retrieve any files or information, as they need. The system is also designed to serve and issue the formal document and reports. Formal reports will help management and to easily evaluate the performance of the company. User training will be provided to all the users such as remote access system training, disaster recovery and back up training and so on. Moreover, the Table 3.20 has shown that all the operation performance are improved; for examples, Search Information, Issued Report, Issued Document and Cost Calculation. Because all of data and information are kept in the database system; therefore, the proposed system will use less time than the existing system with is manually system.

5.2 Recommendations

The change of the system to the computerized system involves many new technologies for the users. So, the users are the most important factor of the system. To success or failure depends on the knowledge of the users. Therefore, to be successful, the users of the system must give all requirements while the system is being developed and understand all the system operation such as how to use the new system. Having a good training from the IT people will help users to understand more and be able to perform theirs tasks more completely.

APPENDIX A

CONTEXT DIAGRAM AND DATA FLOW DIAGRAM
OF THE EXISTING SYSTEM

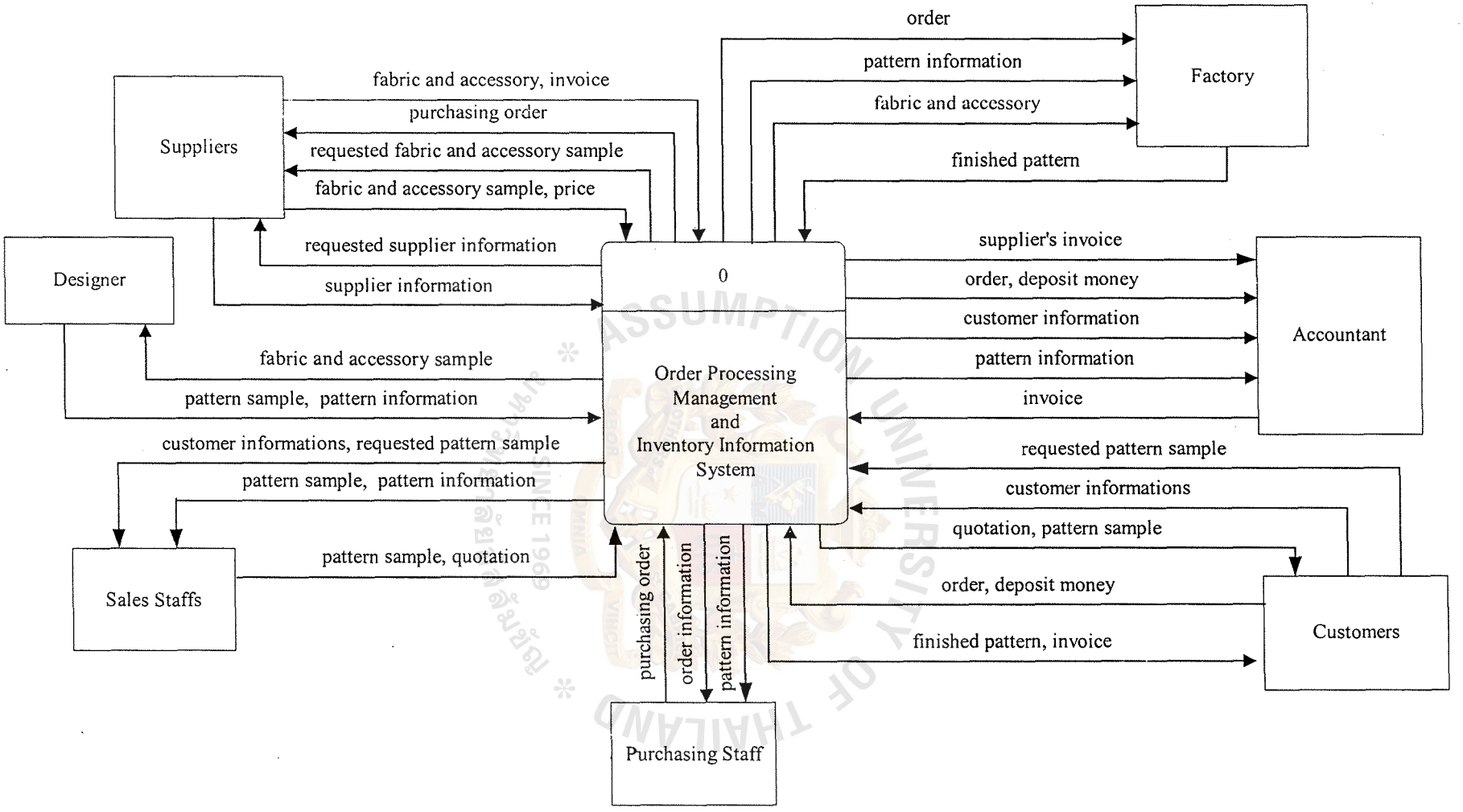

Figure A.1. Context Diagram of the Existing System.

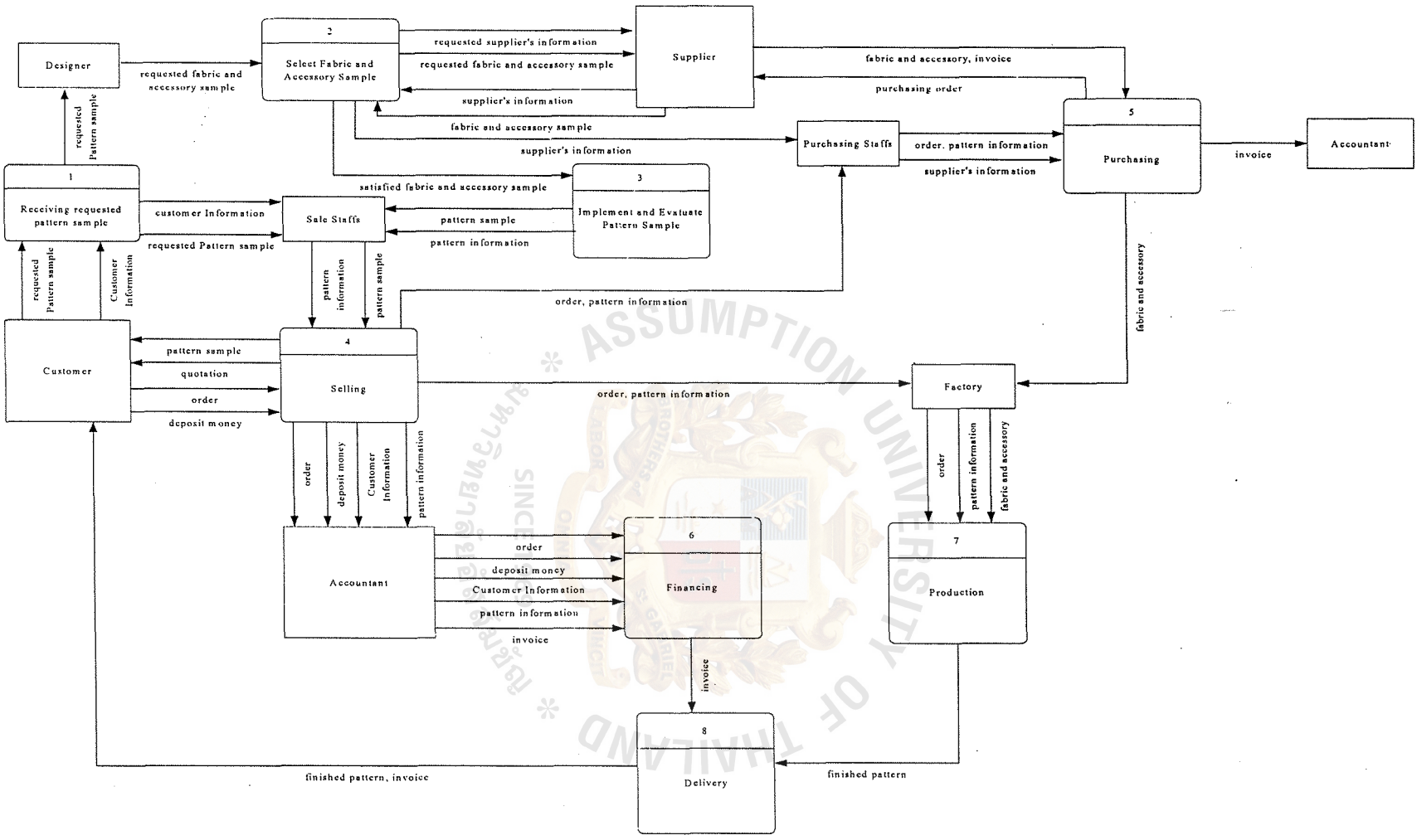

Figure A.2. Data Flow Diagram (Level 0) - the Existing System.

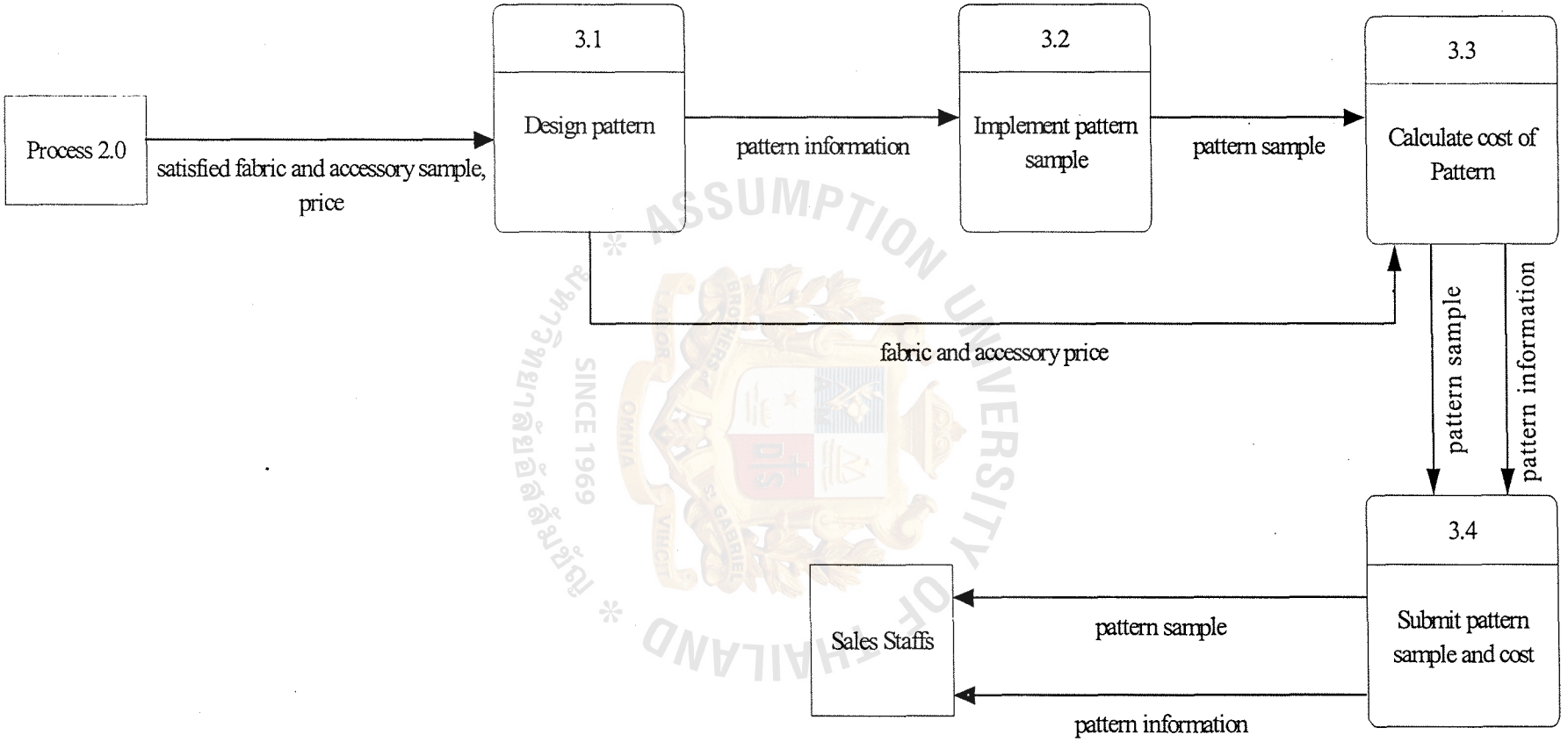

Figure A.3. Data Flow Diagram (Level 1 Process 3) - the Existing System.

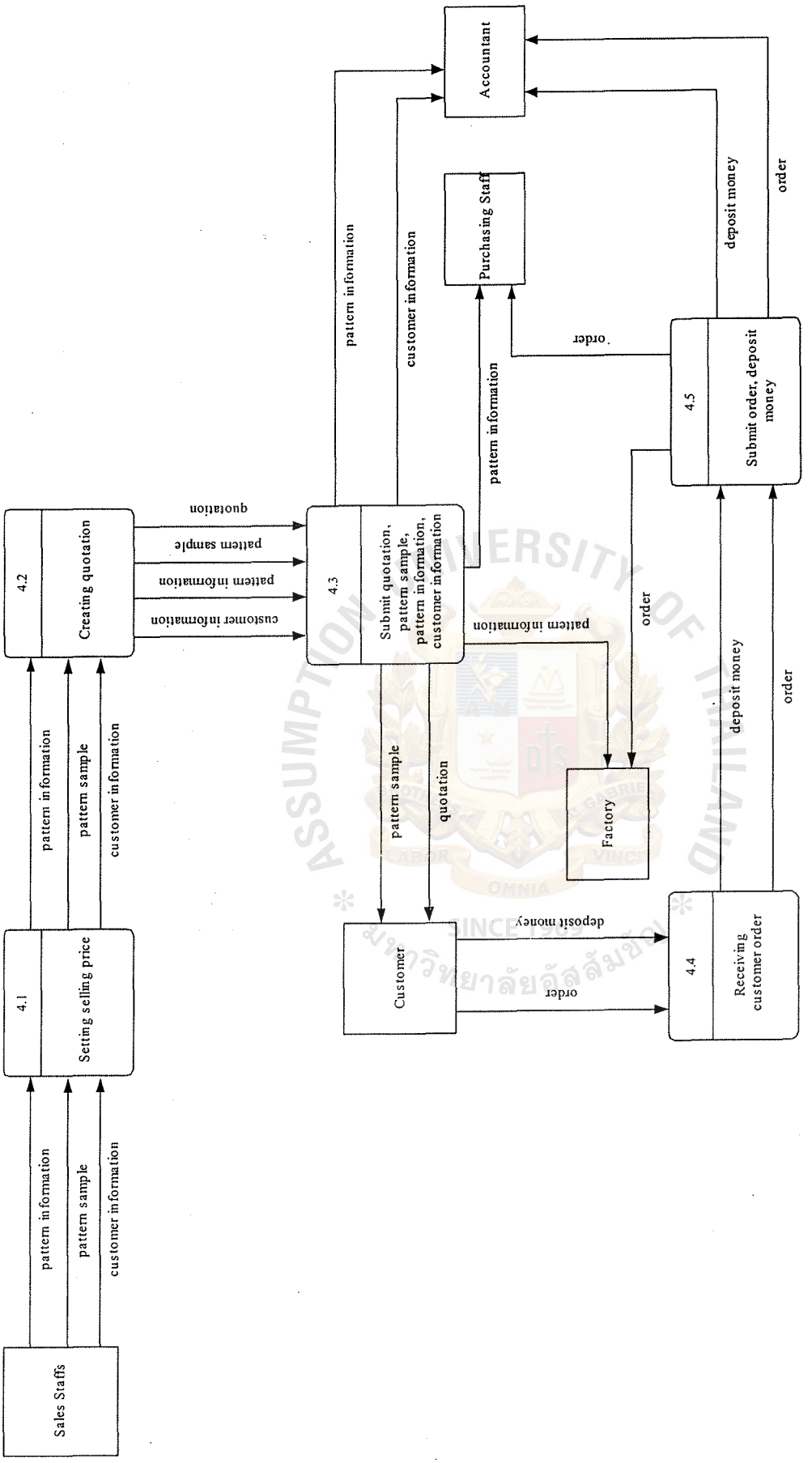

Figure A.4. Data Flow Diagram (Level 1 Process 4) - the Existing System.

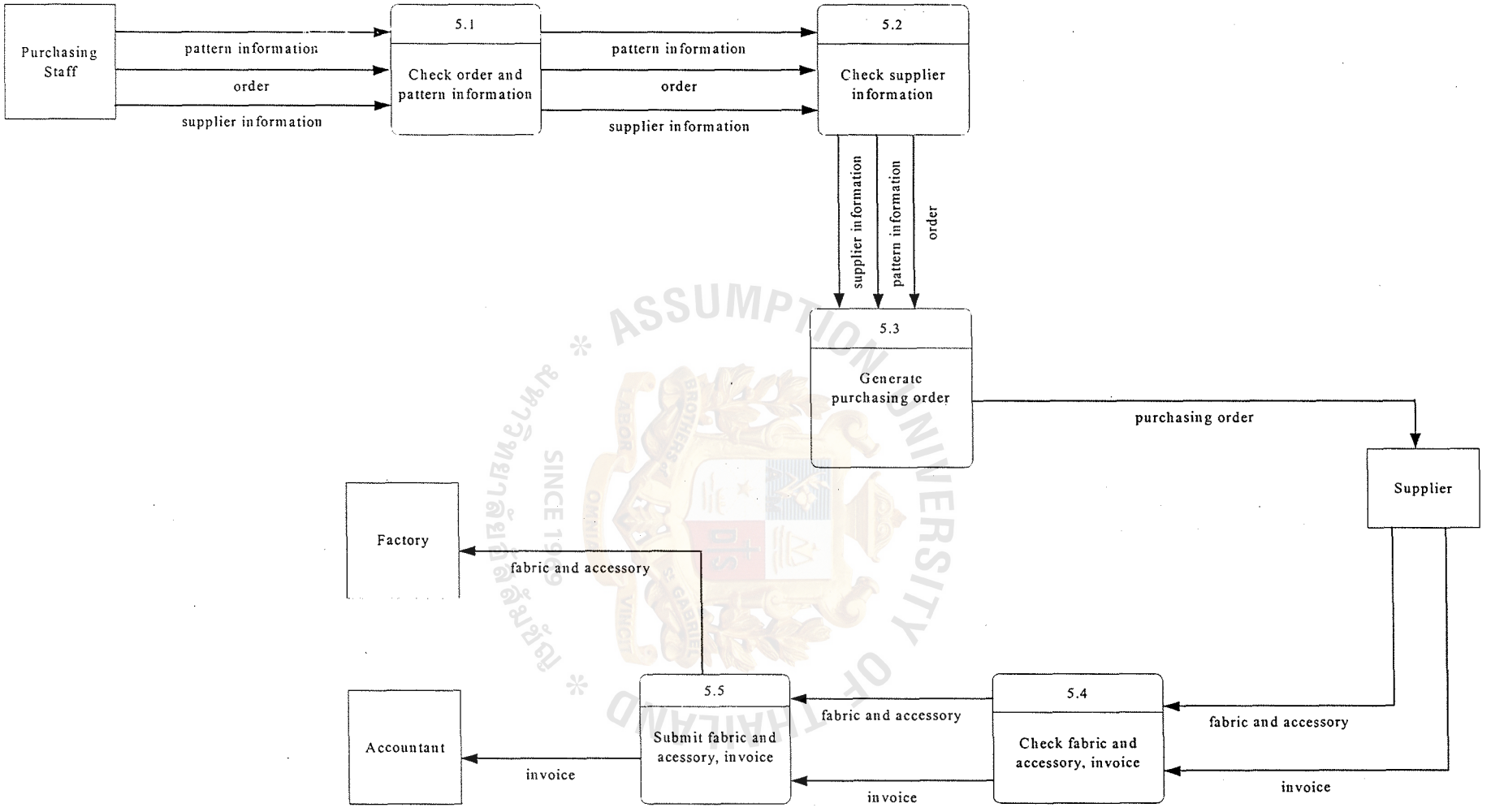

Figure A.5. Data Flow Diagram (Level 1 Process 5) - the Existing System.

