



Small Scale Restaurant Information System

by

Ms. Angkana Lakanapornrak

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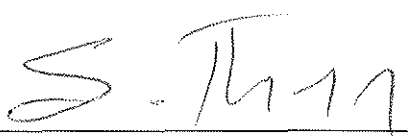
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The Graduate School of Assumption University has approved this final report of the three-credit course, CS 6998 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information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

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ABSTRACT

Ho Ho Hong Kong Kitchen Restaurant is a small scale restaurant located on Silom Road, Bangkok. The restaurant was established since 1997. It provides all good quality of Chinese and Hong Kong style food. The objective of the restaurant is to enable management monitor, analyze and control the operation of the restaurant. This project is to develop the effective restaurant information system to facilitate the operation and management process of the restaurant.

The study of this project begins with the study of the existing system which is done manually. There are many problems that occurred from the existing system. The problem is not only the general problems of day to day operation of the restaurant. But it also contains a lot of data redundancy and is difficult to control the data integrity and it is time consuming.

The new system is designed to capture the data and transactions, which occurred in daily business operation concerning sales and inventory in the restaurant, and then analyze them to support decision making by the management level. According to the objectives defined with the management level that requires a low cost microcomputer-based information system, the hardware and software used are based on client-server architecture which is mature in technology. The proposed system will run parallel with the existing system until the users feel confident with the new system.

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I. INTRODUCTION

1.1 Background of the Project

The restaurant business has been growing continuously in Thailand regardless of their size and type of business. In restaurant business, if we include the sidewalk stall, the market size will be very huge. To contribute to Thai government policy, the writer would like to focus on small-scale restaurants for studying this project. In other words, this studying will help us contribute and persuade SME (Small-Medium enterprise) to exist, survive and compete with large companies effectively. The size of measurement was determined by number of tables and area of service.

Nowadays the restaurant can run smoothly depending not only on the delicious food and cleanliness but also on the location, services and price. To differentiate from competitors, the restaurant has to emphasize on services and create impression to their customer. The operation and services also play a vital role in customer perspective.

For operation management, Sales Transaction process, Inventory management, Order and bill processing time and Pricing strategy should be operated, organized and managed effectively. Though, the earning or profit of restaurant is mainly from the sales of food and services, it is very essential that the restaurant must control their costs, both fixed cost and variable costs and also the inventory of their food and beverage. The sales information of restaurants is highly important for management in terms of sales analysis and as support information to create appropriate marketing plan & strategy.

As the existing manual system causes problems for operation and management, the proposed system has to develop to be computer-based system which is more systemized, utilized and be controllable.

1.2 Objectives of the Project

The objectives of this project are summarized as follows:

- (1) To reduce error problem and high operating cost incurred in the manual system.
- (2) To analyze the existing system in order to design and implement a new computerized system to support the current operations.
- (3) To improve service of restaurant and productivity by reducing the processing operating and response time to service customers.
- (4) To provide the standard and procedure for operation, Inventory Control and Management.
- (5) To provide reliable information to management level for providing better decision making and also to prepare the service report accurately (daily, weekly, monthly or yearly).
- (6) To improve the coordination within the operational level and external entity.
- (7) To reduce complication and eliminate unnecessary paper work in the existing system by using a computerized system.

1.3 Scope of the Project

This project focuses on the entire operation of restaurant business, starting from point of sales, food processing, back office or inventory system. It also emphasized on the output or report from the system as power analysis tool for management level.

In summary, the system has been divided into 2 sub-systems which are Sales Subsystem and Inventory Subsystem

Sales Subsystem will be directly about order, bills and payment of the restaurant. The order and bill processing start when waiter has received order from customer. Once

the food order was created, then it can be changed, added or cancelled. After it was finalized, the system needs to automatically calculate the payment and print out the bill to the customer.

Inventory Subsystem of the restaurant is significantly important. Though we use manually to determine the low level items in the kitchen, at the end we still find out some material ran out of stock due to the miscommunication of staff. The inventory information of both received and issued material must be recorded accurately. The system will require the stock keeper to keep record of the inventory transaction on computer-based in order to use information to determine the cost and report to management. Otherwise, the system needs to facilitate the stock keeper on retrieving of the inventory information faster and easy to use.

1.4 Deliverable

The deliverables of this project are as follows:

- (1) The Input Screen
 - (a) User login
 - (b) Main Menu
 - (c) Sales order sub-system
 - (d) Inventory sub-system
 - (e) Data Maintenance sub-system
 - (f) Table Reservation sub-system
- (2) The output screen
 - (a) Query Result
 - (b) On-line transaction result
 - (c) Batch transaction result
 - (d) Daily Transaction result

- (3) The report
 - (a) Sales report
 - (1) Sales transaction report
 - (2) Sales report by product category
 - (3) Sales report by bill number
 - (4) Hourly sales report
 - (b) Material & Inventory report
 - (1) Material transaction report
 - (2) Material report by product
 - (3) Current Inventory Report
 - (c) Analysis report
 - (1) Top five best seller food report
 - (2) Chart of sales report
 - (3) Chart of inventory report
 - (4) Monthly accounting report
- (4) Project Implementation
 - (a) Overview of Project Implementation
 - (b) Construction Phase
 - (c) Implementation Phase
 - (d) Conclusions and Recommendations

1.5 Project Plan

The project plan is based on System Development Life Cycle (SDLC). The processes are divided into 3 main phases as following:

- (1) Analysis of the existing system.
- (2) Analysis and design of the proposed system.
- (3) Implementation of the proposed system.

This project plan of Restaurant Information System of Ho Ho Hong Kong Kitchen is shown in Figure 1.1



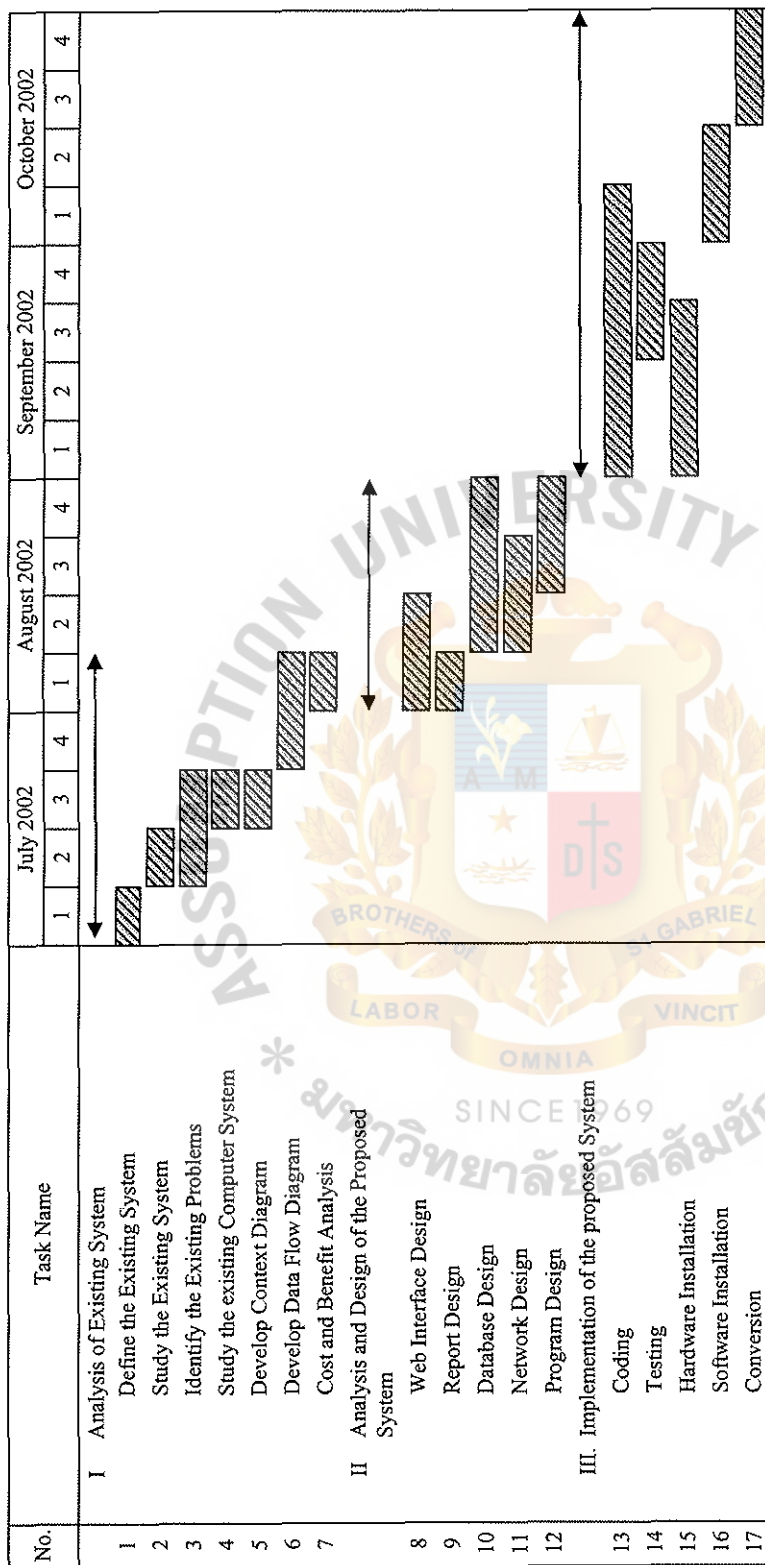


Figure 1.1. The Project Plan of Restaurant Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Ho Ho Hong Kong Kitchen restaurant was established in 1997 by Sithi-Amnuai's Family. Mr. Amnuai Sithi-Amnuai took over this restaurant from his friend and seen the opportunity to operate this restaurant successfully. After settlement, he assigned his daughter, Ms. Rattana Sithi-Amnuai to manage this restaurant on his behalf. The restaurant has service area of 350 sqms with 34 tables to service. The restaurant is located at Silom Road, next to United Center Building. The good location is one of the advantages of this restaurant. Since it is located in the business area, the target market of the restaurant is working people around Silom Area, even though the earning and profit of the restaurant are from sales of product and service. The accuracy of information of sales and inventory is essential for management to work on sales forecast, marketing plan, business plan and strategy in order to maintain, stimulate and increase sales.

Since all existing operations has been done manually, error and time consuming problem has occurred. In order to avoid the problem, the management has decided to use computerize system to support the restaurant's operation.

The organization chart of the restaurant will be shown in Figure 2.1.

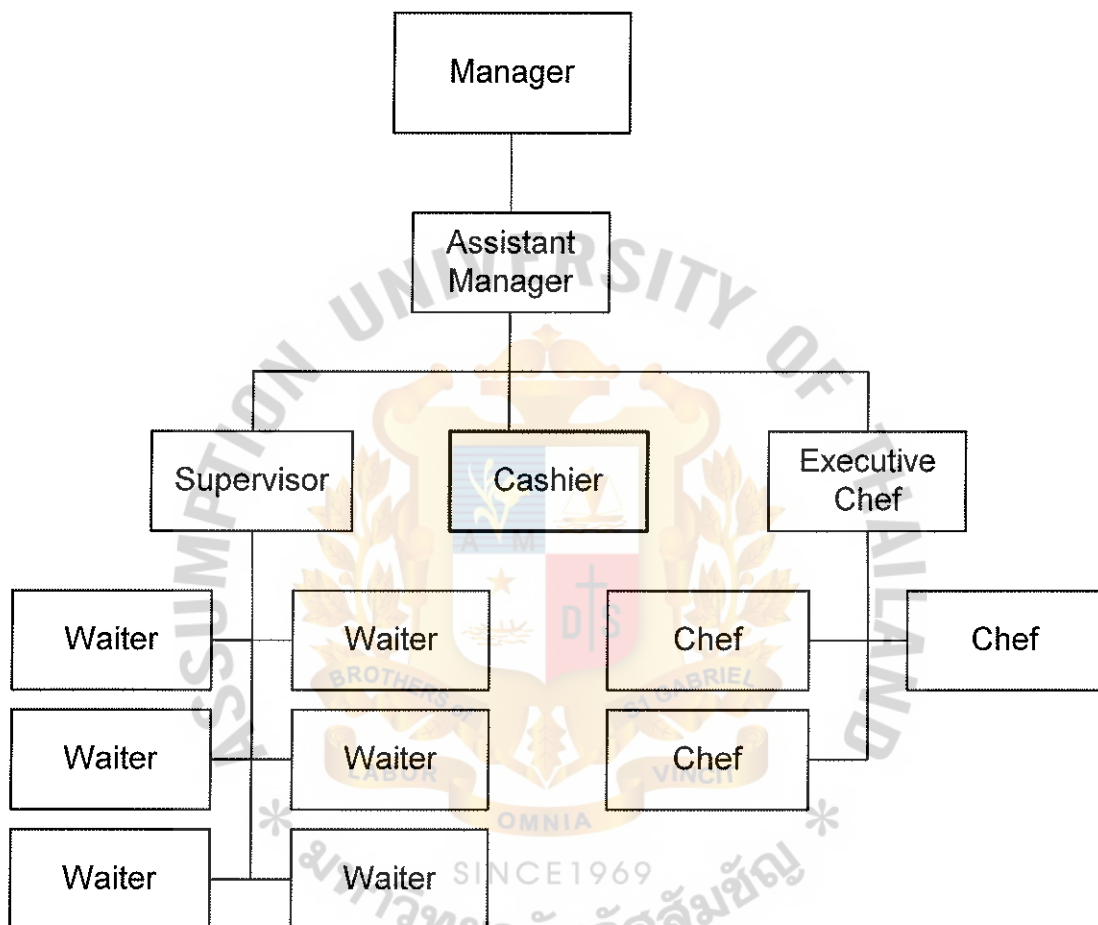


Figure 2.1. Organization Chart of Ho Ho Restaurant.

2.2 Existing Business Function

The operation of restaurant business starts since customer has entered restaurant.

The existing function has been divided into 2 major parts.

(1) Sales Subsystem

The most obvious and important function performed is at sales subsystem. This subsystem can be determined as sales and customer services function of the restaurant, which have to deal with the customer directly.

After the waiter has received order, the order form has been created manually. The order form can be either for food, beverage or both. Therefore the order form is divided in to 2 parts either food or beverage. An original form has been given to cashier. But the copy sent to the kitchen for food or beverage processing. In this subsystem, we will have a pigeonhole to collect and separate order for each table. Once the food has been served, the order copy will be sent from kitchen to the pigeonhole of each table. If there is any food item in customer order is running out of stock, the waiter will inform customer and has to cross out from the order form and return it to pigeonhole.

When the customer requests for bill, the cashier will collect all order forms and the copy for that particular table and calculate the total prices by using the electronic calculator. After the payment was received, the receipt will be issued by slip from electronic calculator.

By the end of that day, the cashier has to print end of day sales figure from electronic calculator and give to manager to verify and as a report.

(2) Inventory Subsystem

Though these subsystem seem not to be important in the customer's perspective, if it is not well organized, it may cause us to lose an opportunity to sell our product.

The stock keeper has to determine manually the low-level item from current inventory, and list the request item. The request was submitted to manager for verification. Once the manager has made the approval, the stock keeper will contact supplier and order the purchase item.

The supplier delivers product with the delivery order and invoice. The invoice was verified and signed by stock keeper. The stock keeper records new items into inventory log book. Stock Keeper keeps the product in the inventory to wait for internal use. Stock keeper has to forward the invoice to manager for making payment.

The supply request for internal use has to be approved by the manager. The stock controller will record the quantity and deduct the request unit from stock quantity.

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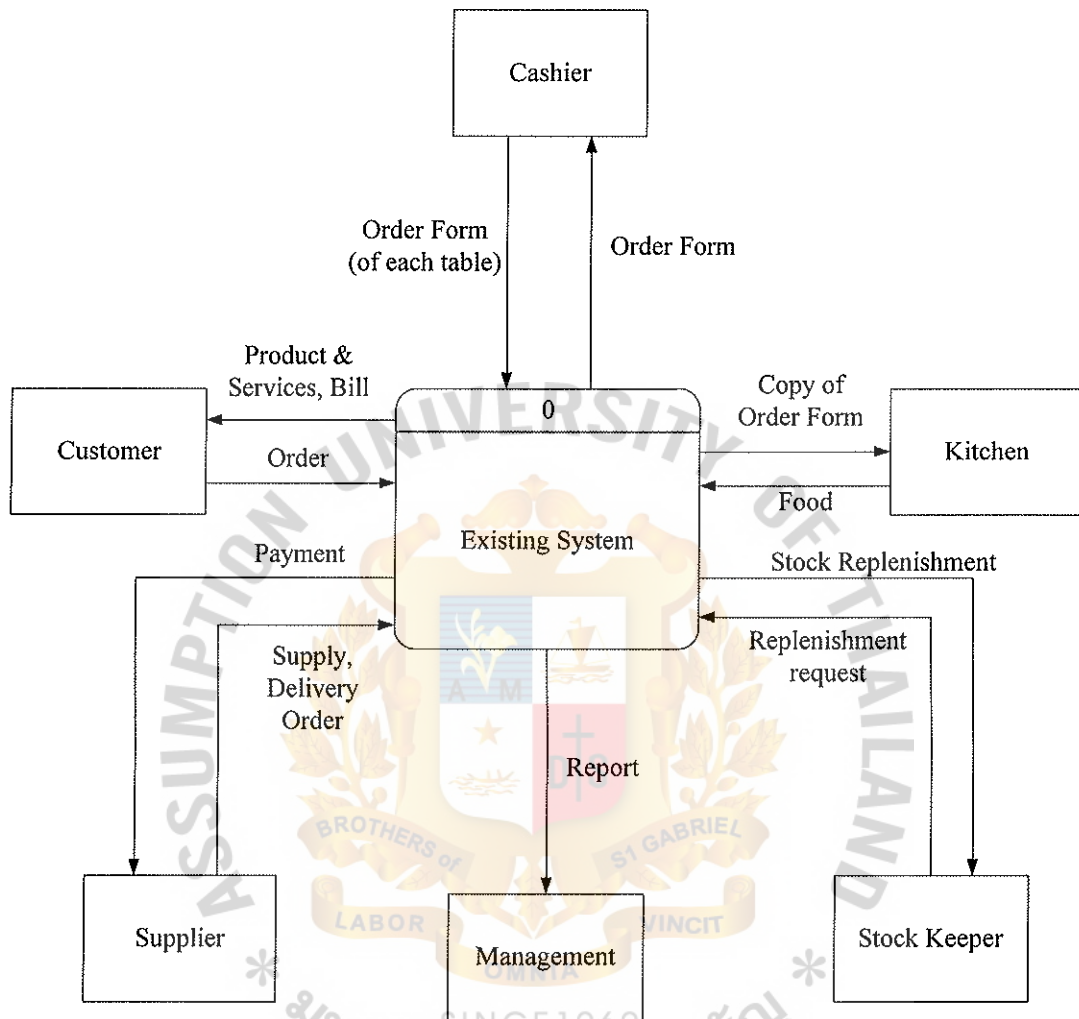


Figure 2.2. Context Diagram of the Existing System.