APPENDIX B

CONTEXT DIAGRAM AND DATA FLOW DIAGRAM
OF THE PROPOSED SYSTEM

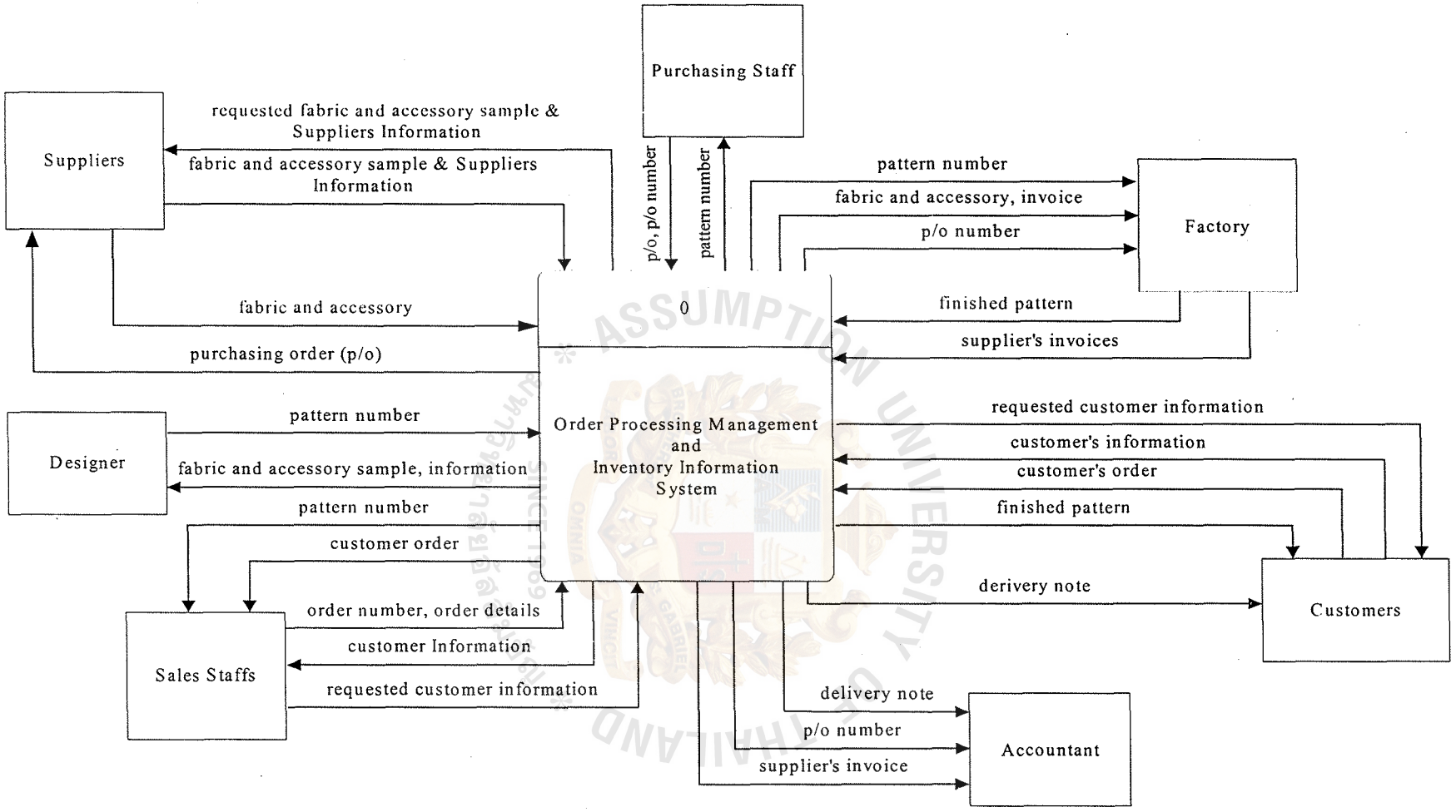

Figure B.1. Context Diagram of the Proposed System.

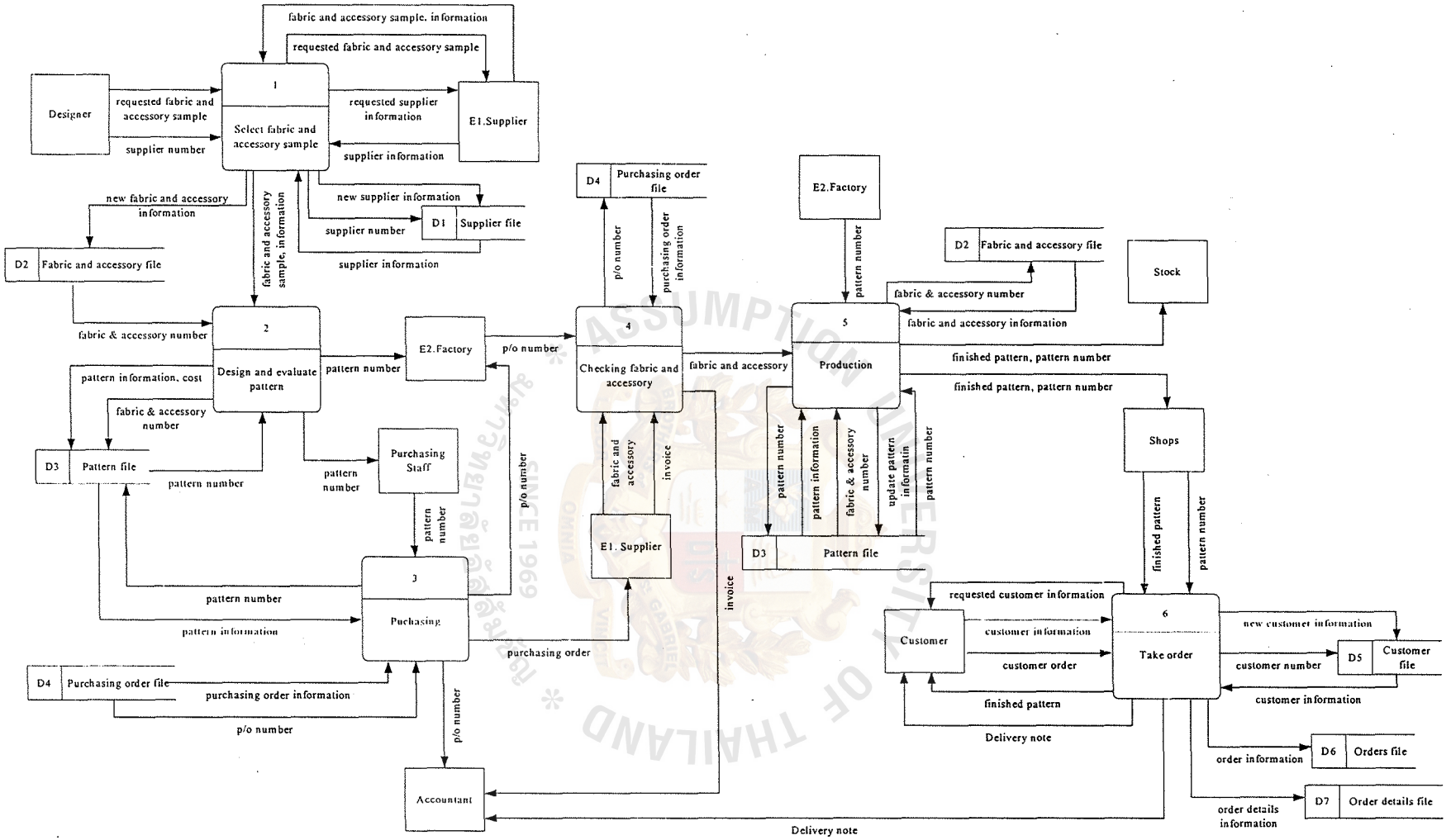

Figure B.2. Data Flow Diagram (Level 0) - the Proposed System.

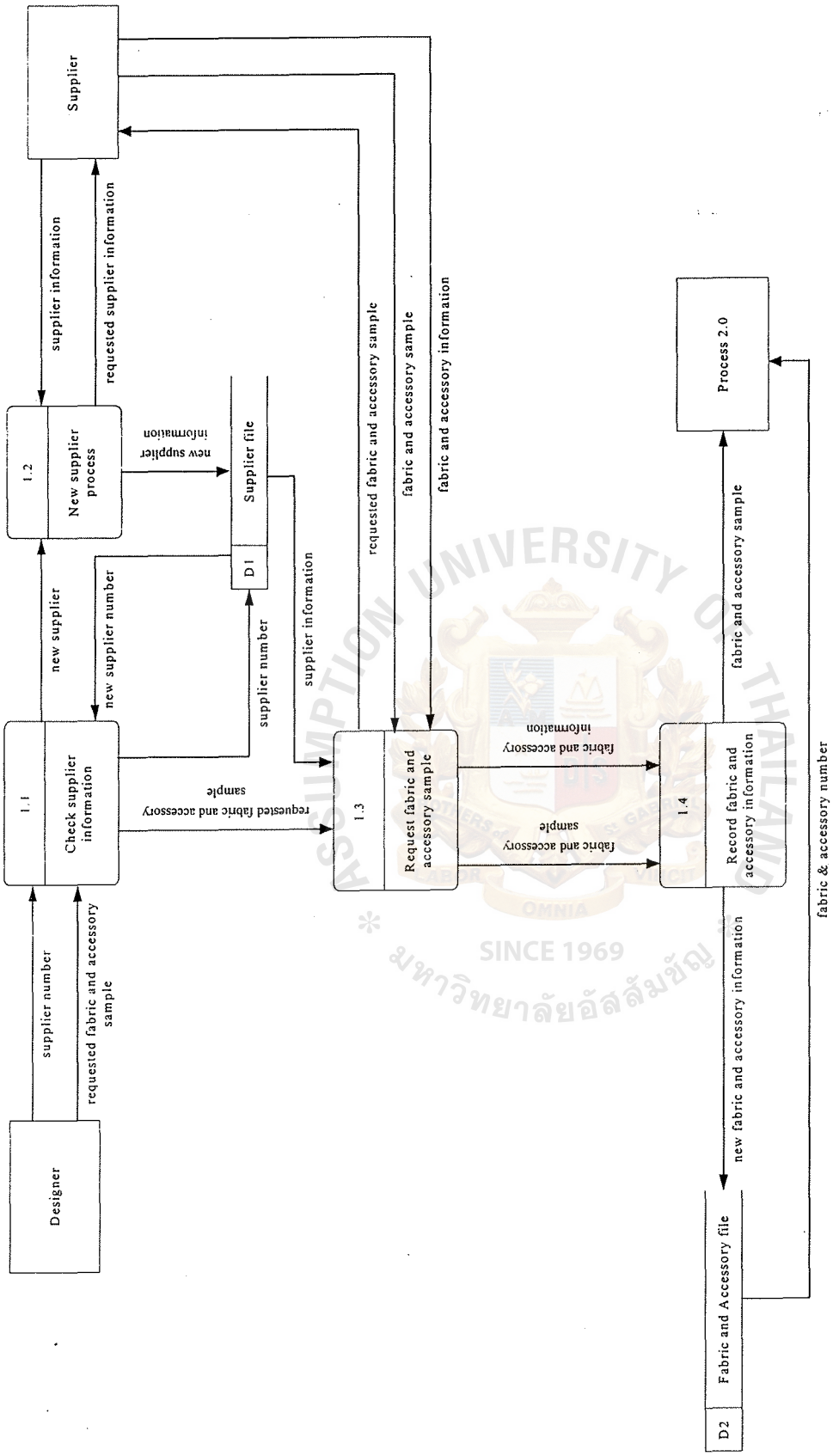

Figure B.3. Data Flow Diagram (Level 1 Process 1) - the Proposed System.

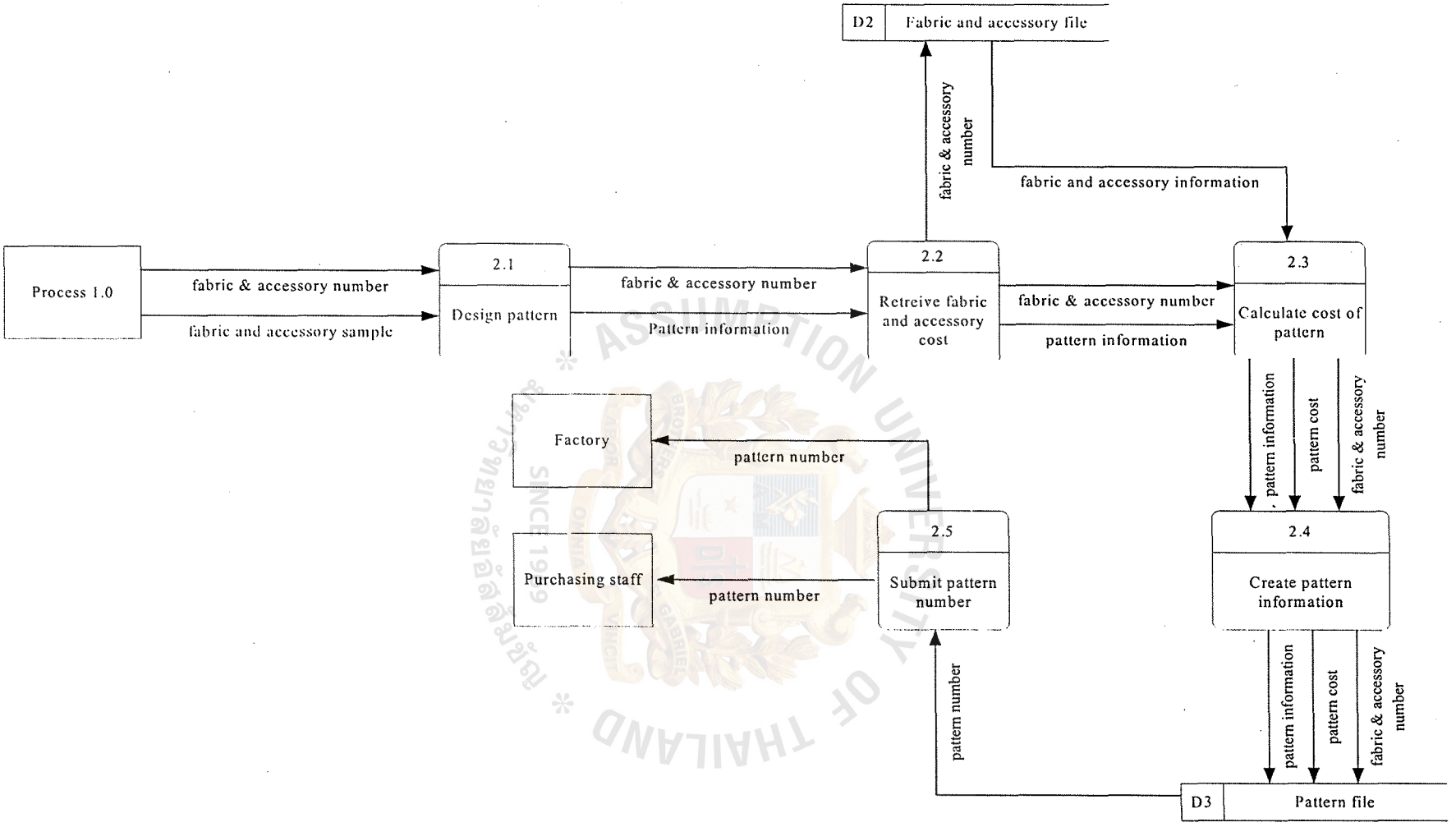

Figure B.4. Data Flow Diagram (Level 1 Process 2) - the Proposed System.