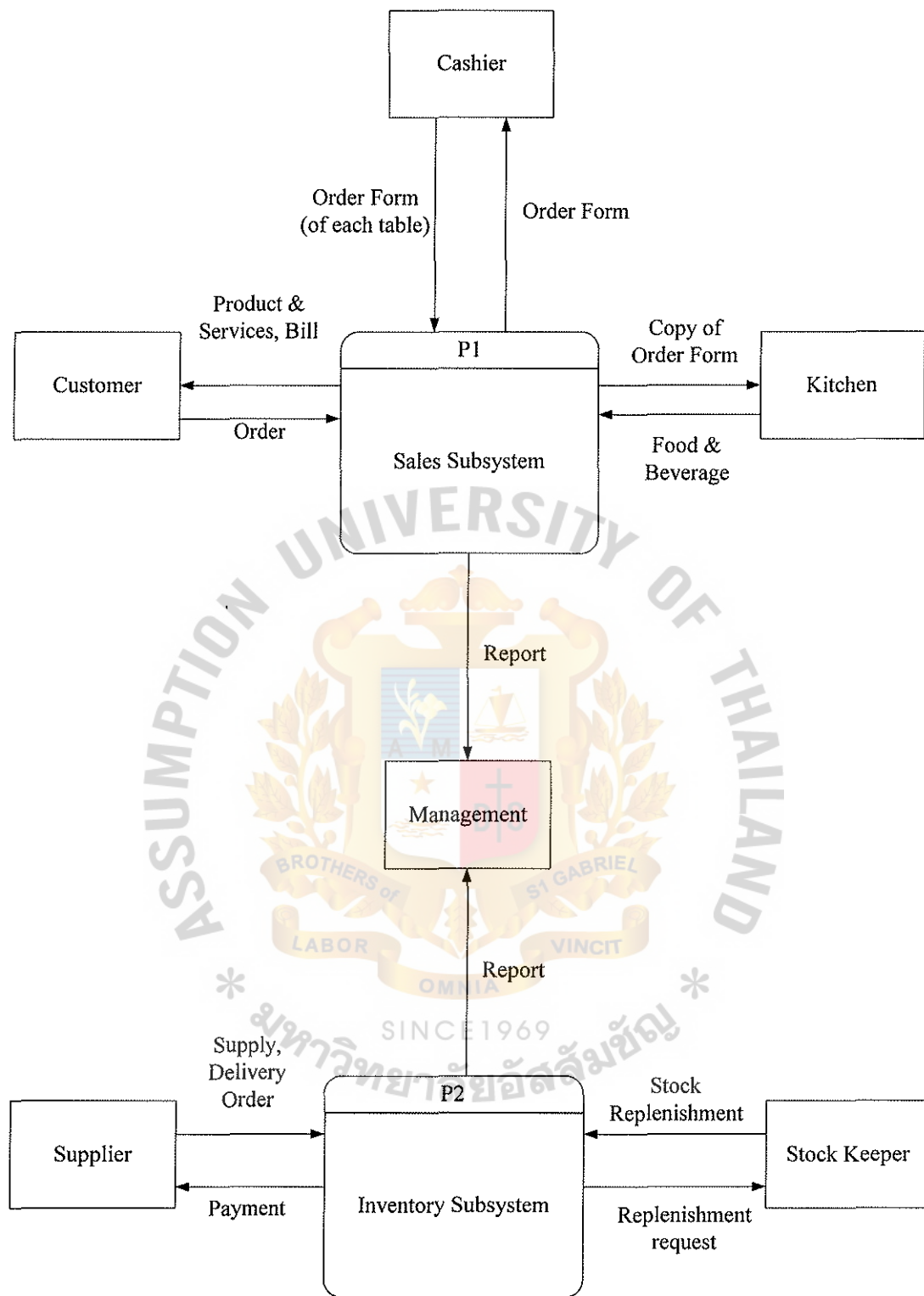


Figure 2.3. Data Flow Diagram Level 0 of the Existing System.

2.3 Current Problems Analysis and Areas for Improvements

By analyzing problem of the existing system using **PIECES** framework: **P** - the need to improve **Performance**; **I** - the need to **Information** (and data); **E** - the need to improve **Economics**, control costs or increase profits; **C** - the need to improve **Control** or security; **E** - the need to improve **Efficiency** of people and processes; **S** - the need to improve **Service** to customer, suppliers, employee, etc. so the current problems, opportunities and directives of the existing system can be summarized as follows:

Performance

- (1) The existing system is not reliable. The system is easy to crash or down if it has to handle a lot of transactions at the same time.
- (2) Heavily reliant on a large number of staff to keep it running efficiently; It is totally controlled and kept running by staff within the system. If members of staff become sick or late for work the whole system begins to suffer the consequences.
- (3) Throughput which is the amount of work performed over some period of time is very low especially during the peak time for rush hour at lunch and dinner time of the day.
- (4) Response time which is the average delay between a transaction or request and a response to that transaction or request is very slow when there are a lot of customers and they are all requests for the bill simultaneously.

Information

- (1) Information is not accurate and contains some redundancy.
- (2) Information is difficult to produce. The process of generating report is complicated, cumbersome and time-consuming.
- (3) Error of input data can cause too much time for investigation and delay the

response time.

- (4) Data is not flexible which means data is not easy to meet new information needs from stored data.
- (5) No back up and recovery process for the stored data in case of the non-systemized filing or unexpected situation.

Economics

- (1) Costs are untraceable to source.
- (2) A lot of paperwork is being used daily when it is not necessary. It is also filling up a lot of space in the offices and not environmentally friendly.

Control

The existing system has too little security or control over stock and sales information. :

- (1) Input data is not adequately edited.
- (2) Crimes (e.g. fraud, embezzlement) are (or can be) committed against data.
- (3) Redundantly stored data is inconsistent in different files or databases.
- (4) Data privacy regulations or guidelines are being (or can be) violated.
- (5) Processing errors is occurring either by people, machines, or software.
- (6) Decision-making error is occurring. The wrong decision comes from inaccurate data or information.

Efficiency

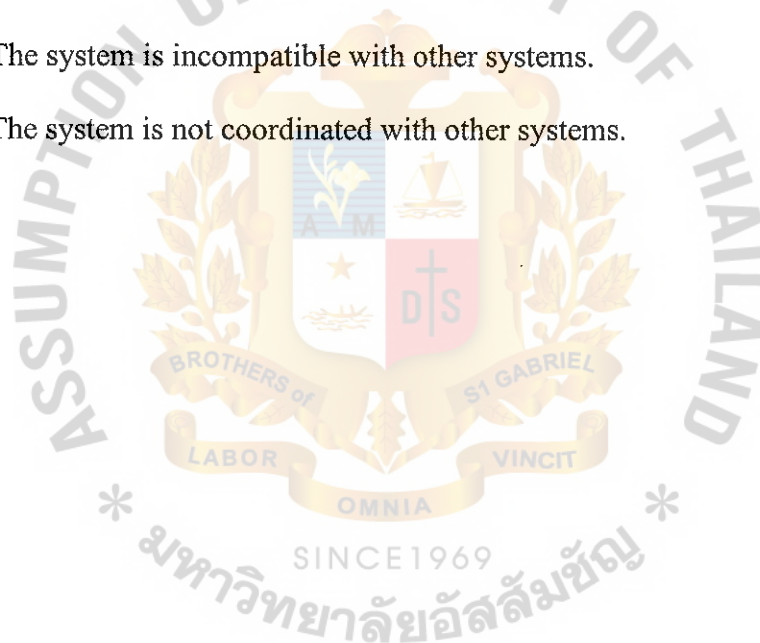
- (1) People, machines or computers waste time.
 - (a) Data is redundantly input or copied.
 - (b) Data is redundantly processed.
 - (c) Information is redundantly generated.
- (2) Lack of good communication skills resulted in information redundancy and

delay in processing.

- (3) Effort required for tasks is excessive such as the generating report process which will be wasting time for manager to translate and re-create data from electronic calculator to the monthly sales report.

Service

- (1) The system produces inaccurate results.
- (2) The system is not easy to learn and use.
- (3) The system is inflexible to change or inflexible to new or exceptional situations.
- (4) The system is incompatible with other systems.
- (5) The system is not coordinated with other systems.



III. THE PROPOSED SYSTEM

3.1 Requirements Analysis and System Specification

The major requirement for the proposed system is try to solve the current problems from the existing information system. However, we also try to improve the existing system in order to have a better performance in process and maintain information needed for operation and management. The system specification has to provide the main or major functions of restaurant information system efficiently.

By studying from existing problem, we divide the requirement analysis to functional and non-functional requirement.

- (a) Functional requirement - is a function or feature that must be included in the restaurant information system to satisfy the business needs and be acceptable to the users.
 - (1) The system should process sales order information, calculate total price order, print the accurate bill and receipt, provide and generate sales report and information on timely basis.
 - (2) The system should have update or current status of inventory information, track the history inventory information, minimize the out of stock material, and expired material
 - (3) The system should record sales details, payment details, table reservation details, inventory history and other related information.
 - (4) The system should enable the user to modify sales order and update inventory.
 - (5) The system should produce all required reports such as sales report, inventory report, table reservation report, and other managerial reports.

- (b) Nonfunctional requirement – is a description of the features, attributes, and characteristics of the system as well as any constraints that may limit the boundaries of the proposed solution. The PIECES framework from problem analysis is used for classifying nonfunctional requirements as follows:

Performance

- (1) The acceptable throughput for sales order process is about 40-45 tables per day.
- (2) The acceptable response time for a bill request and payment is about 5-8 minutes per one request.

Information

- (1) The input data should have validation and verification checking for accuracy and reduce redundancy.
- (2) The system should operate and store in both Thai and English.
- (3) The system should insert, update, delete and search the information easily and quickly.
- (4) The system should enable the user to retrieve the required information easily and fast.
- (5) Data stored should contain primary key, but no redundancy.

Economics

- (1) The paperwork and transaction cost must be reduced.
- (2) The project should be finished within the budget and implemented within 5 months.

Control (and security)

- (1) The system should be reliable for user and able to handle a lot of processes and data simultaneously.

- (2) The system should provide the security and access control.
- (3) The system should provide the backup and recovery function to protect against the loss of data.

Efficiency

- (1) The system should reduce some duplicated step in the operation process.
- (2) Material available and out of stock can be reviewed easily and accurately.
- (3) Sales Order details, supplier profile and required information can be reviewed and checked immediately as required.
- (4) All information for sales order to the customer can be checked easily and quickly.
- (5) The system should produce all reports without time consuming.

Service

- (1) The system should be user friendly or in window platform.
- (2) The system should allow users to customize the reports.
- (3) The system should be compatible for new trend of technology in the future.

3.2 Feasibility Analysis

Feasibility analysis is particularly important to the system analysis because it is the measure of how beneficial or practical the development of the restaurant information system will be to Ho Ho Restaurant.

In decision analysis, we must first identify alternative candidate solutions in form of a candidate matrix, which is a useful tool for effectively capturing, organizing and comparing the characteristics for different candidate system solutions. Each candidate

system solution must be analyzed for feasibility. A candidate matrix is analyzed based on characteristics of Interface, Data, Processes and Geography.

After the candidate solutions are identified, the feasibility analysis can be done for each candidate. The following feasibility criteria should take into consideration select the best solution to implement in the production environment.

- (1) Operational feasibility is a measure of how well the solution will work in the restaurant. It is also a measure of how people feel about the new system.
- (2) Technical feasibility is a measure of the practicality of a specific technical solution and the availability of technical resources and expertise.
- (3) Schedule feasibility is a measure of how reasonable the new information system project timetable is.
- (4) Economic feasibility is a measure of the cost-effectiveness of a new project or solution. This is often called a cost-benefit analysis because it deals with the costs and benefits of the information system.

The candidate systems matrix and feasibility analysis matrix will be shown in Tables 3.1 and 3.2 respectively.

Table 3.1. A Candidate Systems Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
<p>Portion of System Computerized</p> <p>Brief description of that portion of the system that would be computerized in this candidate.</p>	<p>COTS package would be purchased and customized to satisfy required restaurant information system functionality.</p>	<p>Hiring the outsource company to analyze and develop the new restaurant information system.</p>	<p>Same as candidate 2.</p>
<p>Benefits</p> <p>Brief description of the business benefits that would be realized for this candidate.</p>	<p>This solution can be implemented quickly because it's a purchased solution.</p>	<p>Same as candidate 3. Plus more efficient in dealing with user for any additional requirements.</p>	<p>Fully supports user required business processes for restaurant information system of Ho Ho restaurant.</p>
<p>Servers and Workstations</p> <p>A description of the servers and workstations needed to support this candidate.</p>	<p>Technically architecture dictates Pentium III, MS Windows 2000 class servers and workstations (clients).</p>	<p>Same as candidate 1.</p>	<p>Same as candidate 1.</p>
<p>Software Tools Needs</p> <p>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.</p>	<p>Power Builder and Access for customization of package to provide report writing and integration.</p>	<p>MS Visual Basic 6.0 to code program and Crystal Report to generate all required reports and the other additional reports.</p>	<p>Delphi 5 to code program and Crystal Report to generate all required reports.</p>

Table 3.1. A Candidate Systems Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
<p>Application Software</p> <p>A description of the software to be purchased, built, accessed, or some combination of these techniques.</p>	Package Solution	Custom Solution	Same as candidate 2.
<p>Method of Data Processing</p> <p>Generally some combination of: on-line, batch, deferred batch, remote batch, and real-time.</p>	Client/Server Architecture.	Same as candidate 1.	Same as candidate 1.
<p>Output Devices and Implications</p> <p>A description of output devices that would be used, special output requirements (e.g., network, preprinted forms, etc.) and output considerations (e.g., timing constraints)</p>	(1) Fujitsu dot matrix printers.	Same as candidate 1.	(1) Epson LQ300 dot matrix printers.
<p>Input Devices and Implications</p> <p>A description of input methods to be used, input devices (e.g., keyboard, mouse, etc.), special input requirements (e.g., new or revised forms from which data would be input), and input considerations (e.g., timing of actual inputs).</p>	Keyboard and mouse.	Same as candidate 1.	Same as candidate 1.

Table 3.1. A Candidate Systems Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
<p>Storage Devices and Implications</p> <p>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.</p>	<p>MS SQL Server DBMS with 250 GB arrayed capability.</p>	<p>Same as Candidate 1.</p>	<p>Same as Candidate 1.</p>



Table 3.2. Feasibility Analysis Matrix.

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
<p>Operational Feasibility</p> <p>Functionality. A description of to what degree the candidate would benefit the organization and how well the system would work.</p> <p>Political. A description of how well received this solution would be from both user management, user, and organization perspective.</p>	30%	<p>Some current business processes would have to be modified to take advantage of software functionality</p> <p>Score : 60</p>	<p>Fully supports user required and restaurant functionality.</p> <p>Score : 100</p>	<p>Same as candidate 2</p> <p>Score : 100</p>
<p>Technical Feasibility</p> <p>Technology. An assessment of the maturity, availability (or ability to acquire), and desirability of the computer technology needed to support this candidate.</p> <p>Expertise. An assessment of the technical expertise needed to develop, operate, and maintain the candidate system.</p>	30%	<p>The package solution is easy and fast in implementation but maturity of product is a risk and company charges an additional monthly fee for technical support.</p> <p>Required to hire or train Access expertise to perform modifications for integration requirements.</p> <p>Score : 65</p>	<p>MS Visual Basic is one of the successful programming languages. The training will be simple and finding experienced programmers will be easy and much cheaper than other language programmers.</p> <p>MS Visual Basic is a mature technology based on version number.</p> <p>Score : 95</p>	<p>Although all applications will be written by outsourcing programmers, company needs to hire maintenance company with some knowledge of Delphi and Crystal Report to maintain the new system.</p> <p>MS SQL Server is a mature technology based on version number. It is easy to find an expertise to take care the database.</p> <p>Score : 80</p>

Table 3.2. Feasibility Analysis Matrix (Continued).

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
Economic Feasibility	30%			
Cost to develop:		Approximately 198,500 Baht.	Approximately 205,000 Baht.	Approximately 271,000 Baht.
Payback period (discounted):		Approximately 4 years.	Approximately 2.9 years.	Approximately 4.1 years.
Net Present Value:		Approximately 40,718.94 Baht.	Approximately 183,098.50 Baht.	Approximately 102,629.43 Baht.
Detailed calculations:		See Table 3.12, 3.13 & Figure 3.16.	See Table 3.14, 3.15 & Figure 3.18.	See Table 3.16, 3.17 & Figure 3.20.
		Score : 50	Score : 60	Score : 55
Scheduled Feasibility	10%	Less than 4 months.	7-9 months	9-12 months
An assessment of how long the solution will take to design and implement.		Score : 90	Score : 80	Score : 75
Ranking	100%	61.5	84.5	78.0

Once the feasibility analysis has been completed for each candidate solution, we can compare the candidates and select one or more restaurant information system solutions to recommend to the restaurant manager and cashier who is the system owner and user respectively. From a feasibility analysis matrix (Table 3.2), after ranking or scoring all candidates on each criterion, the candidate system solution 2 has the highest scores which means the candidate system 2 offers the best overall combination of technical, operational, economic and schedule feasibility. Thus, the candidate system solution 2 is recommended to Ho Ho Restaurant.

3.3 Data Modeling and Analysis

Data Modeling is a technique for organizing and documenting a system's data. The complete data model is usually implemented as a database. Typically, the data model is called an entity relationship diagram (ERD).

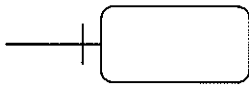
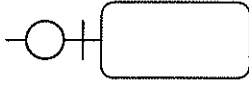
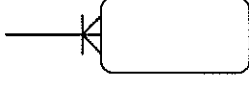


Entity Relationship Diagrams (ERD) are employed for data modeling, as it is the most popular and simplest logical data modeling techniques. There are three levels of entity relationship diagram: context data model, key-based data model and fully attributed data model.