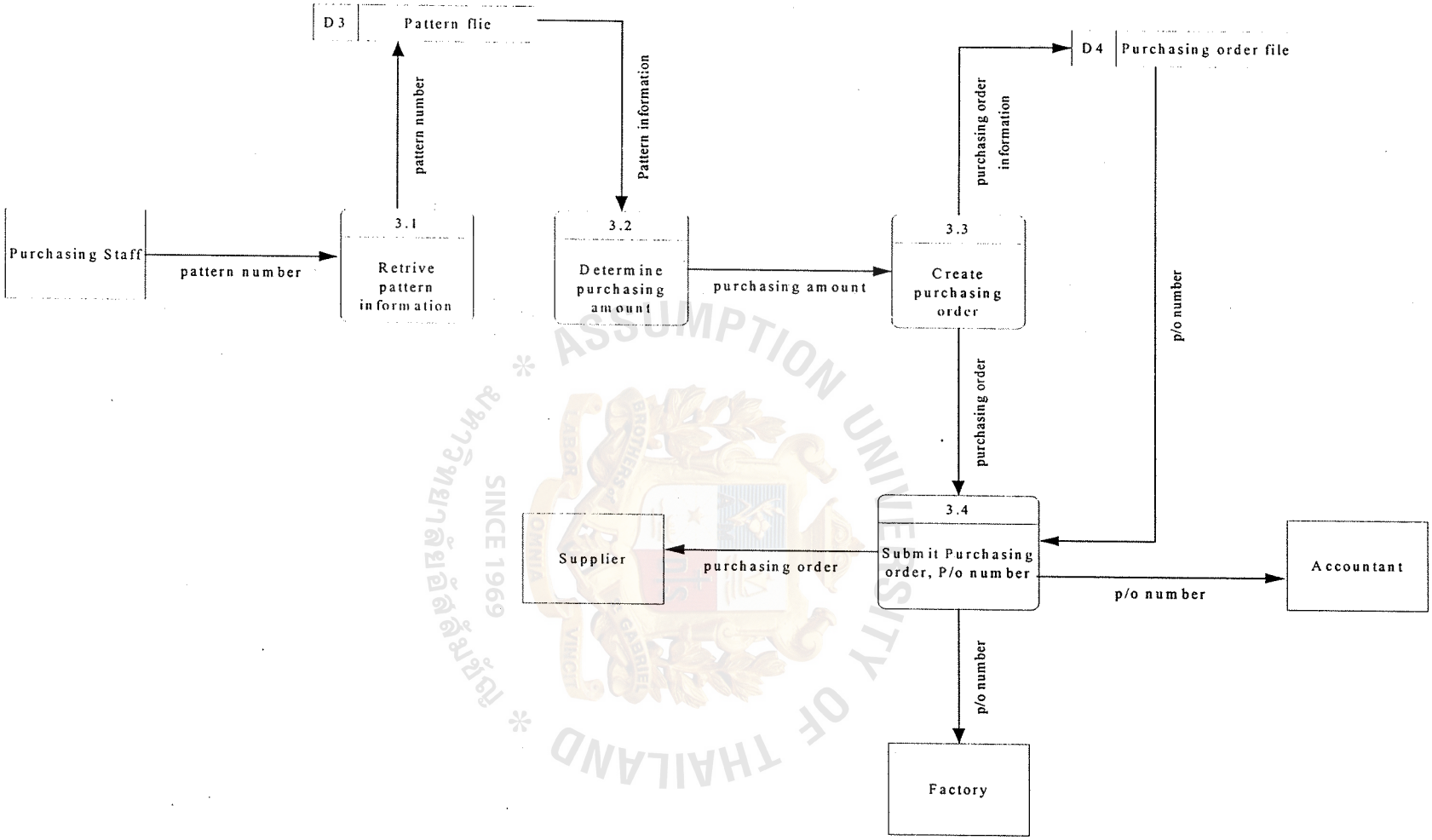

Figure B.5. Data Flow Diagram (Level 1 Process 3) - the Proposed System.

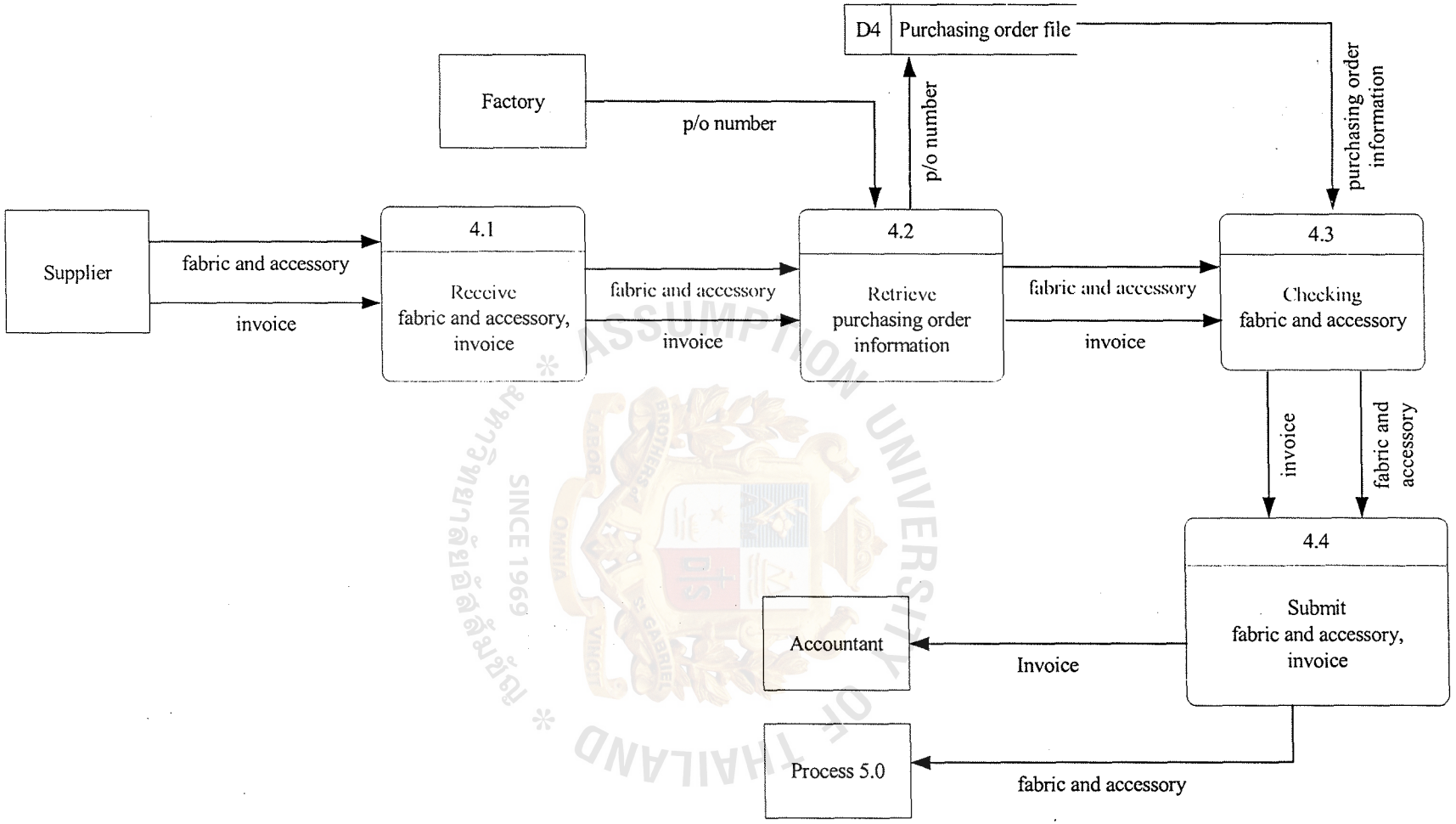

Figure B.6. Data Flow Diagram (Level 1 Process 4) - the Proposed System.

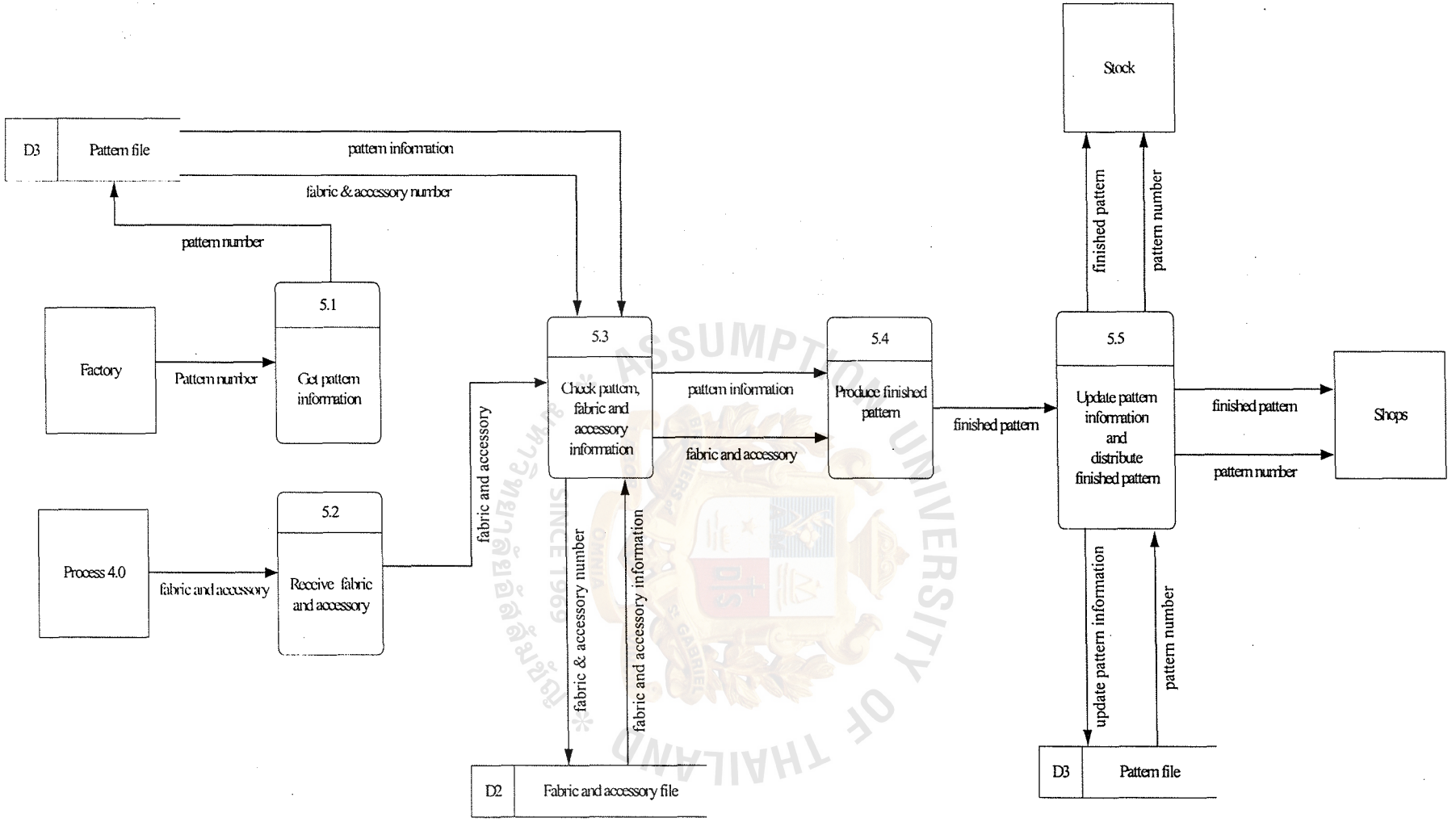

Figure B.7. Data Flow Diagram (Level 1 Process 5) - the Proposed System.

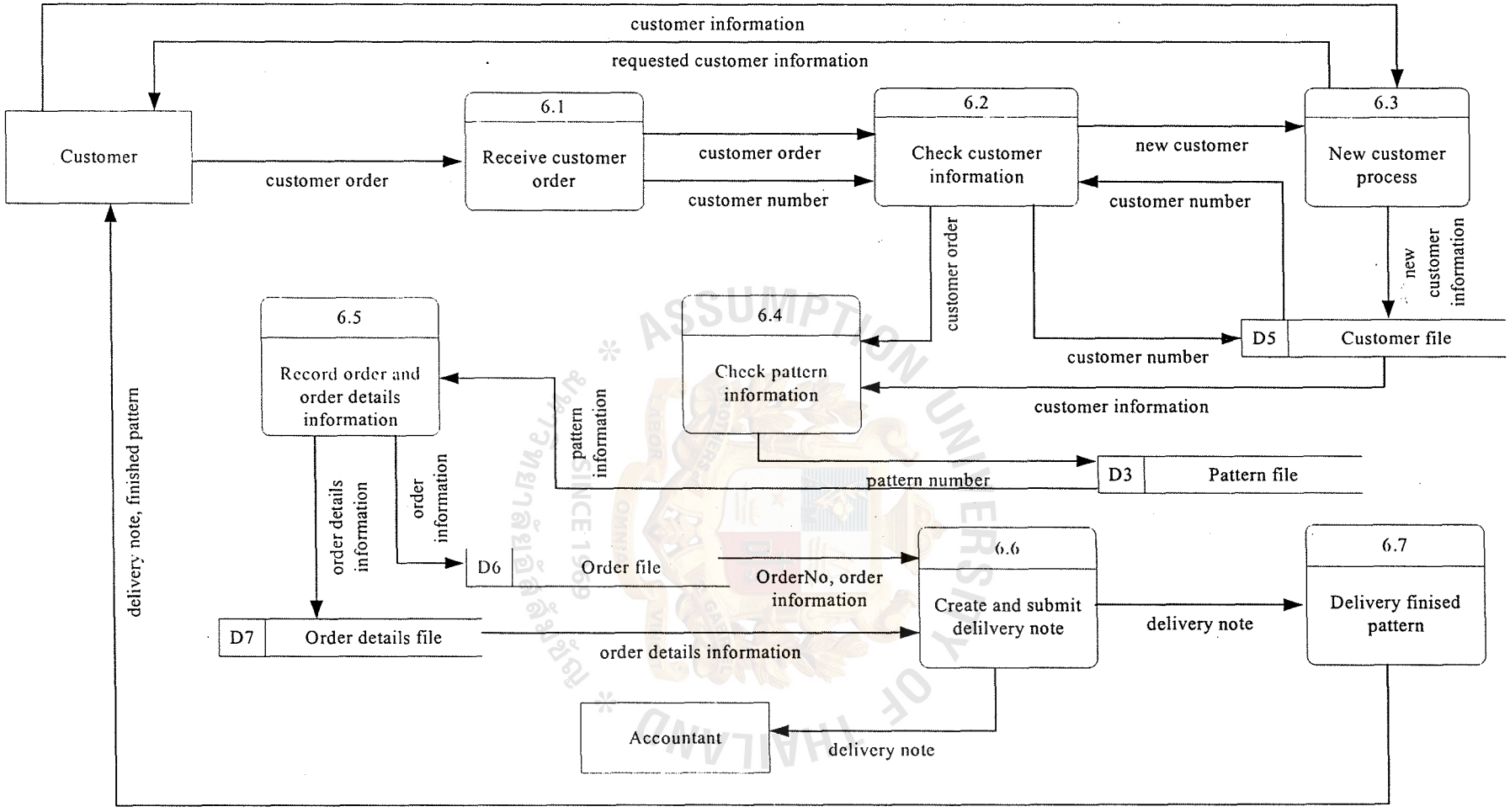

Figure B.8. Data Flow Diagram (Level 1 Process 6) - the Proposed System.

APPENDIX C

WEB INTERFACE AND OUTPUT DESIGN

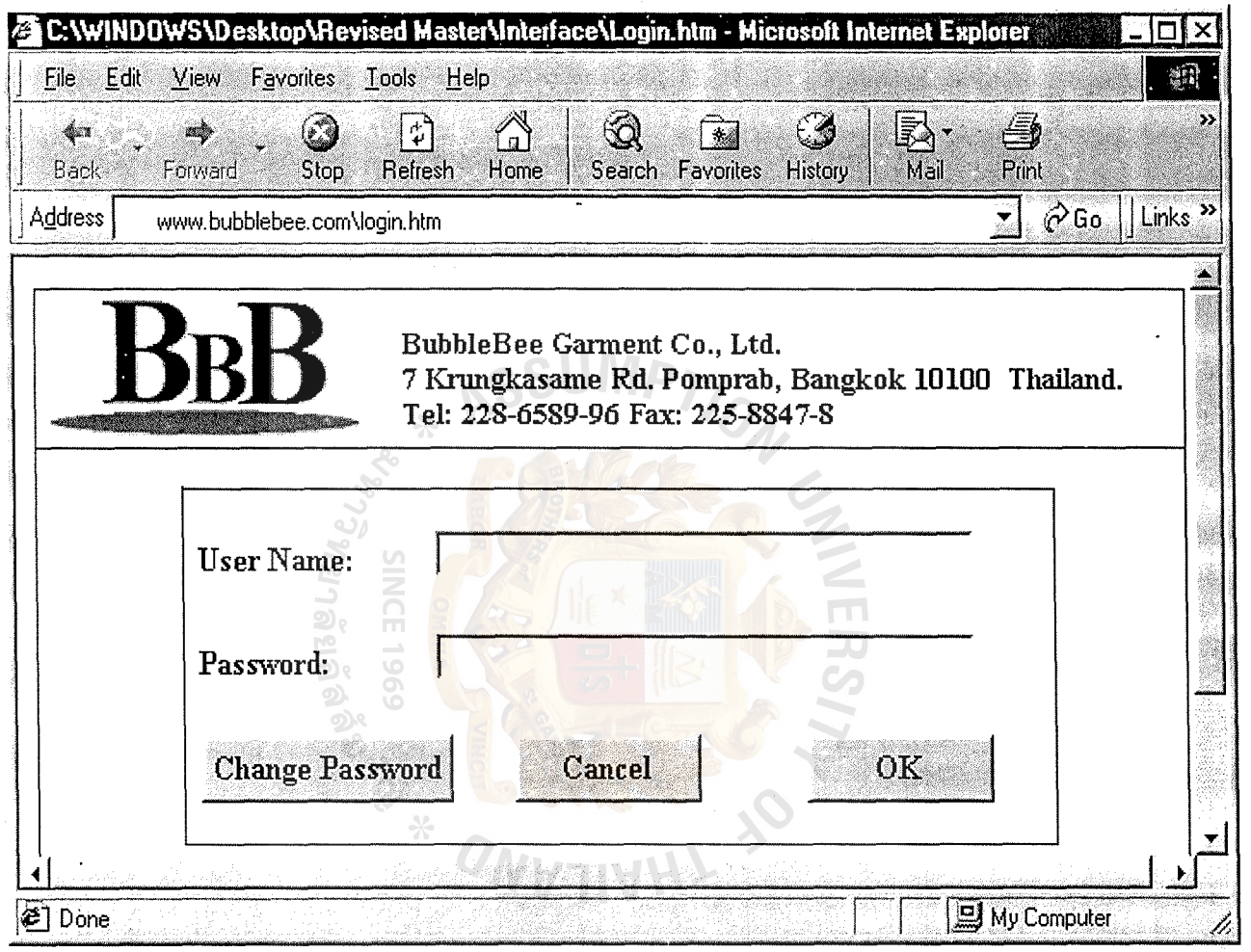

Figure C.1. Login Screen.