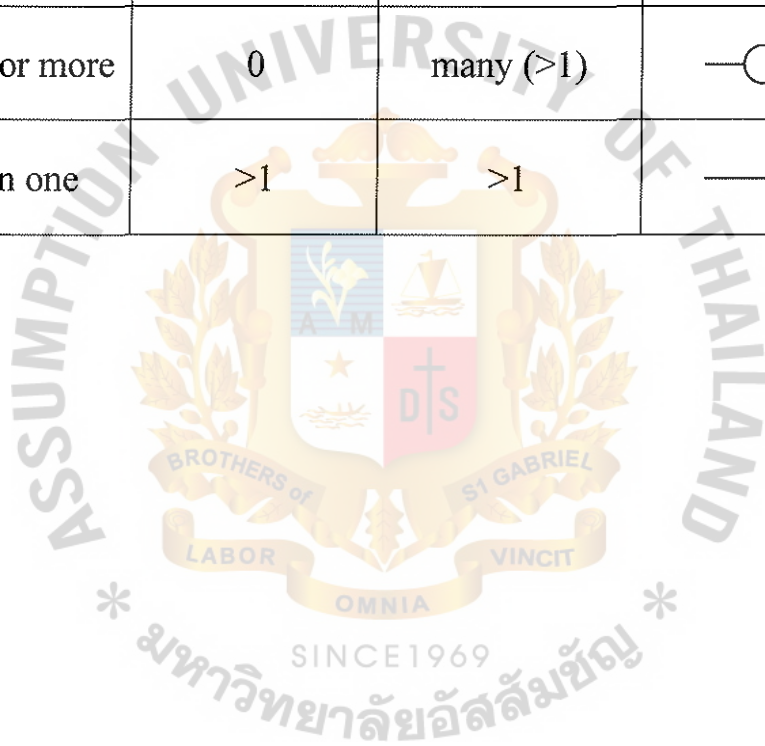
By investigating the requirements, four fundamental entities in Inventory subsystem and five entities in Sales subsystem of the proposed restaurant system, are discovered. Three data models are developed. The first data model is "Context Entity Relationship Diagram". It contains only previously discovered entities and nonspecific relationships entities. Figure 3.1 illustrates Context Entity Relationship Diagram of the proposed system.

The next data model is "Key Based Entity Relationship Diagram". It contains more details regarding entities by specifying primary key of each entity. It eliminates nonspecific relationship entities that are specified in Context Entity Relationship Diagram by resolving them into Associative Entities. Figure 3.2 illustrates Key-based data model of the proposed system.

The final data model, fully attributed data model, shows all attributes of each entity. To identify all attributes, it requires the understanding of the data attributes for the system. These facts can be discovered through the study of the existing reports and documents to be the naming standard for attribution. Figure 3.3 provides the fully attributed data model for the restaurant information system project.

Table 3.3. Cardinality of a Relationship.

Cardinality Interpretation	Minimum Instances	Maximum Instances	Graphic Notation
Exactly one	1	1	
Zero or one	0	1	
One or more	1	many (>1)	
Zero, one or more	0	many (>1)	
More than one	>1	>1	



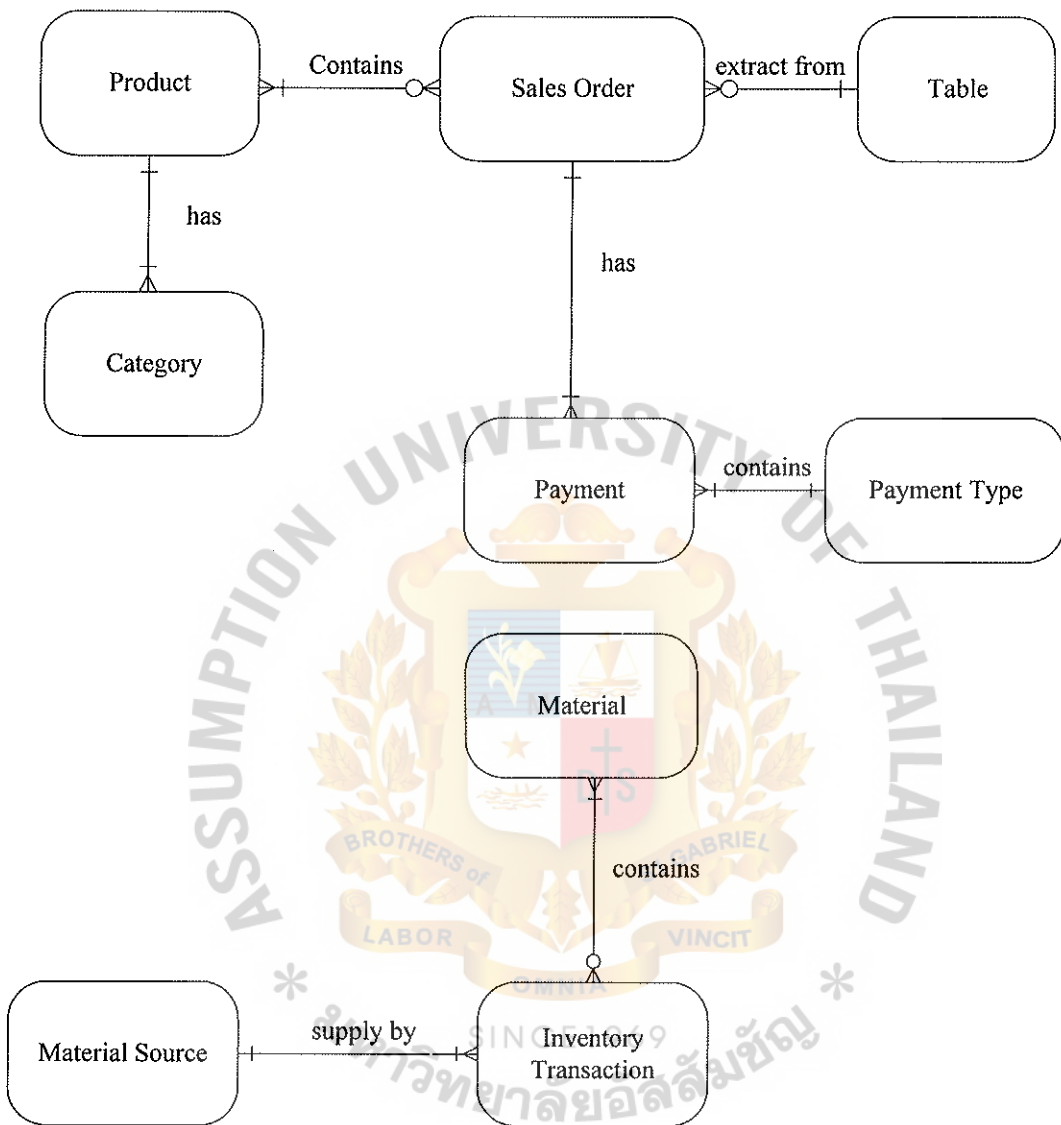


Figure 3.1. The Entity Relationship Diagram (Context Data Model).

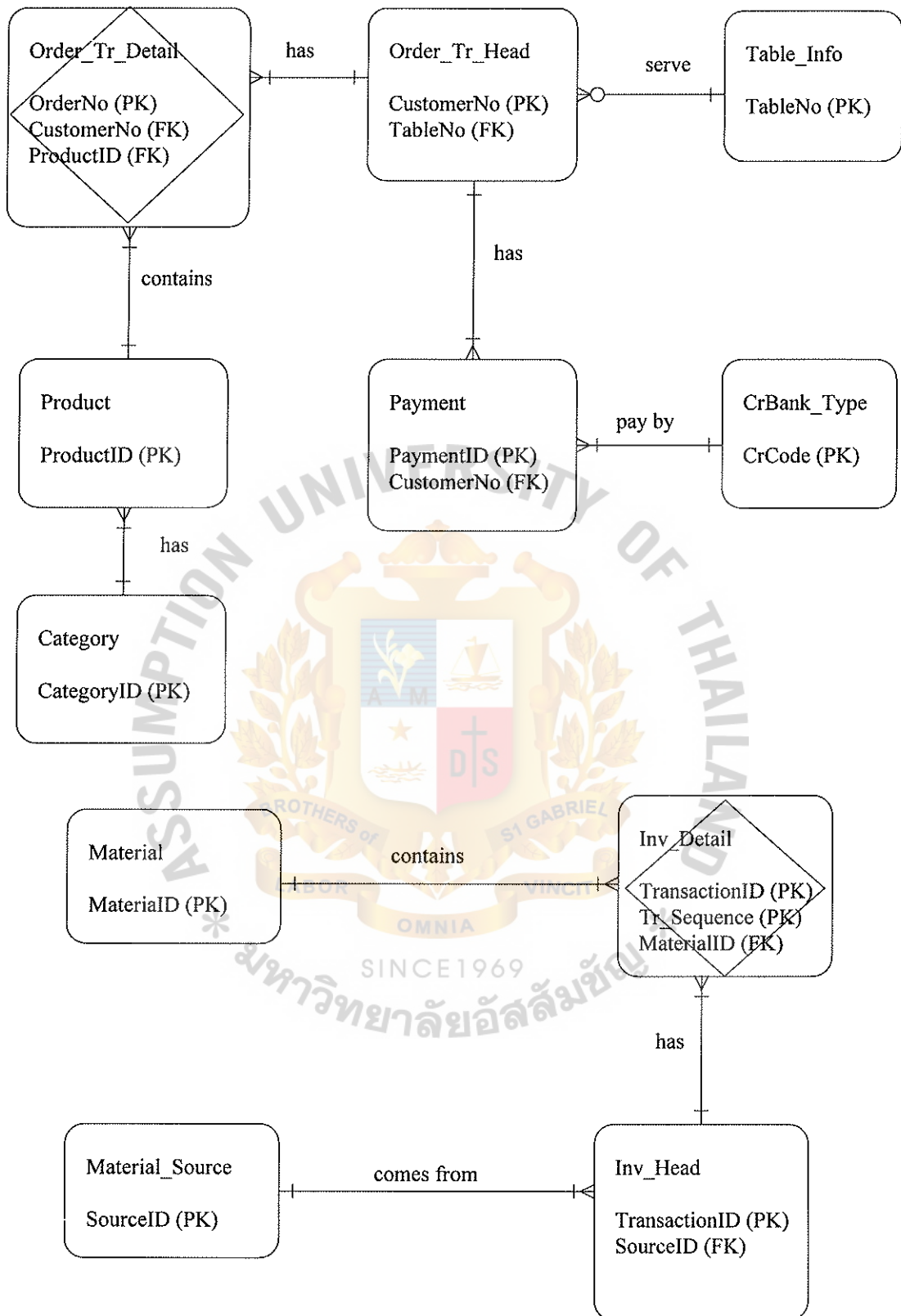


Figure 3.2. The Entity Relationship Diagram (Key-Based Data Model).