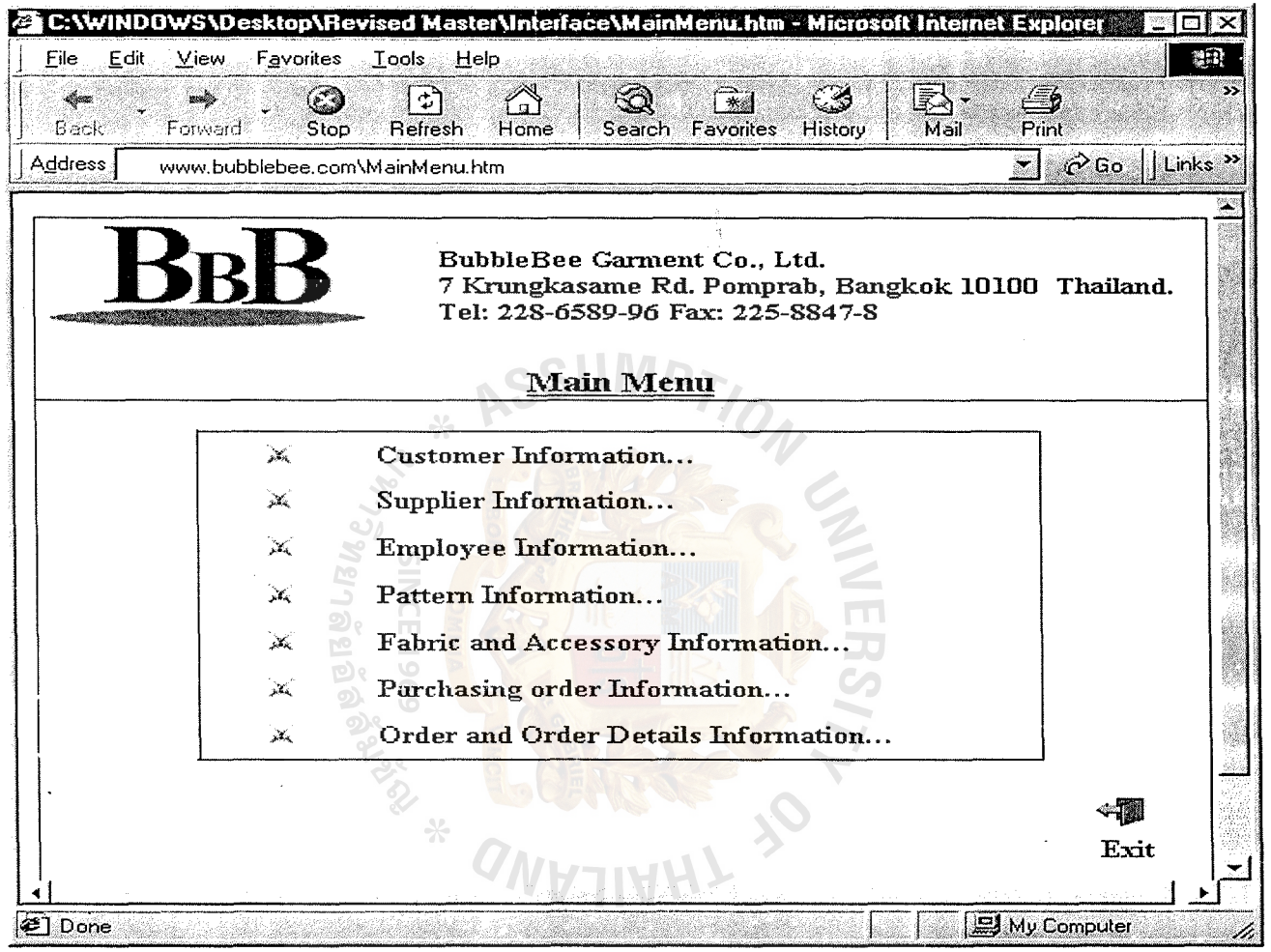

Figure C.2. Main Menu Screen.

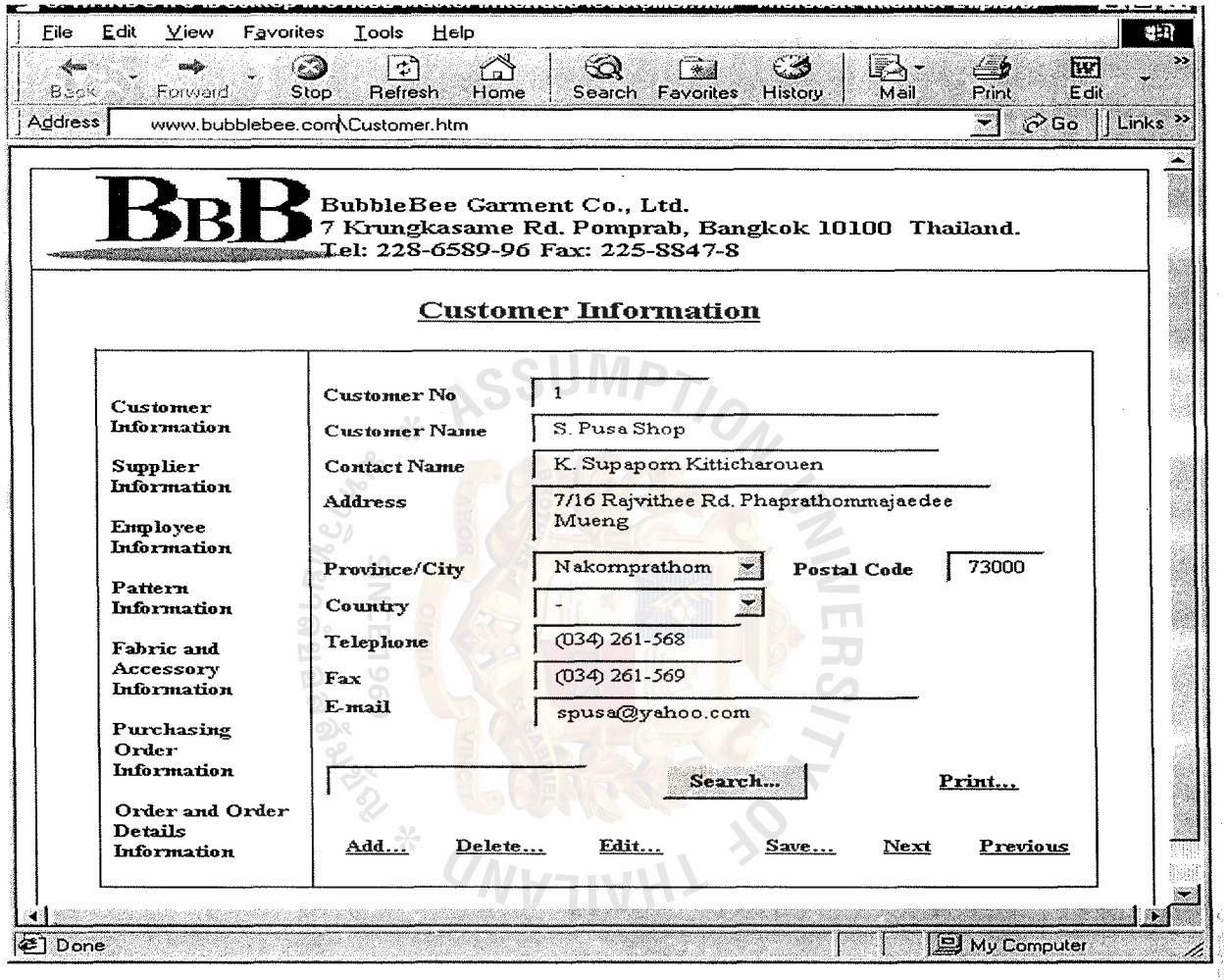

Figure C.3. Customer Information Screen.

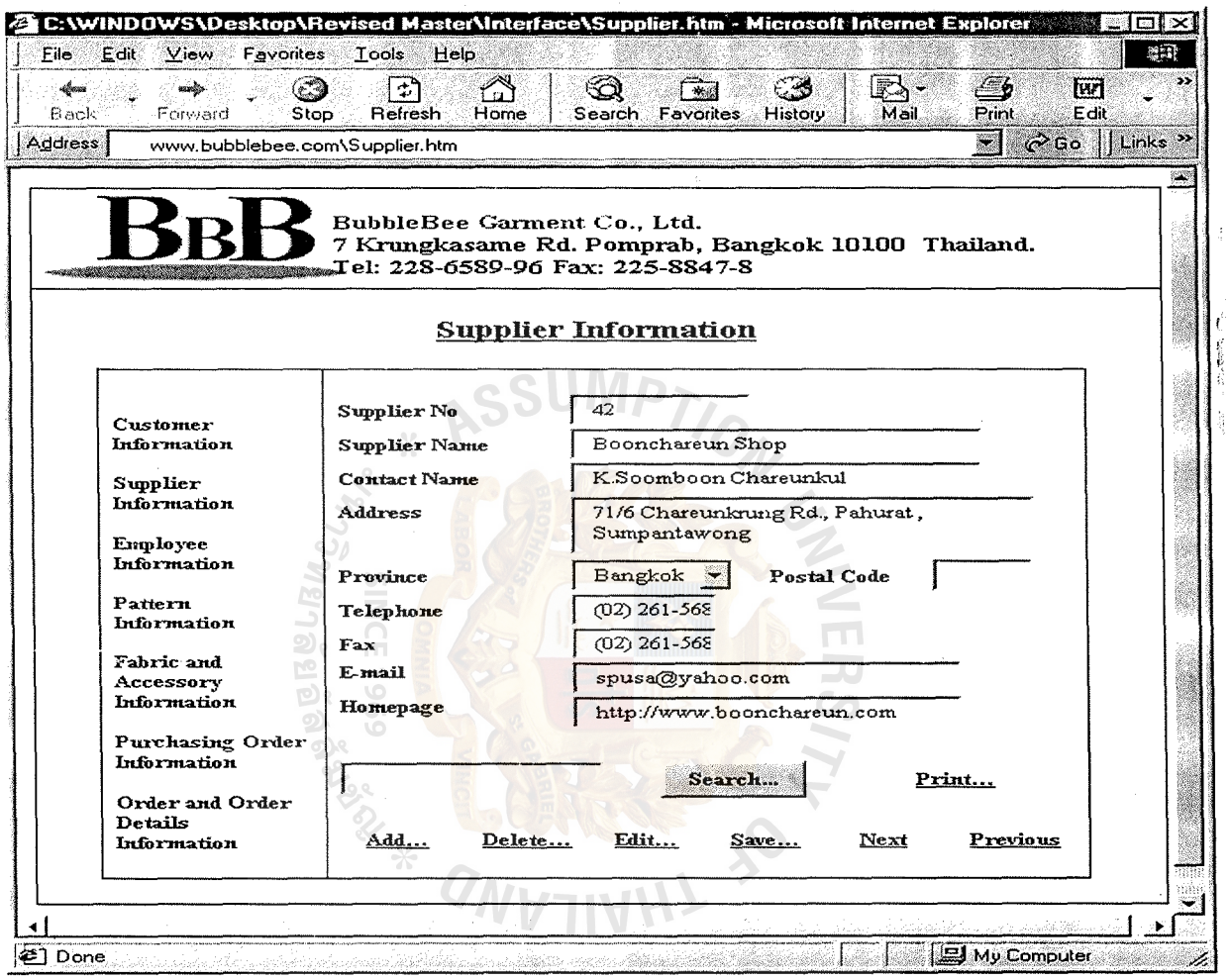

Figure C.4. Supplier Information Screen.

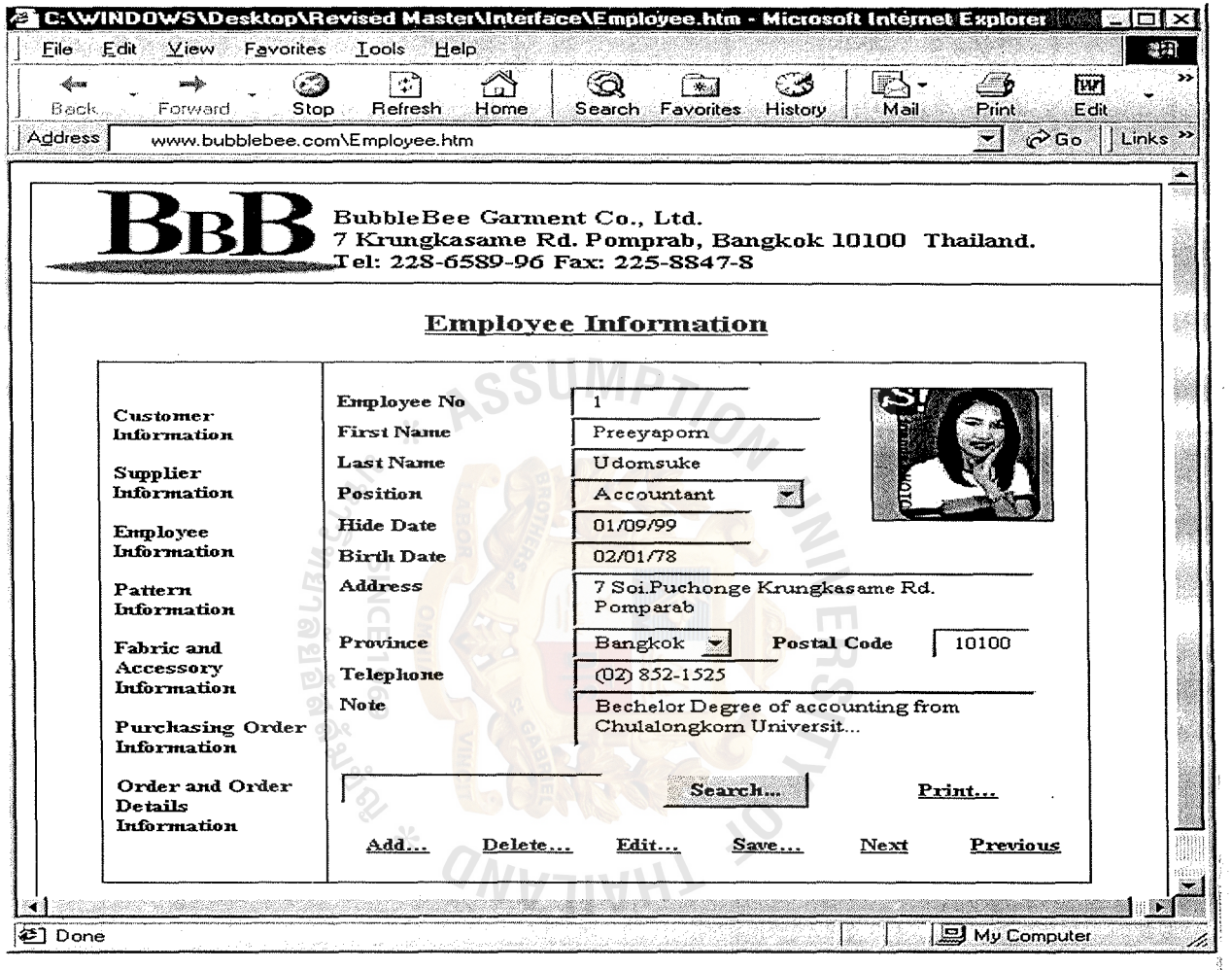

Figure C.5. Employee Information Screen.

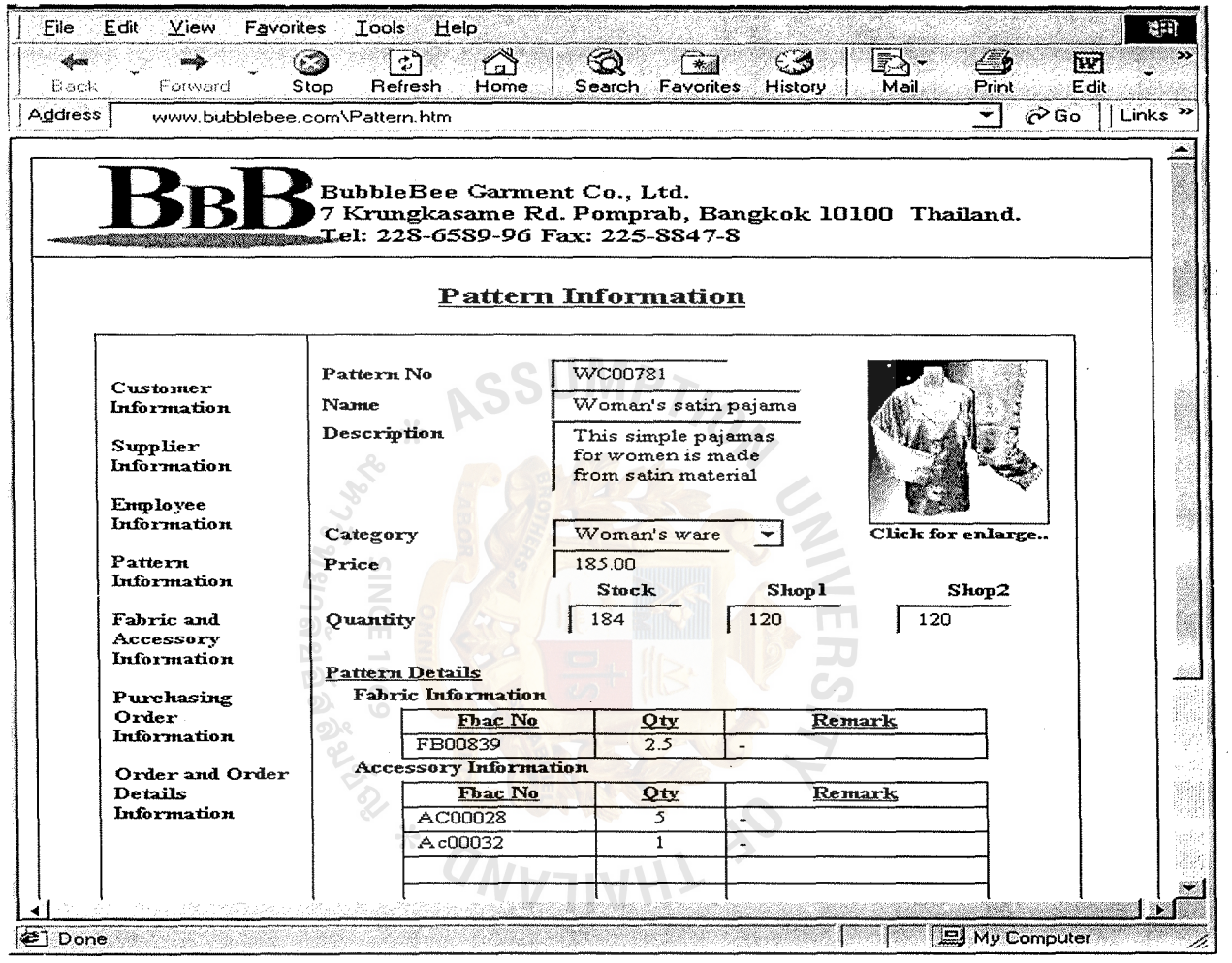

Figure C.6 Pattern Information Screen.

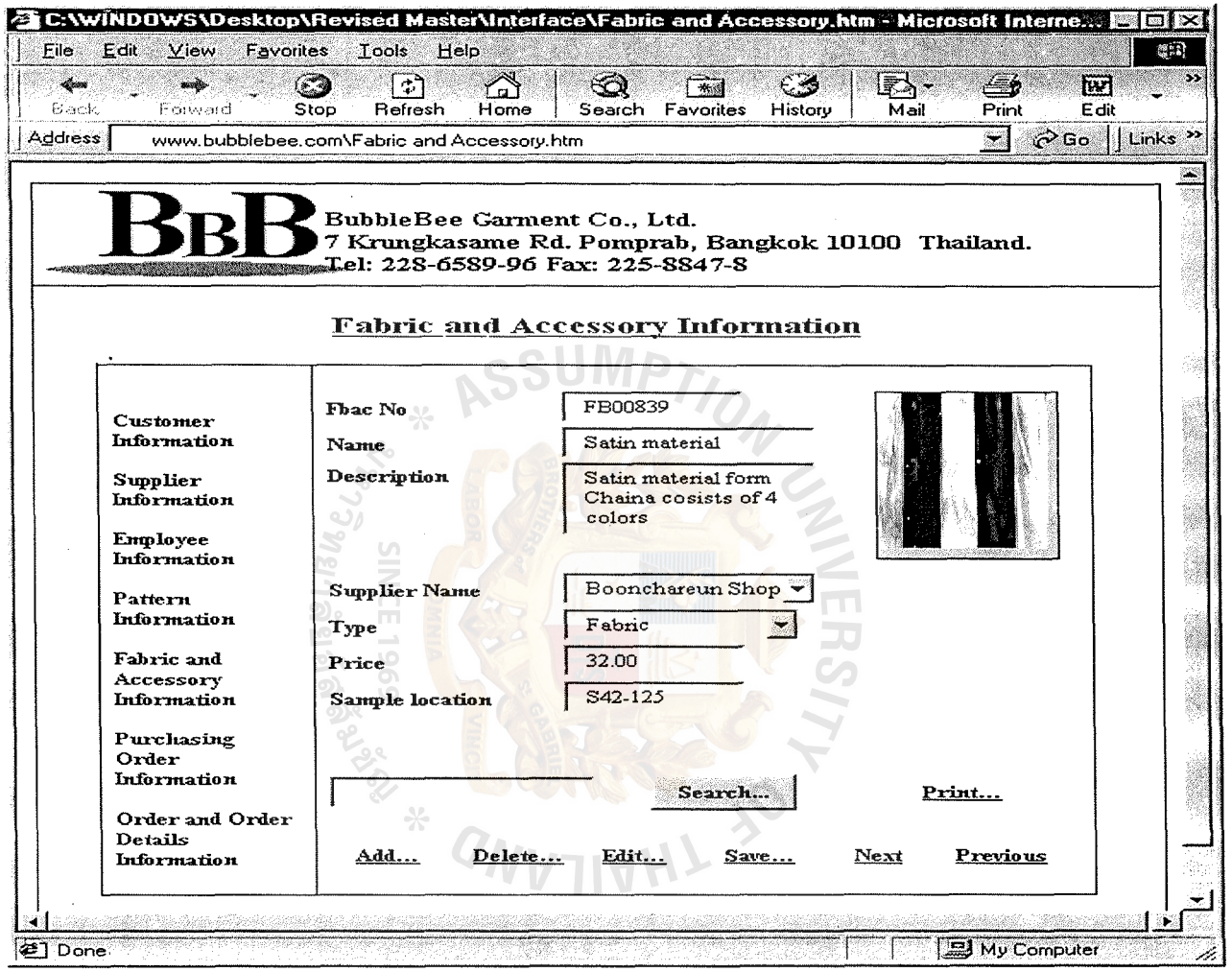

Figure C.7. Fabric and Accessory Information Screen.

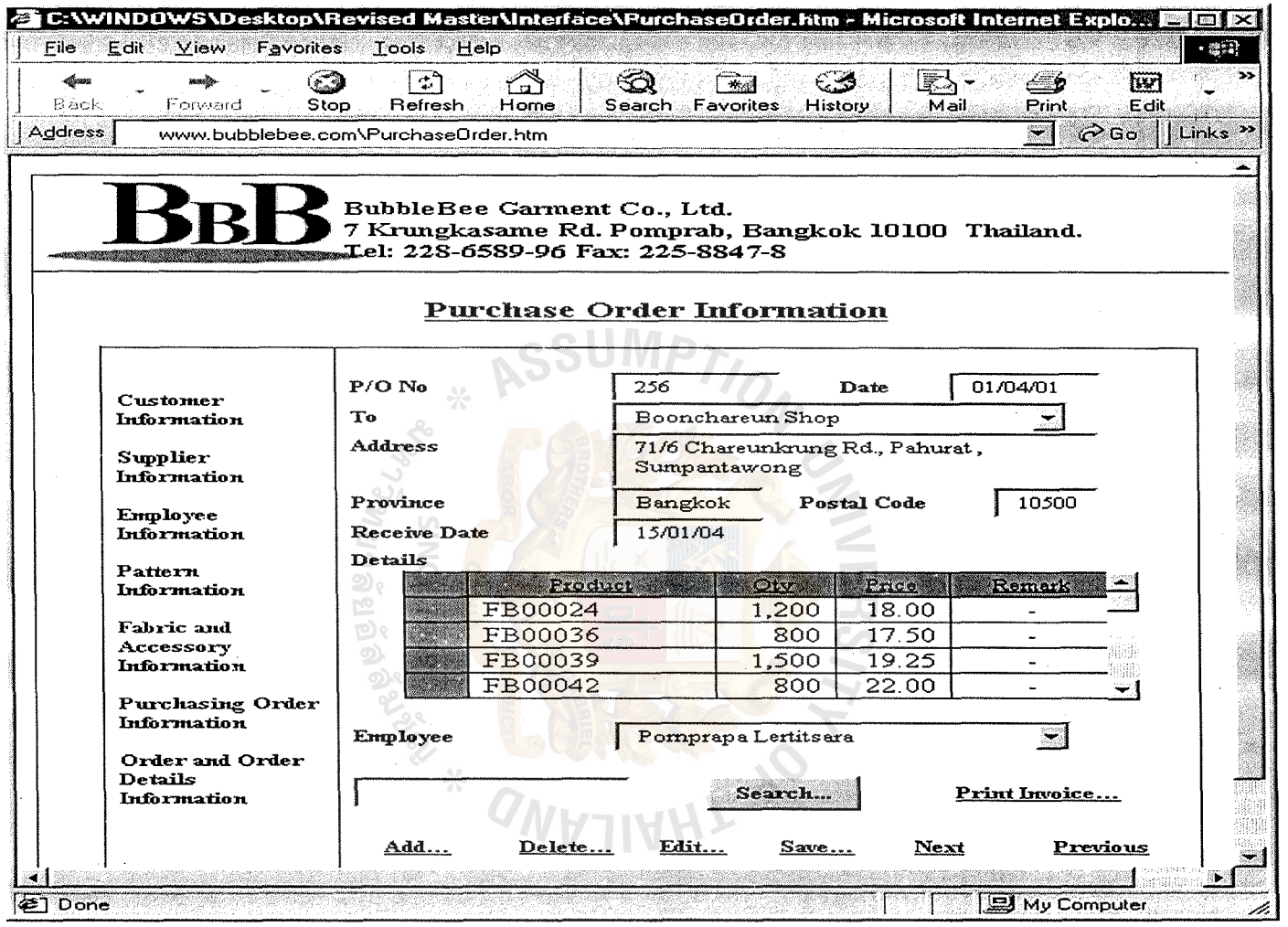

Figure C.8. Purchase Order Information Screen.

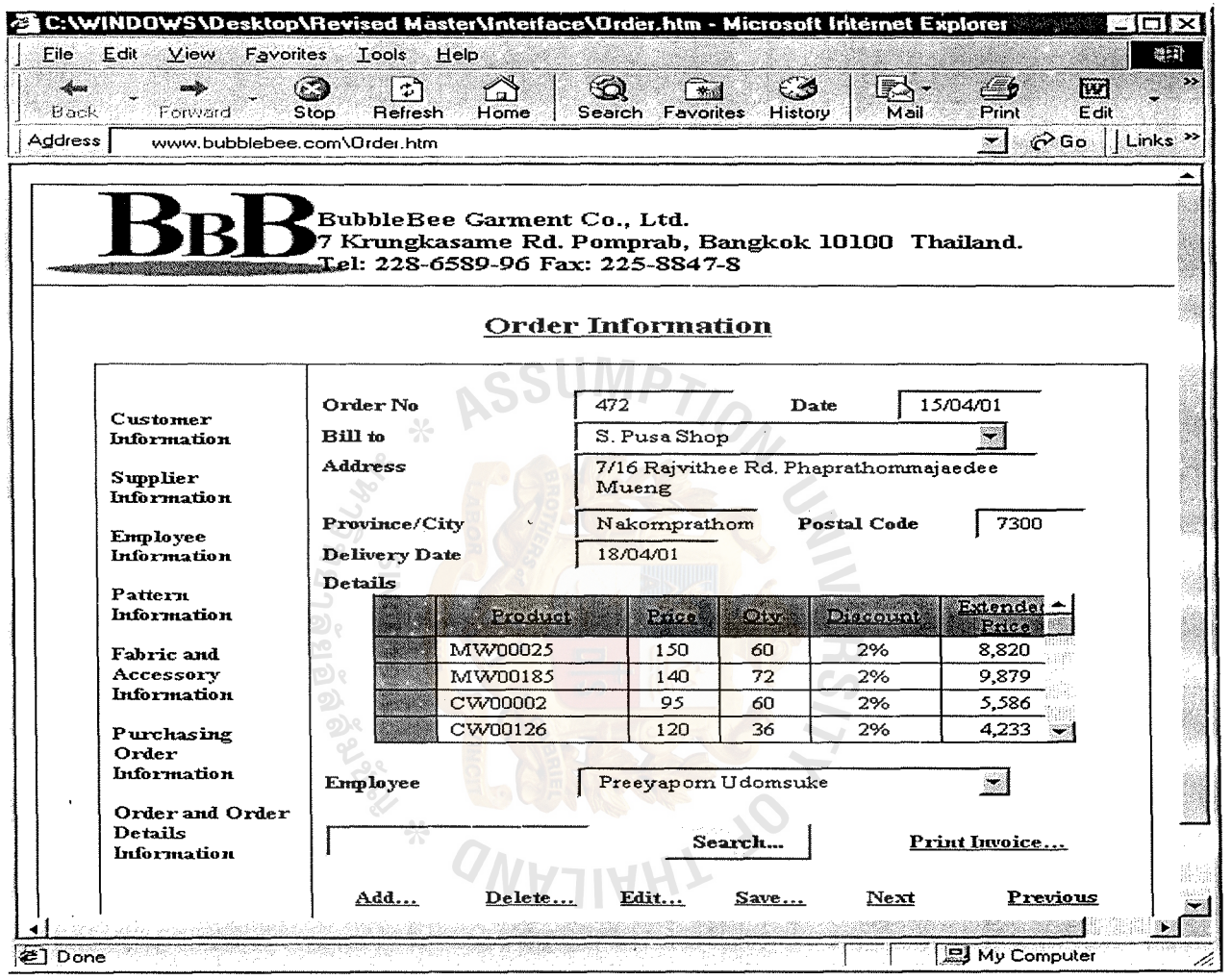

Figure C.9. Order Information Screen.

BubbleBee Garment Co., Ltd.
7 Krungkasame Rd. Pomprab, Bangkok 10100
Thailand.
Tel: 228-6589-96 Fax: 225-8847-8

29-May-2001

Customer Information

Customer Code:	1		
Customer Name:	S. Pusa Shop		
Address:	7/16 Rajvithee Rd. Phaprathommajaedee Mueng		
Province/City:	Nakornprathom	Country:	-
Telephone:	(034) 261-568	Fax:	(034) 261-569
E-mail:	spusa@yahoo.com		
Customer Code:	2		
Customer Name:	Jasmine Shop		
Address:	21/26 Krungkasame Rd. Pomprab		
Province/City:	Bangkok	Country:	-
Telephone:	(02) 221-4567-8	Fax:	(02) 221-4569
E-mail:	jasmine@hotmail.com		
Customer Code:	3		
Customer Name:	ToA E&I Singapore Textile Co.,Ltd.		
Address:	52, Genting Lane #07-01 Hiang Kie Complex 1		
Province/City	-	Country:	Singapore
Telephone:	(65) 743-5161	Fax:	(65) 747-8700
E-mail:	purchaseinfor@toaei.com		
Customer Code:	4		
Customer Name:	Let's Stop N Shop		
Address:	55 Grizzly Peak Rd.		
Province/City:	London	Country:	London
Telephone:	(171) 555-7733	Fax:	(171) 555-7730
E-mail:	letstop@usa.net		

Figure C.10. Customer Information Report.

BubbleBee Garment Co., Ltd.
7 Krungkasame Rd. Pomprab, Bangkok
10100 Thailand.
Tel: 228-6589-96 Fax: 225-8847-8

29-May-2001

Supplier Information

Supplier Code	42		
Supplier Name:	Boonchareun Shop		
Address:	71/6 Chareunkrung Rd., Pahurat , Sumpantawong		
Province/City:	Bangkok	**Telephone:**	(02) 261-5681
E-mail:	spusa@yahoo.com	**Fax:**	(02) 261-5692
Home page:	http://www.boonchareun.com		

Purchased Product List:

Product	Unit Price
FB00012	22.50
FB00013	23.00
FB00024	18.00
FB00036	17.50
FB00039	19.25
FB00042	22.00
FB00113	21.00
FB00124	18.50
FB00136	17.25
FB00239	21.25
FB00312	23.00
FB00313	18.00
FB00424	17.50
FB00536	19.25
FB00839	32.00

Figure C.11. Supplier Information Report.

BBB

BubbleBee Garment Co., Ltd.
7 Krungkasame Rd. Pomprab, Bangkok
10100 Thailand.
Tel: 228-6589-96 Fax: 225-8847-8

29-May-2001

Pattern Information

Pattern No: WW00086
Fabric: FB00536
Accessory: AC00025
AC00003
Name Ladies Poly Cotton Backwrap Gown

Description
Poly/Cotton Blend-- Short sleeves-- Rear closure with two shoulder snap--overlaps for modesty-- Round neck with fancy lace trim on sleeves and front yoke-- full sweep for added mobility--Wide assortment of prints.

Unit Price 185.00

Pattern No: CW00126
Fabric: FB00036
Accessory: AC00015
-
Name Girl pink butterfly pajamas

Description
Childrens pajamas, girls cotton butterfly print. This pretty print is one of our favorites! Pink ground with multi color butterflies and a touch of sparkle (see inset). Pair these with our pink princess slippers or moon and star slippers for a great look!

Unit Price 120.00

Figure C.12. Pattern Information Report.

BubbleBee Garment Co., Ltd.
7 Krungkasame Rd. Pomprab, Bangkok
10100 Thailand.
Tel: 228-6589-96 Fax: 225-8847-8

29-May-2001

Summary Sales by Employee by Quarter

Employee No: 1
Employee Name: Preeyaporn Udomsuke

Year	Quarter	Total Order	Total Amount
2000	Quarter1	62	1,685165
	Quarter2	82	1,563,420
	Quarter3	68	1,235,640
	Quarter4	85	1,452,630
2001	Quarter1	72	1,548,525

Employee No: 2
Employee Name Krittika Pengudom

Year	Quarter	Total Order	Total Amount
2000	Quarter1	52	2,685165
	Quarter2	62	1,400,420
	Quarter3	58	1,000,640
	Quarter4	85	2,522,630
2001	Quarter1	62	1,548,005

Employee No: 3
Employee Name Araya Meesupkul

Year	Quarter	Total Order	Total Amount
2000	Quarter1	42	1,685165
	Quarter2	52	1,100,420
	Quarter3	48	1,250,640
	Quarter4	75	2,122,530
2001	Quarter1	52	1,008,005

Figure C.13. Summary Sales by Employee by Quarter Report.

BBB

BubbleBee Garment Co., Ltd.
7 Krungkasame Rd. Pomprab, Bangkok
10100 Thailand.
Tel: 228-6589-96 Fax: 225-8847-8

29-May-2001

Sales Information by Order
Between 1 May 2001-15ay 2001

Date	Order No.	Customer Name	Amount
01/04/01	352	K.Preeya Imchan	30,058.00
01/04/01	353	Jasmine Shop	52,520.00
01/04/01	354	Yenjit Yenjai Shop	25,600.00
01/04/01	355	Naraisup Shop	12,500.00
02/04/01	356	S. Pusa Shop	65,055.00
02/04/01	357	Queen Shop	14,500.00
02/04/01	358	Classic Shop	19,205.00
03/04/01	359	K.Ummarin Nitikul	18,500.00
03/04/01	360	K.Numchoke Yoocharouen	8,500.00
03/04/01	361	Best Shop	8,600.00
03/04/01	362	ToA E&I Singapore Textile	550,850.00
03/04/01	363	Let's Stop N Shop	750,520.00
04/04/01	364	Prapaporn Shop	20,520.00
04/04/01	365	K.Nualprang Kittikul	12,350.00
04/04/01	366	K.Somchai Boonkop	15,255.00
0504/01	367	K.Pimchai Suksomchit	8,550.00
0504/01	368	Kethchangsin Shop	25,000.00
0504/01	369	K.Neeramol Pomprakulchai	15,455.00
0504/01	370	K.Numchoke Yoocharouen	6,500.00
0504/01	371	Best Shop	12,365.00
0604/01	372	Queen Shop	25,365.00
0604/01	373	Udomchaipanit Shop	25,200.00

Figure C.14. Sales Information by Order Report.

BbB

BubbleBee Garment Co., Ltd.
7 Krungkasame Rd. Pomprab, Bangkok
10100 Thailand.
Tel: 228-6589-96 Fax: 225-8847-8

29-May-2001

Invoice

Order No: 472 **Date** 15/04/01 **Delivery Date** 18/04/01
Customer Code: 1
Customer Name: S. Pusa Shop
Address: 7/16 Rajvithee Rd. Phaprathommajaedee Mueng
Province/City: Nakornprathom Country: -
Telephone: (034) 261-568 Fax: (034) 261-569
E-mail: spusa@yahoo.com

No.	Product/Pattern	Amount	Unit Price	Total
1	MW00025	60	150.00	9,000.00
2	MW00185	72	140.00	10,080.00
3	CW00002	60	95.00	5,700.00
4	CW00126	36	120.00	4,320.00
5	WW00086	24	185.00	4,440.00
6	WW00087	60	135.00	8,100.00
7	WW00188	24	120.00	2,280.00
	Total			44,520.00
	Discount 2 %			890.00
	Discounted Total			43,630.00
	VAT 7%			3,054.00
	Net Total			46,684.00

Employee: Preeyaporn Udomsuke

Approved By:

Panu Jittrapinate
Manager

Figure C.15. Invoice Report.