3.4 Process Modeling

Process modeling is a technique used for organizing and documenting the structure and flow of data to and from the restaurant system's processes and/or logic, policy, and procedures to be implemented by a system process. The process modeling of restaurant information system will be shown by the data flow diagram. Data flow diagram (DFD) depicts the flow of data through a system and the work or processing performed by the system.

(a) Context data flow diagram

Before constructing process model, a system context data flow diagram is constructed to establish initial project scope. The context data flow diagram, which is illustrated in Figure 3.4 defines the scope and boundary for the restaurant information system project. Because the scope of the project is always subject to change, the context data flow diagram is also subject to constant change.

(b) Functional Decomposition Diagram

Decomposition is the act of breaking a system into its component subsystems, processes and subprocesses. A decomposition diagram, also called a hierarchy chart, show the top-down functional decomposition and structure of a system. A functional decomposition diagram is drawn to partition the system into logical subsystems and/or functions. Figure 3.5 is the functional decomposition diagram for the restaurant information system project.

After finishing the previous two diagrams, a data flow diagram (DFD) can be drawn to depict the flow of data to, from, and within the system. A data flow diagram has many levels of details. The lower the level of data flow diagram, the more details of the processes within the system have. Figure 3.6 to Figure 3.14 illustrate the lower level context diagram of both sales and inventory subsystem of the proposed system.



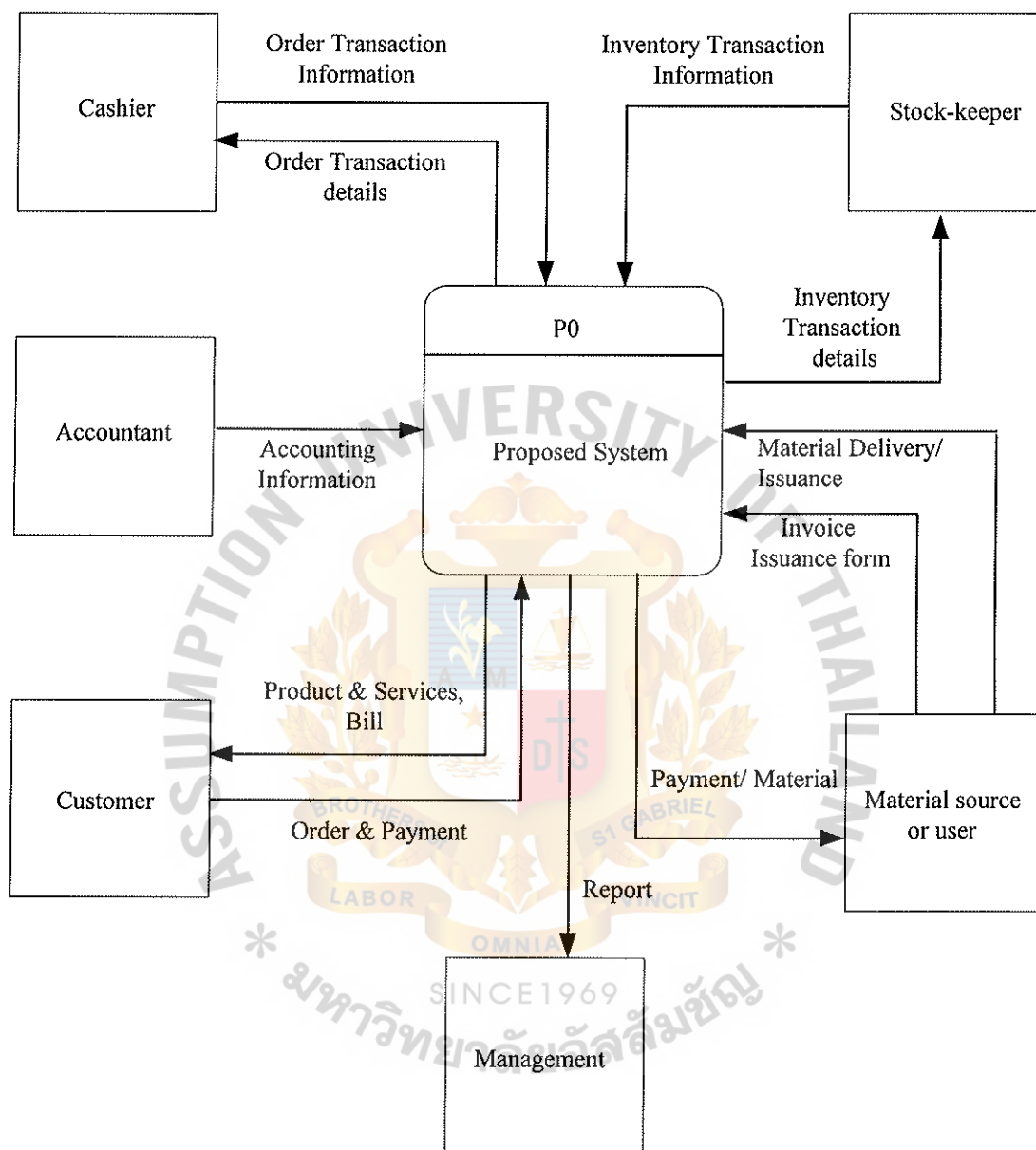


Figure 3.4. The Context Data Flow Diagram of Restaurant Information System.

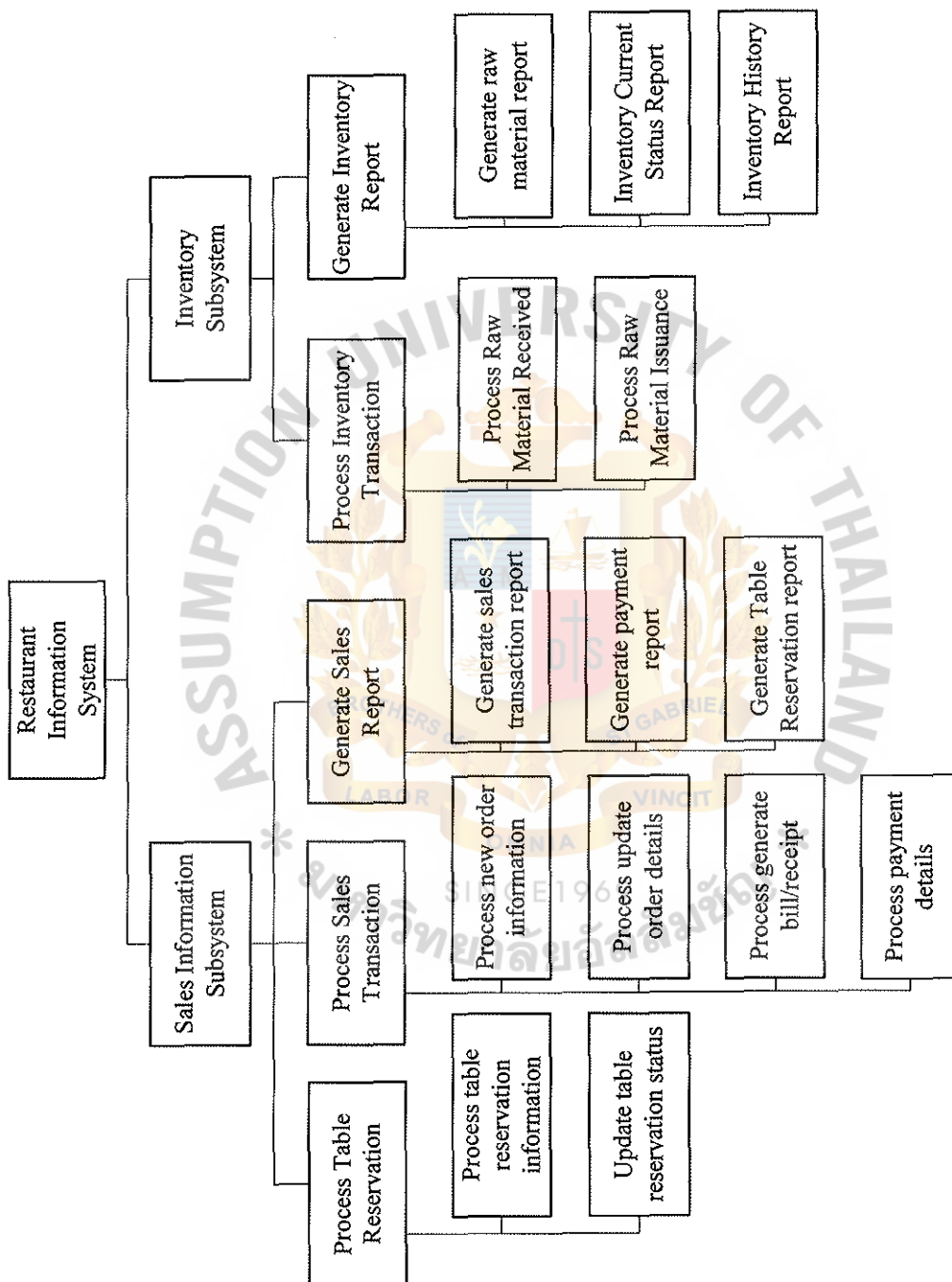


Figure 3.5. A Functional Decomposition Diagram of Restaurant Information System.