BBB

BubbleBee Garment Co., Ltd.
7 Krungkasame Rd. Pomprab, Bangkok
10100 Thailand.
Tel: 228-6589-96 Fax: 225-8847-8

29-May-2001

Purchase Order

P/O number: 256 **Date:** 01/04/01
Supplier Code: 42
Supplier Name: Booncharoen Shop
Address: 71/6 Charoenkrung Rd., Pahurat , Sumpantawong
Province/City: Bangkok **Telephone:** (02) 261-5681
Fax: (02) 261-5692

No.	Product	Unit Price	Quantity	Total
1	FB00024	18.00	1,200	21,600.00
2	FB00036	17.50	800	14,000.00
3	FB00039	19.25	1,500	28,875.00
4	FB00042	22.00	800	17,600.00
5	FB00113	21.00	800	16,800.00
6	FB00124	18.50	1,200	21,900.00
Total				122,775.00

Employee: Pornprapa Lertitsara

Approved By:

Panu Jittrapinate
Manager

Figure C.16. Purchase Order Report.

APPENDIX D

PROCESS SPECIFICATION AND STRUCTURE CHART

PROCESS SPECIFICATION

Table D.1. Process Specification of Process 1.1.

Items	Description.
Process Name:	Check supplier information
Data In:	Supplier number
Data Out:	New supplier information
Process:	Check necessary supplier data, supplier name, address, phone number
Attachment:	Supplier file

Table D.2. Process Specification of Process 1.2.

Items	Description.
Process Name:	New supplier process
Data In:	New supplier Supplier information
Data Out:	New supplier information New supplier number
Process:	(1) Request information from the supplier (2) Record the information into Supplier file
Attachment:	(1) Supplier (2) Supplier file

Table D.3. Process Specification of Process 1.3.

Items	Description.
Process Name:	Request fabric and accessory sample
Data In:	Requested fabric and accessory sample Supplier information
Data Out:	Fabric and accessory information Fabric and accessory sample
Process:	Request fabric and accessory from the supplier
Attachment:	-

Table D.4. Process Specification of Process 1.4.

Items	Description.
Process Name:	Record fabric and accessory information
Data In:	Fabric and accessory information Fabric and accessory sample
Data Out:	Fabric and accessory number Fabric and accessory sample
Process:	Record the information into Fabric and accessory file
Attachment:	(1) Fabric and accessory file (2) Process 2.0

Table D.5. Process Specification of Process 2.1.

Items	Description.
Process Name:	Design Pattern
Data In:	Fabric and accessory number Fabric and accessory sample
Data Out:	Fabric and accessory number Pattern information
Process:	(1) Design pattern (2) Specify pattern information
Attachment:	-

Table D.6. Process Specification of Process 2.2.

Items	Description.
Process Name:	Retrieve fabric and accessory cost
Data In:	Fabric and accessory number Pattern information
Data Out:	Fabric and accessory number Pattern information
Process:	Retrieve fabric and accessory cost from the fabric and accessory file.
Attachment:	Fabric and accessory file

Table D.7. Process Specification of Process 2.3.

Items	Description.
Process Name:	Calculate cost of pattern
Data In:	Fabric and accessory number Pattern information
Data Out:	Pattern information Pattern cost Fabric and accessory number
Process:	Calculate cost of pattern by approximate fabric and accessory used quantity, cost
Attachment:	Fabric and accessory file

Table D.8. Process Specification of Process 2.4.

Items	Description.
Process Name:	Create pattern information
Data In:	Pattern information Pattern cost Fabric and accessory number
Data Out:	Pattern number
Process:	Create new pattern number and record all related information about the pattern to the Pattern file
Attachment:	Pattern file

Table D.9. Process Specification of Process 2.5.

Items	Description.
Process Name:	Submit pattern number
Data In:	Pattern number
Data Out:	Pattern number
Process:	(1) Submit pattern number to factory for produce finished pattern. (2) Submit pattern number to purchasing staff for purchasing fabric and accessory.
Attachment:	(1) Factory (2) Purchasing staff (3) Pattern file

Table D.10. Process Specification of Process 3.1.

Items	Description.
Process Name:	Retrieve pattern information
Data In:	Pattern number
Data Out:	Pattern information
Process:	Check pattern information to find what fabric and accessory need to purchase
Attachment:	Pattern file
Attachment:	-

Table D.11. Process Specification of Process 3.2.

Items	Description.
Process Name:	Determine purchasing amount
Data In:	Pattern information
Data Out:	Purchasing amount
Process:	Determine how many purchasing amount which adequate for the request production.
Attachment:	Pattern file

Table D.12. Process Specification of Process 3.3

Items	Description.
Process Name:	Create purchasing order
Data In:	Purchasing amount
Data Out:	Purchasing order P/O number
Process:	Create new purchasing order number and record all related information about the purchasing order to the Purchasing order file
Attachment:	Purchasing order file

Table D.13. Process Specification of Process 3.4.

Items	Description.
Process Name:	Submit purchasing order, P/O
Data In:	Pattern information
Data Out:	Purchasing order P/O number
Process:	(1) Submit P/O number to factory (2) Submit P/O number to accountant (3) Submit purchasing order to supplier for purchasing fabric and accessory
Attachment:	(1) Purchasing order file (2) Supplier (3) Accountant (4) Factory

Table D.14. Process Specification of Process 4.1.

Items	Description.
Process Name:	Receive fabric and accessory, invoice
Data In:	Fabric and accessory Invoice
Data Out:	Fabric and accessory Invoice
Process:	(1) Receive fabric and accessory from supplier. (2) Invoice from supplier.
Attachment:	-

Table D.15. Process Specification of Process 4.2.

Items	Description.
Process Name:	Retrieve purchasing order information
Data In:	P/O number Fabric and accessory Invoice
Data Out:	Purchasing order information Fabric and accessory Invoice
Process:	Use the P/O number that receive from previous process to retrieve purchasing order information from the purchasing order file to determine what purchased fabric and accessory is.
Attachment:	Factory

Table D.16. Process Specification of Process 4.3.

Items	Description.
Process Name:	Create purchasing order
Data In:	Purchasing order information Fabric and accessory Invoice
Data Out:	Fabric and accessory Invoice
Process:	Check necessary information such as fabric and accessory, price, quantity, and supplier name in invoice with purchasing order
Attachment:	Purchasing order file

Table D.17. Process Specification of Process 4.4.

Items	Description.
Process Name:	Submit fabric and accessory
Data In:	Fabric and accessory Invoice
Data Out:	Fabric and accessory Invoice
Process:	(1) Submit fabric and accessory to the next process for produce finished pattern. (2) Submit invoice to accountant staff for preparing payment to supplier
Attachment:	(1) Accountant (2) Process 5.0

Table D.18. Process Specification of Process 5.1.

Items	Description.
Process Name:	Get pattern information
Data In:	Pattern number
Data Out:	Pattern information Fabric and accessory number
Process:	Use the Pattern number that receive from previous process to retrieve pattern information, fabric and accessory information from the pattern.
Attachment:	(1) Factory (2) Pattern file

Table D.19. Process Specification of Process 5.2.

Items	Description.
Process Name:	Receive fabric and accessory
Data In:	Fabric and accessory
Data Out:	Fabric and accessory
Process:	Worker receives the fabric and accessory from the previous process and prepares it for cutting.
Attachment:	Process 4.0

Table D.20. Process Specification of Process 5.3.

Items	Description.
Process Name:	Check pattern, fabric and accessory information
Data In:	Fabric and accessory Fabric and accessory number Pattern information
Data Out:	Fabric and accessory Pattern information
Process:	(1) Check the pattern information to see what is fabric and accessory number. (2) Use the fabric and accessory number to verify that received fabric and accessory is the same fabric and accessory with the fabric and accessory file
Attachment:	Fabric and accessory file

Table D.21. Process Specification of Process 5.4.

Items	Description.
Process Name:	Produce finished pattern
Data In:	Pattern information Fabric and accessory
Data Out:	Finished pattern
Process:	Produce finished pattern according to pattern information
Attachment:	-

Table D.22. Process Specification of Process 5.5.

Items	Description.
Process Name:	Update pattern information and distribute finished Pattern
Data In:	Finished pattern
Data Out:	Pattern information Finished pattern Pattern number
Process:	(1) Receive finished pattern from the previous process and record the finished quantity to the Pattern file separated into stock, shop1, shop2. (2) Submit finished pattern, pattern number to stock (3) Submit finished pattern, pattern number to shops
Attachment:	(1) Stock (2) Shops (3) Pattern file

Table D.23. Process Specification of Process 6.1.

Items	Description.
Process Name:	Receive customer order
Data In:	Customer order
Data Out:	Customer order Customer number
Process:	Sale staffs receive the customer order from the Customer
Attachment:	Customer

Table D.24. Process Specification of Process 6.2.

Items	Description.
Process Name:	Check customer information
Data In:	Customer order Customer number
Data Out:	New customer
Process:	Sale staffs check the customer information by using customer number if it is the new customer, staffs will do the next process
Attachment:	Customer file

Table D.25. Process Specification of Process 6.3.

Items	Description.
Process Name:	New customer process
Data In:	New customer Customer information
Data Out:	New customer information New customer number
Process:	(1) Request information from the customer (2) Record the information into Customer file
Attachment:	(1) Customer (2) Customer file

Table D.26. Process Specification of Process 6.4.

Items	Description.
Process Name:	Check pattern information
Data In:	Customer order Customer information
Data Out:	Pattern information
Process:	Sale staffs check the customer order by using pattern number to see what ordered patterns and order details are.
Attachment:	Pattern file

Table D.27. Process Specification of Process 6.5.

Items	Description.
Process Name:	Record order and order details information
Data In:	Pattern information
Data Out:	Order number Order details information
Process:	Sale staffs record the order and order details information to the Order file and Order details file
Attachment:	(1) Order file (2) Order details file

Table D.28. Process Specification of Process 6.6.

Items	Description.
Process Name:	Create and submit delivery note
Data In:	Order number Order details information
Data Out:	Deliver note
Process:	(1) Sales staffs create the delivery note related to the customer order information (2) Sale staffs submit the delivery note to the accountant staff creating invoice
Attachment:	Accountant

Table D.29. Process Specification of Process 6.7.

Items	Description.
Process Name:	Delivery finished pattern
Data In:	Delivery note
Data Out:	Delivery note Finished pattern
Process:	Sales staffs delivery finished pattern and delivery note to the customer
Attachment:	(1) Customer

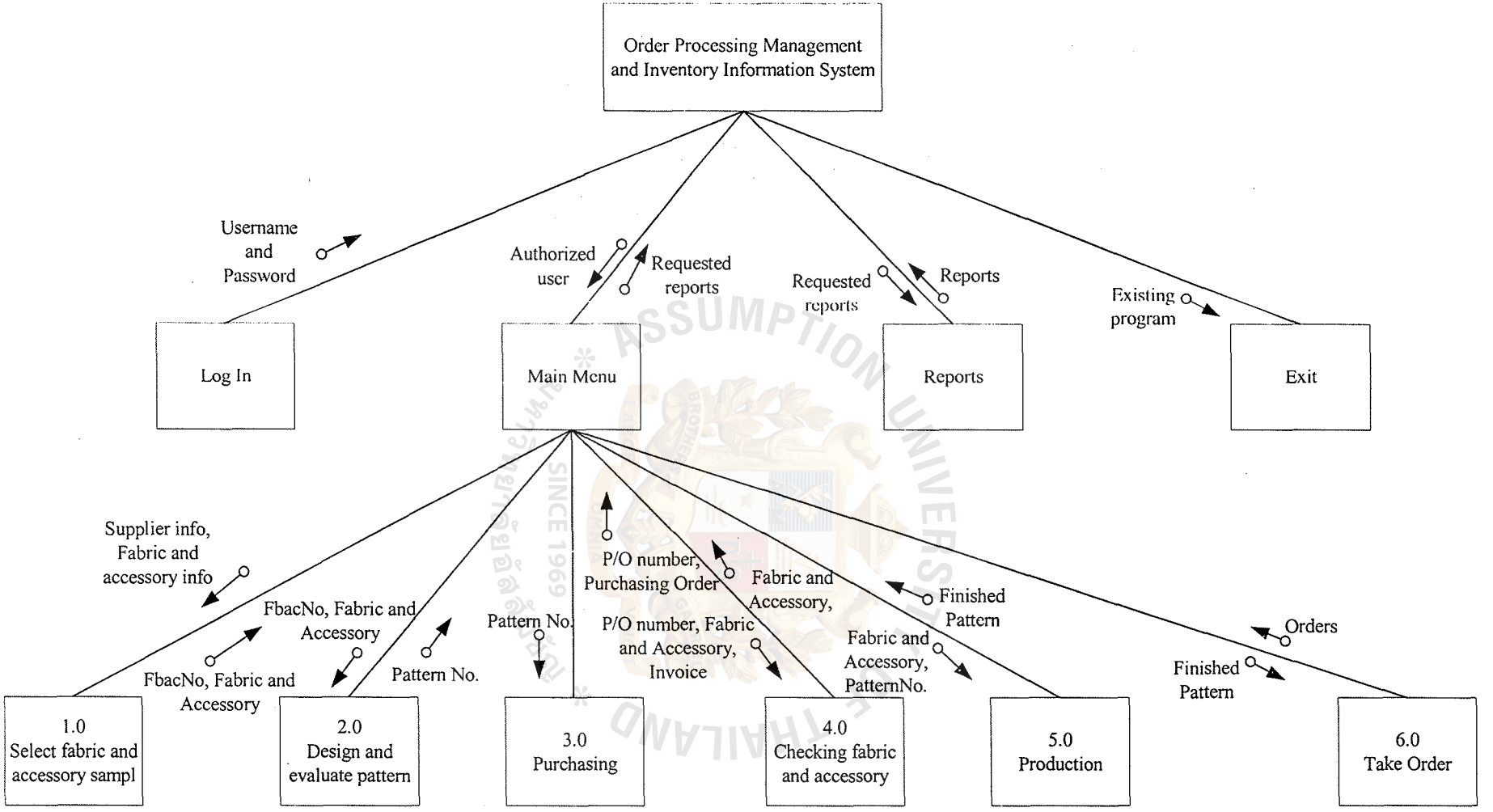

Figure D.1. Structure Chart: Main Menu.

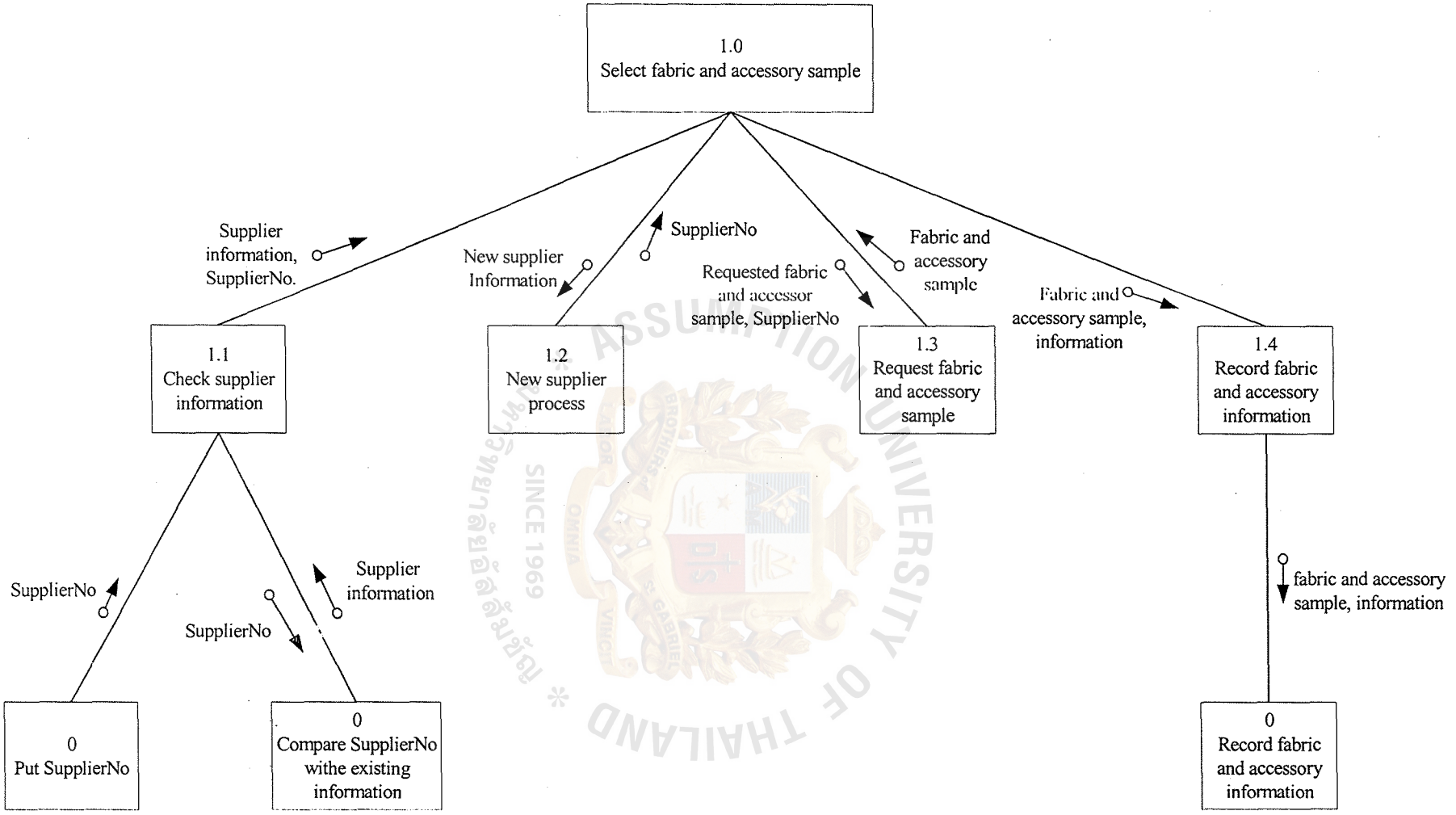

Figure D.2. Structure Chart: Select Fabric and Accessory Sample System.

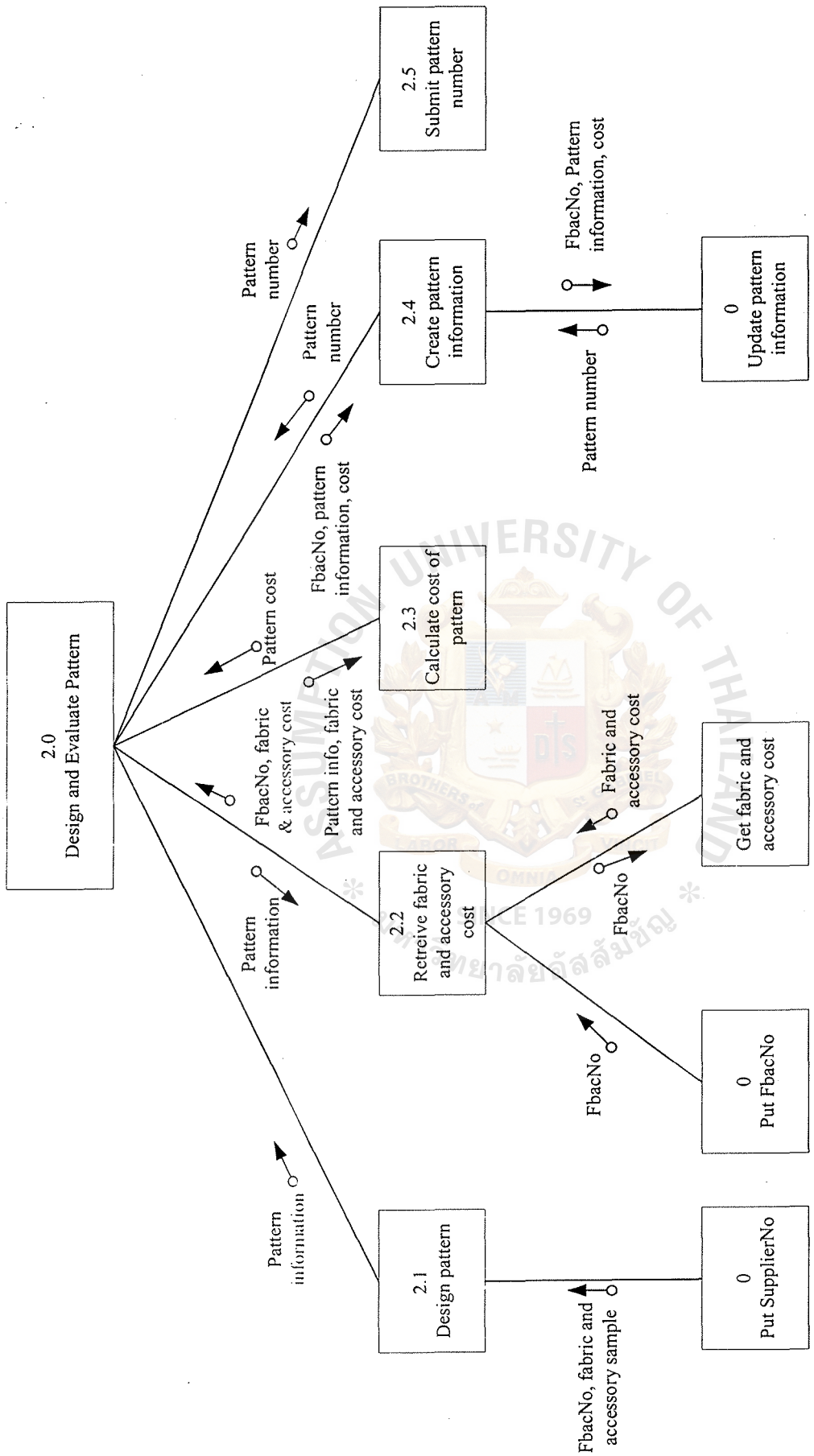

Figure D.3. Structure Chart: Design and Evaluate Pattern System.

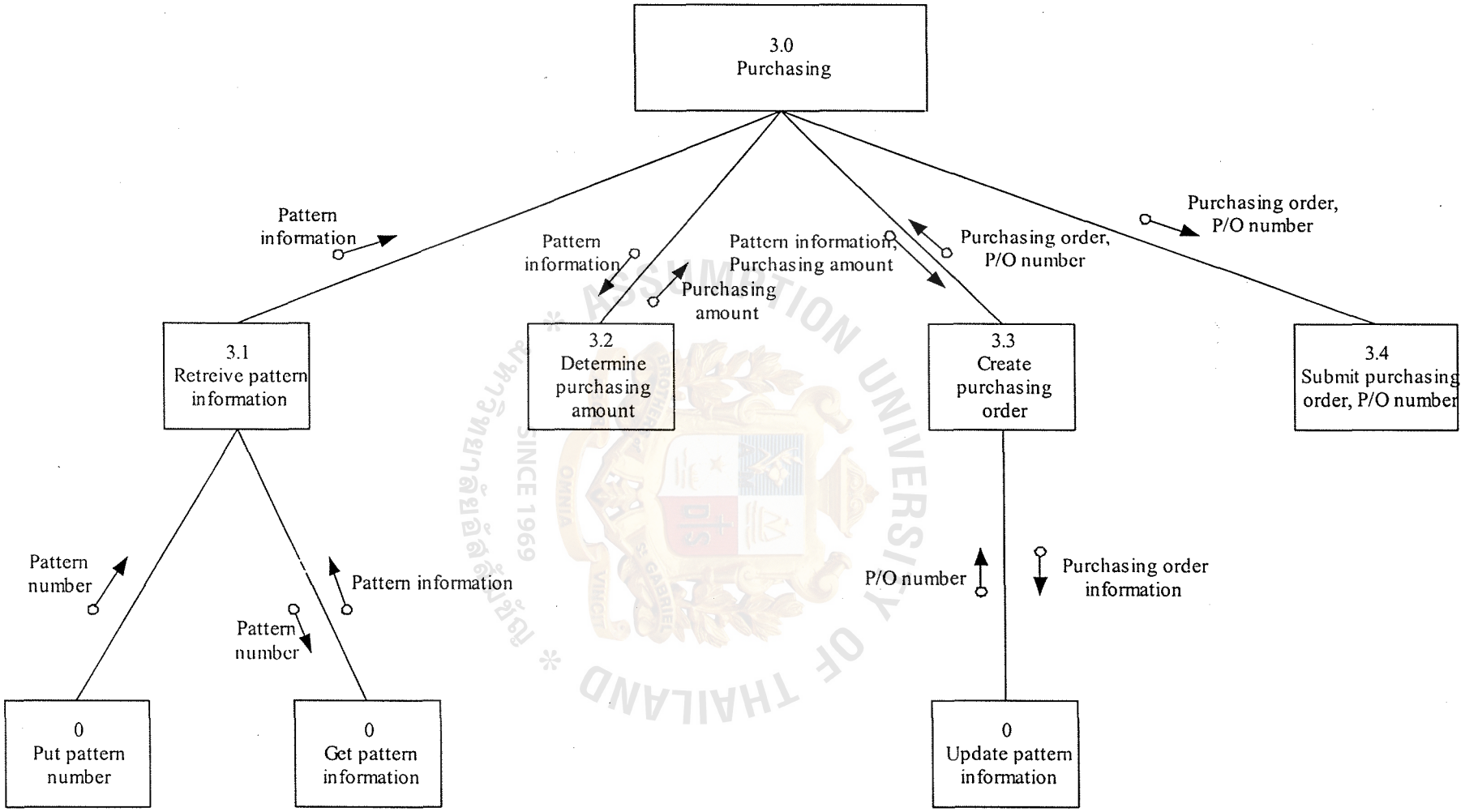

Figure D.4. Structure Chart: Purchasing System.

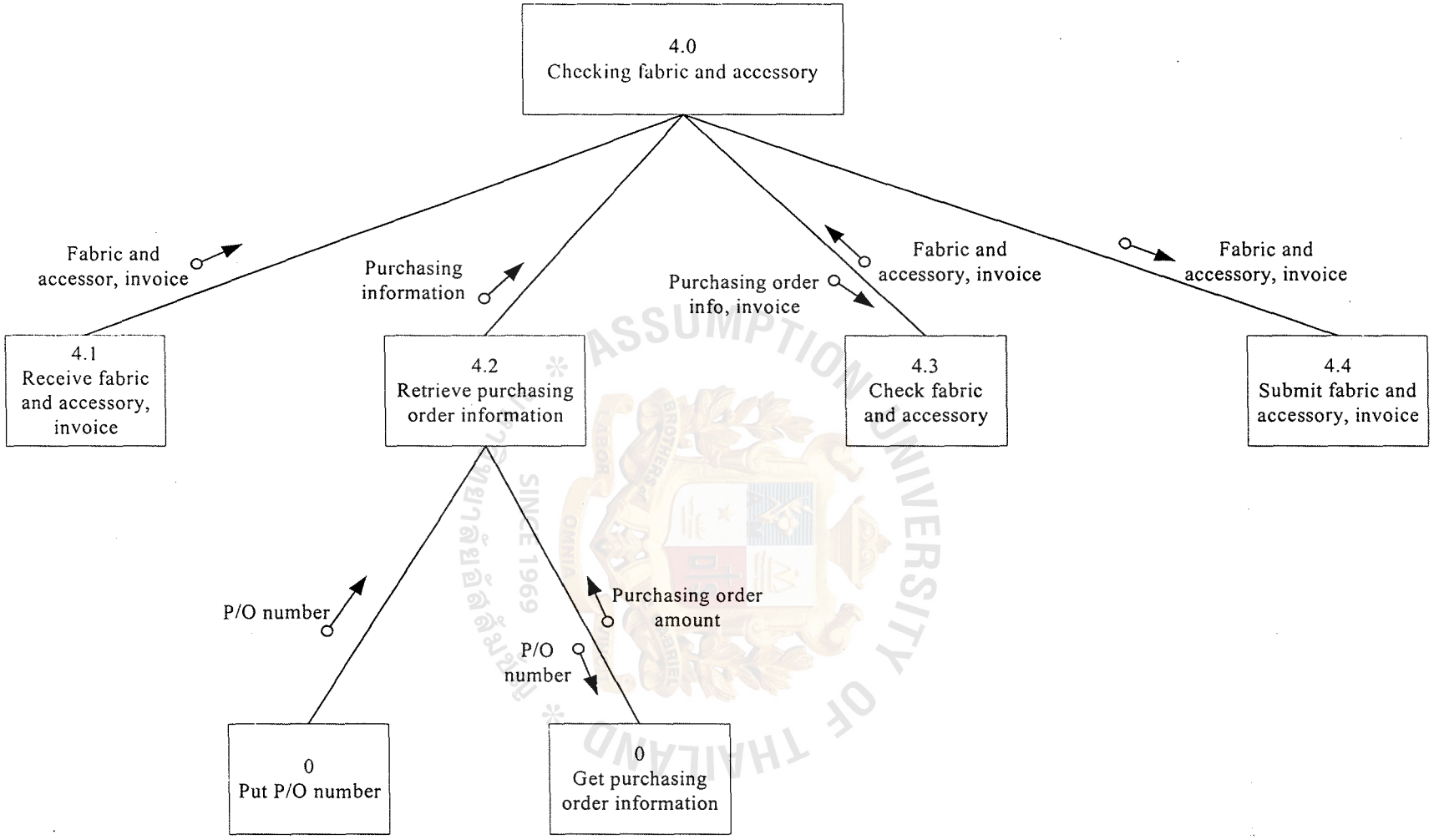

Figure D.5. Structure Chart: Checking Fabric and Accessory System.

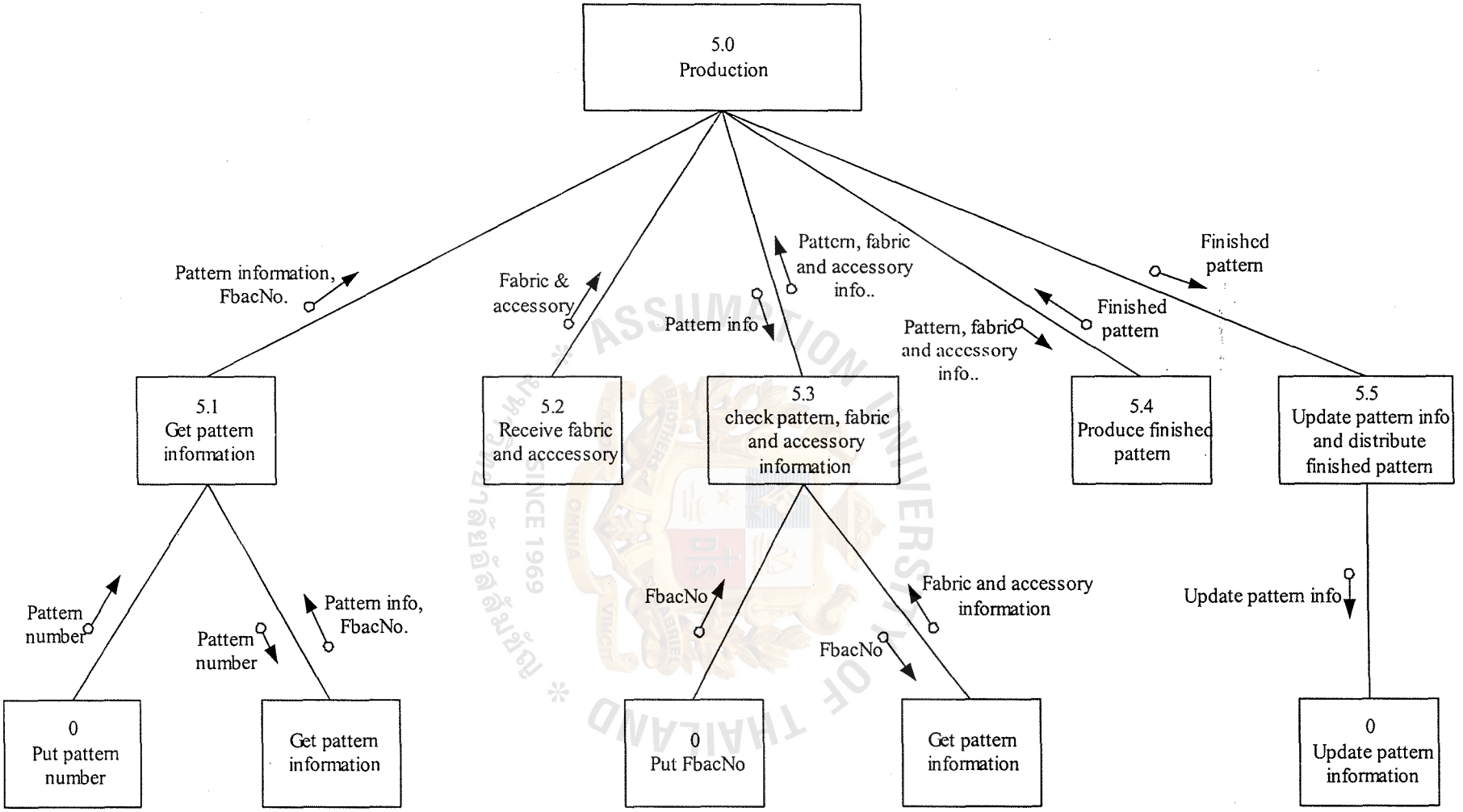

Figure D.6. Structure Chart: Production System.

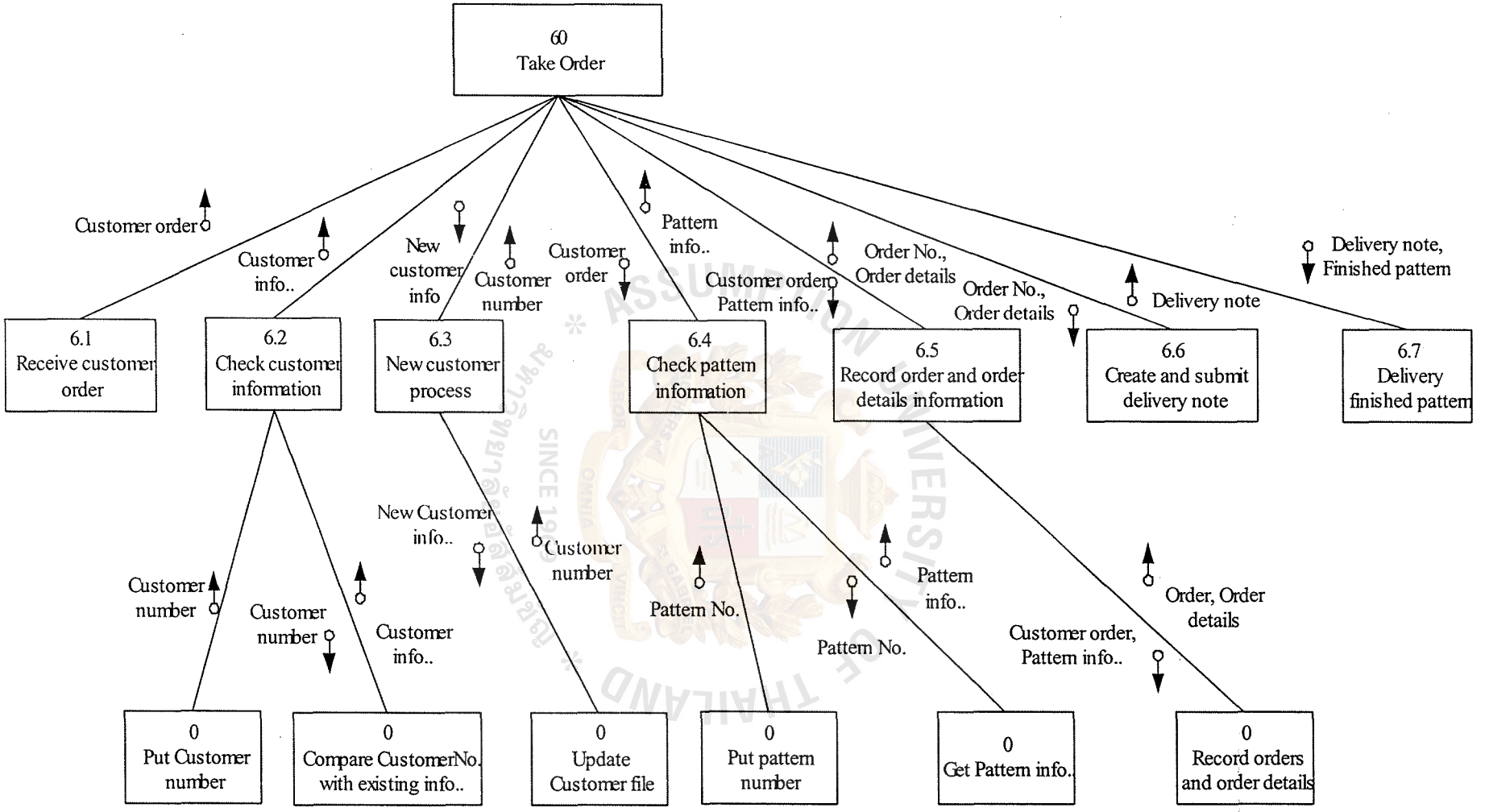

Figure D.7. Structure Chart: Take Order System.

APPENDIX E

DATA DICTIONARY

DATA DICTIONARY

Table E.1. Data Dictionary of Order Processing Management and Inventory Information Database.