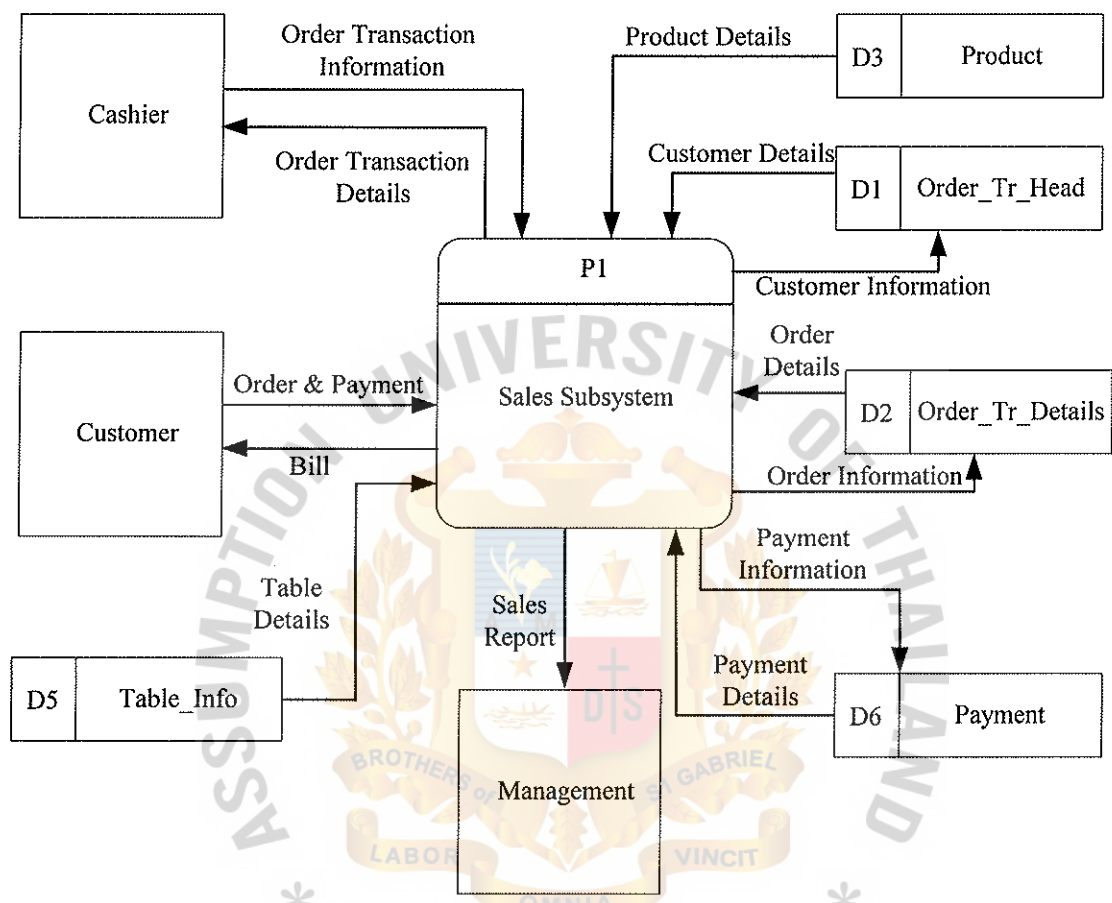


Figure 3.6. Data Flow Diagram Level 0 of Sales Subsystem.

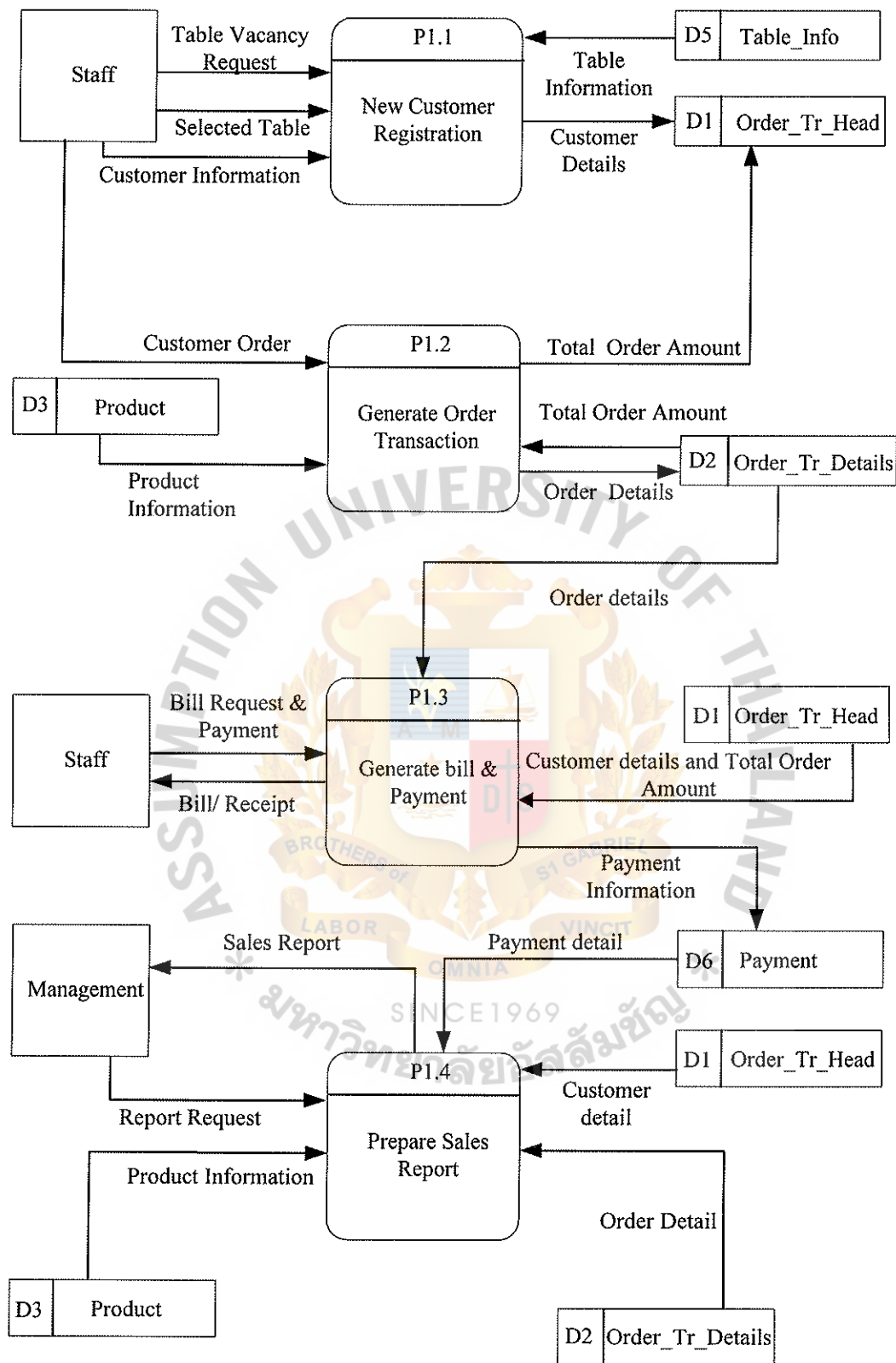


Figure 3.7. Data Flow Diagram Level 1 (Sales Subsystem).