Field Name	Meaning
CustNo	Number automatically assigned to new customer.
CustName	Name of customer.
CustConName	Name of customer contact person.
CustAddress	Customer's address.
CustProCity	Province or city of customer's address.
CustCountry	Country of customer's address.
CustPostalCode	Postal code of the customer's address.
CustPhone	Customer's telephone number includes country code or area code.
CustFax	Customer's fax number includes country code or area code.
CustEmail	Customer's e-mail address.
SupNo	Number automatically assigned to new supplier.
SupName	Name of supplier.
SupConName	Name of supplier contact person.
SupAddress	Supplier's address.
SupProvince	Province of supplier's address
SupPostalCode	Postal code of the supplier's address.
SupPhone	Supplier's telephone number includes country code or area code.
SupFax	Supplier's fax number includes country code or area code.
SupEmail	Supplier's e-mail address.
SupHomepage	Supplier's home page.
EmpNo	Number automatically assigned to new employee.
FirstName	Fist name of employee.
LastName	Last name of employee.
BirthDate	Employee's birth date.
HideDate	Employee's hide date.
Address	Employee's address.
Province	Province of employee's address.
PostalCode	Postal code of the employee's address.
HomePhone	Employee's home telephone number includes area code.
Photo	Employee's picture.
Note	General information about employee's background.
FbacNo	Unique seven-character code based on fabric or accessory name.
FbacName	Name of fabric or accessory.
FbacType	Define type of fabric and accessory product
FbacDescription	Fabric or accessory's description
FbacPrice	Fabric or accessory's price.

Table E.1. Data Dictionary of Order Processing Management and Inventory Information Database (Continued).

Field Name	Meaning
FbacSampleLoc	Location which keep fabric and accessory sample.
FbacPhoto	Fabric or accessory's picture.
PatternNo	Unique seven-character code based on pattern category.
PatternName	Name of pattern.
PatternDescript	Pattern's description
UnitPrice	Pattern's price per unit
Unit Cost	Pattern's cost per unit
UnitInStock	Remaining pattern in stock
UnitInShop1	Remaining pattern in shop 1
UnitInShop2	Remaining pattern in shop 2
Discontinued	If yes means pattern is no longer available.
PatternPhoto	Pattern's picture.
CategoryNo	Number automatically assigned to new category
CategoryName	Name of category
FbacQty	Quantity of fabric or accessory which used for the pattern
Remark	Reminder statement
OrderNo	Number automatically assigned to new order.
OrderDate	Date which order was issued.
DeliveryDate	Date which order was delivered to the customer.
OrderQty	Quantity of ordered pattern in order details table
OrderUnitPrice	Unite price of ordered pattern in order details table
PurOrderNo	Number automatically assigned to new purchase order.
PurOrderDate	Date which purchase order was issued.
ReceiveDate	Date which fabric and accessory was received from the supplier.
POQty	Quantity of purchased fabric and accessory in purchase order details table
POUnitPrice	Unite price of purchased fabric and accessory in purchase order details table

APPENDIX F

DATABASE DESIGN

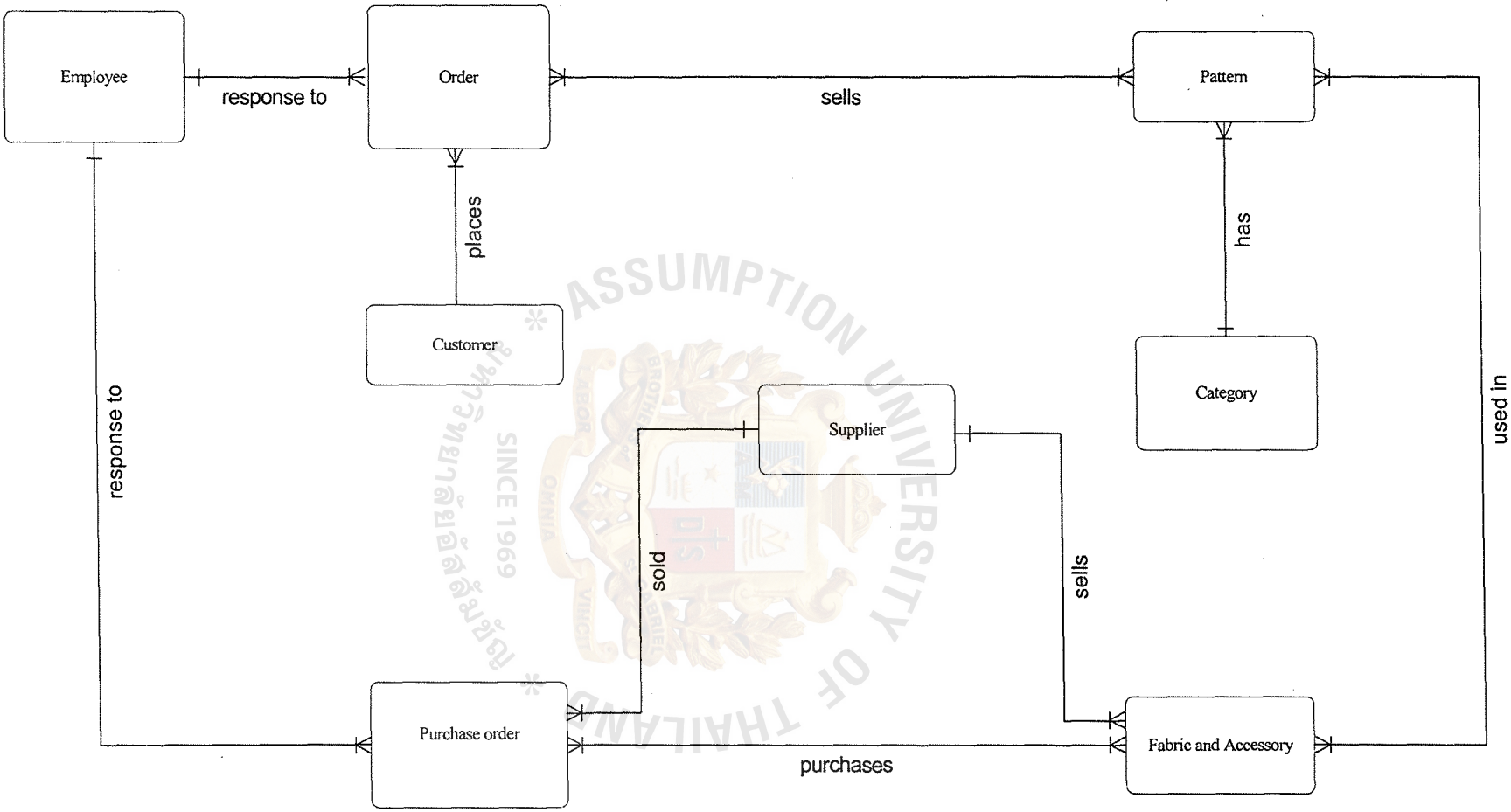

Figure F.1. Context Data Model of Order Processing and Inventory Information System.

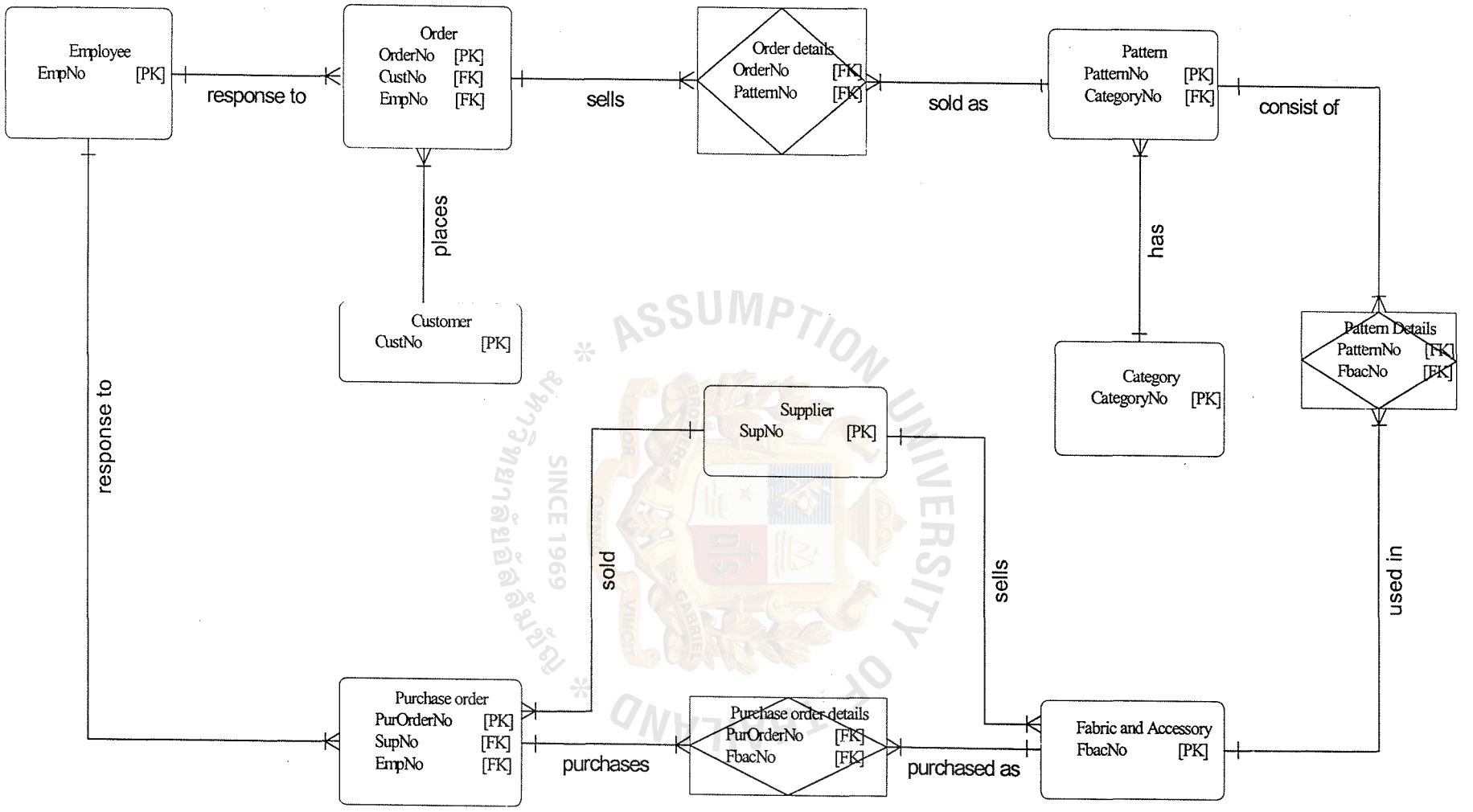

Figure F.2. Key Based Attribute Data Model of Order Processing and Inventory Information System.

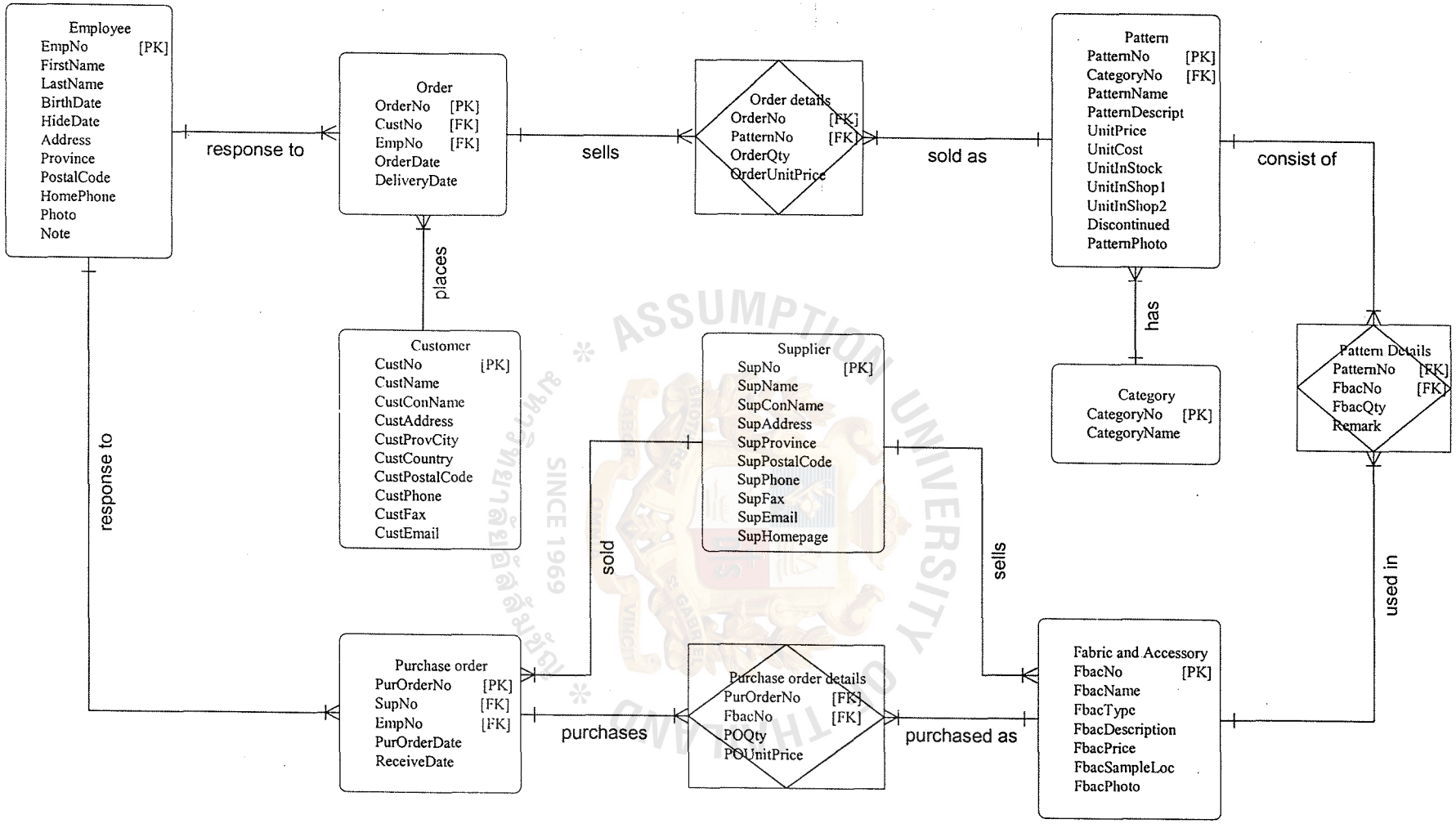

Figure F.3. Fully Attribute Data Model of Order Processing and Inventory Information System.

Order Processing Management and Inventory Information System Database

Table F.1. Structure of Customer Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	CustNo	auto number	Y	Y				Primary Key
2	CustName	varchar (50)	Y					Attribute
3	CustConName	varchar (50)			Y			Attribute
4	CustAddress	varchar (150)						Attribute
5	CustProCity	varchar (10)	Y					Attribute
6	CustCountry	varchar (10)	Y					Attribute
7	CustPostalCode	varchar (5)						Attribute
8	CustPhone	varchar (15)			Y			Attribute
9	CustFax	varchar (15)			Y			Attribute
10	CustEmail	varchar (50)	Y		Y			Attribute

Table F.2. Structure of Supplier Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	SupNo	auto number	Y	Y				Primary Key
2	SupName	varchar (50)	Y					Attribute
3	SupConName	varchar (50)			Y			Attribute
4	SupAddress	varchar (150)						Attribute
5	SupProvince	varchar (10)	Y					Attribute
6	SupPostalCode	varchar (5)						Attribute

Table F.2. Structure of Supplier Table. (Continued).

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
7	SupPhone	varchar (15)			Y			Attribute
8	SupFax	varchar (15)			Y			Attribute
9	SupEmail	varchar (50)	Y		Y			Attribute
10	SupHomepage	varchar (50)	Y		Y			Attribute

Table F.3. Structure of Employee Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	EmpNo	auto number	Y	Y				Primary Key
2	FirstName	varchar (50)	Y					Attribute
3	LastName	varchar (50)						Attribute
4	BirthDate	date					<1-Jan-01	Attribute
5	HideDate	date	Y				<1-Jan-01	Attribute
6	Address	varchar (150)						Attribute
7	Province	varchar (10)	Y					Attribute
8	PostalCode	varchar (5)						Attribute
9	HomePhone	varchar (15)			Y			Attribute
10	Photo	bitmap img						Attribute
11	Note	varchar (250)	Y					Attribute

Table F.4. Structure of Fabric and Accessory Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	FbacNo	varchar (7)	Y	Y				Primary Key
2	FbacName	varchar (100)						Attribute
3	FbacType	varchar (50)						Attribute
4	FbacDescription	varchar (50)						Attribute
5	FbacPrice	decimal (4,2)						Attribute
6	FbacSampleLoc	varchar (5)						Attribute
7	FbacPhoto	bitmap img						Attribute

Table F.5. Structure of Pattern Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	PatternNo	varchar (7)	Y	Y				Primary Key
2	CategoryNo	auto number	Y			Category Table		Foreign Key
3	PatternName	varchar (50)						Attribute
4	PatternDescript	varchar (200)						Attribute
5	UnitPrice	decimal (4,2)						Attribute
6	UnitCost	decimal (4,2)						Attribute
7	UnitInStock	int (6)						Attribute
8	UnitInShop1	int (6)						Attribute
9	UnitInShop2	int (6)						Attribute
10	Discontinued	Yes/No						Attribute
11	PatternPhoto	bitmap img						Attribute

Table F.6. Structure of Category Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	CategoryNo	auto number	Y					Primary Key
2	CategoryName	varchar (25)						Attribute

Table F.7. Structure of Pattern Details Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	PatternNo	varchar (7)	Y	Y		Pattern Table		Foreign Key
2	FbacNo	varchar (7)	Y			Fabric and accessory Table		Foreign Key
3	FbacQty	int (6)						Attribute
4	Remark	varchar (150)						Attribute

Table F.8. Structure of Order Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	OrderNo	auto number	Y	Y				Primary Key
2	CustNo	auto number				Customer Table		Foreign Key
3	EmpNo	auto number				Employee Table		Foreign Key
4	OrderDate	date					<1-Jan-01	Attribute
5	DeliveryDate	date					<1-Jan-01	Attribute

Table F.9. Structure of Order Details Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	OrderNo	auto number	Y			Order Table		Foreign Key
2	PatternNo	varchar (7)	Y			Pattern Table		Foreign Key
3	OrderQty	int (6)	Y					Attribute
4	OrderUnitPrice	decimal (6,2)	Y					Attribute

Table F.10. Structure of Purchase Order Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	PurOrderNo	auto number	Y	Y				Primary Key
2	SupNo	auto number				Supplier Table		Foreign Key
3	EmpNo	auto number				Employee Table		Foreign Key
4	PurOrderDate	date					<1-Jan-01	Attribute
5	ReceiveDate	date					<1-Jan-01	Attribute

Table F.11. Structure of Purchase Order Details Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	PurOrderNo	auto number	Y			Purchase Order Table		Foreign Key
2	FbacNo	varchar (7)	Y			Fabric and accessory Table		Foreign Key
3	POQty	int (6)	Y					Attribute
4	POUnitPrice	decimal (6,2)	Y					Attribute

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