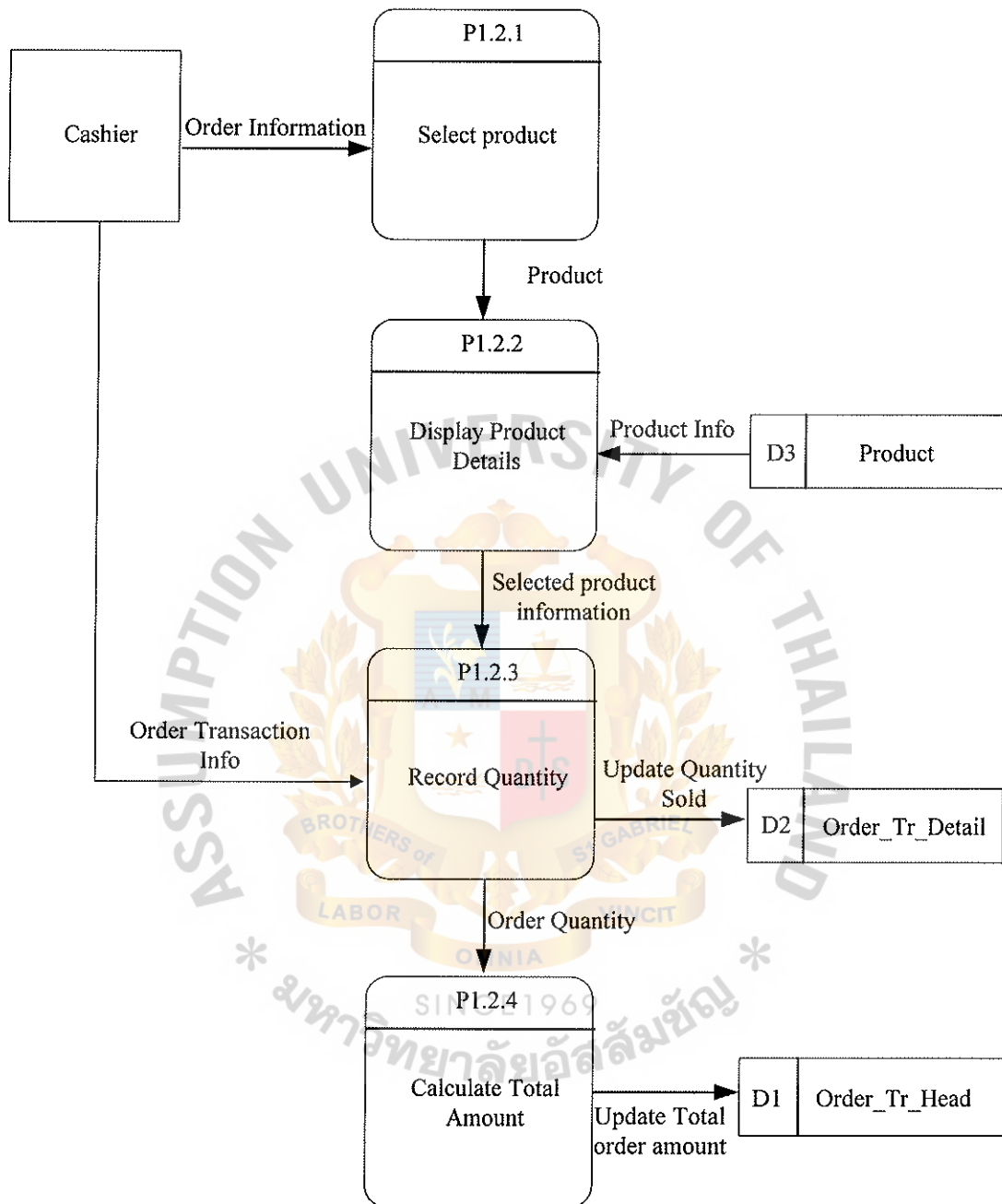


Figure 3.8. Data Flow Diagram Level 2 (Order Transaction Process).

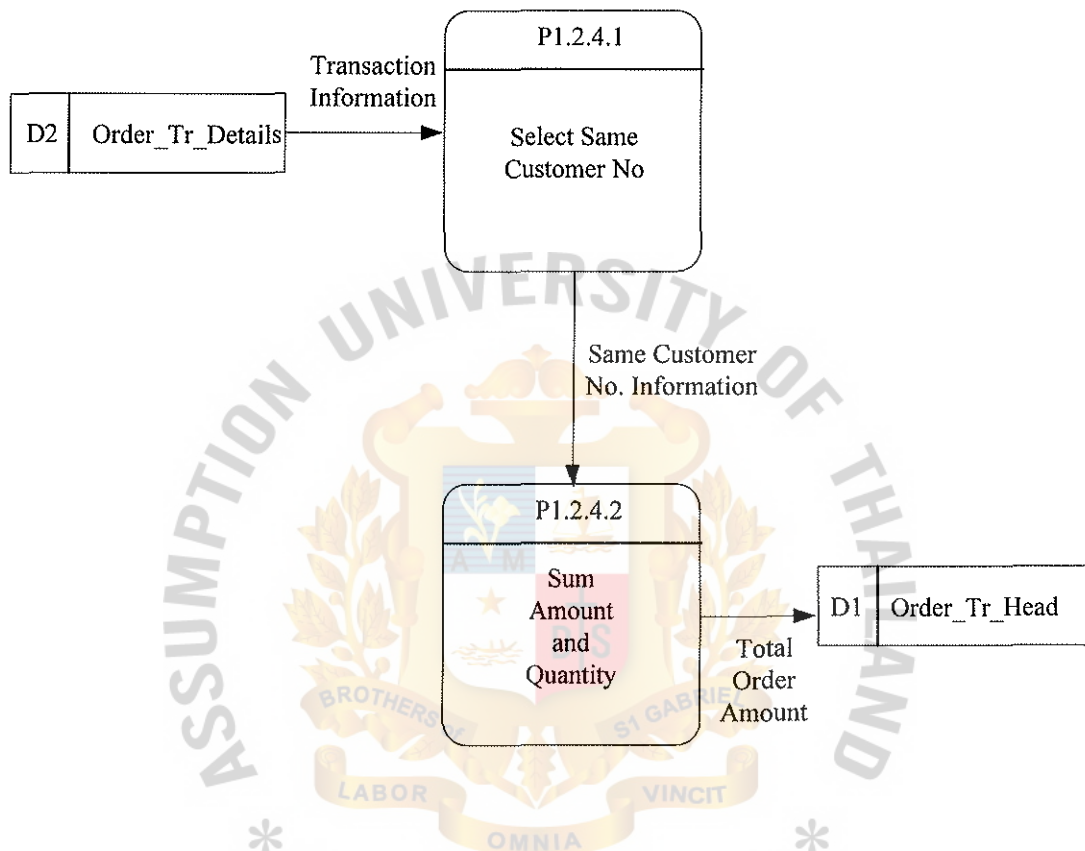


Figure 3.9. Data Flow Diagram Level 3 (Calculate Total Amount).

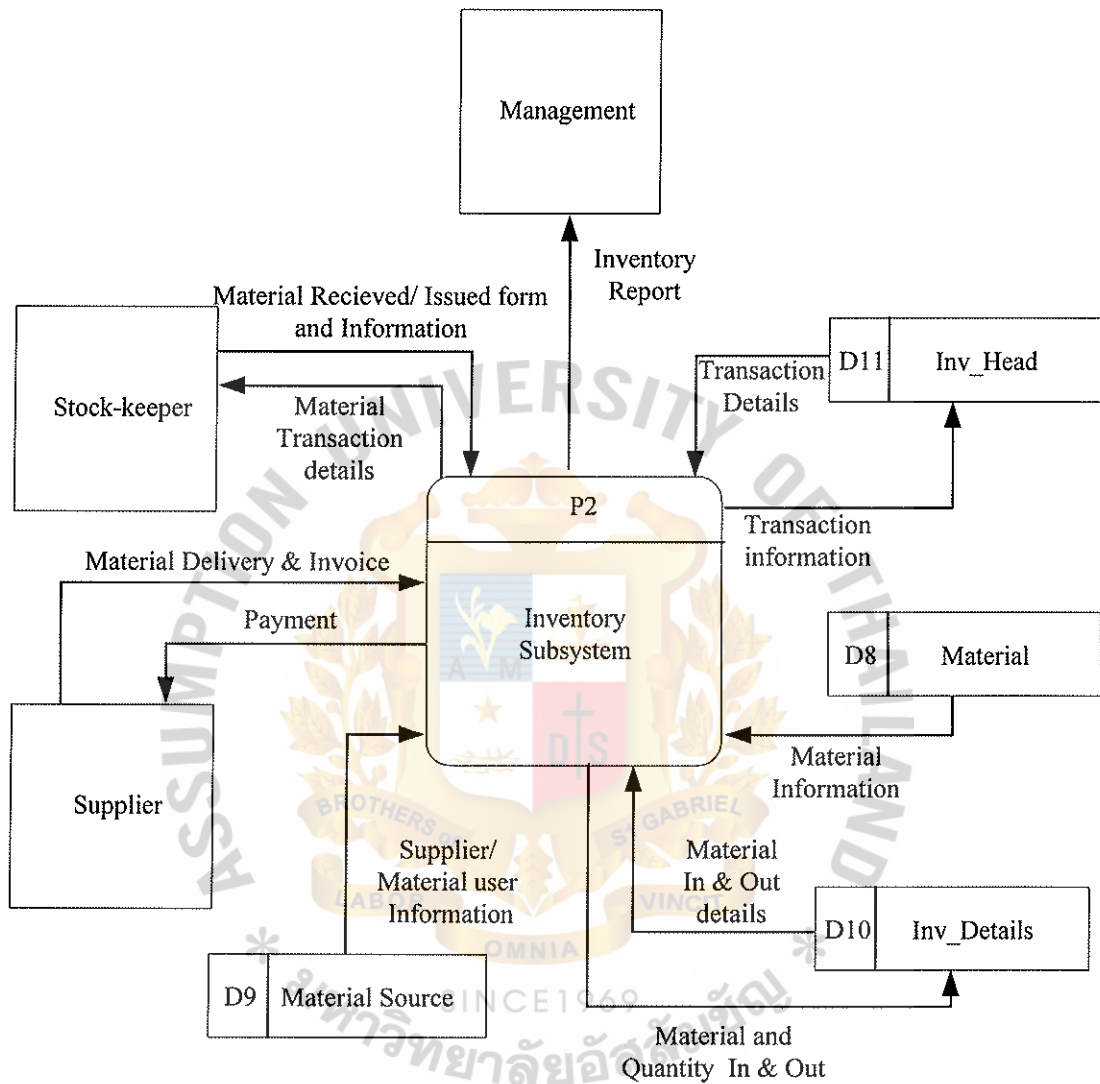


Figure 3.10. Data Flow Diagram Level 0 of the Inventory Subsystem.

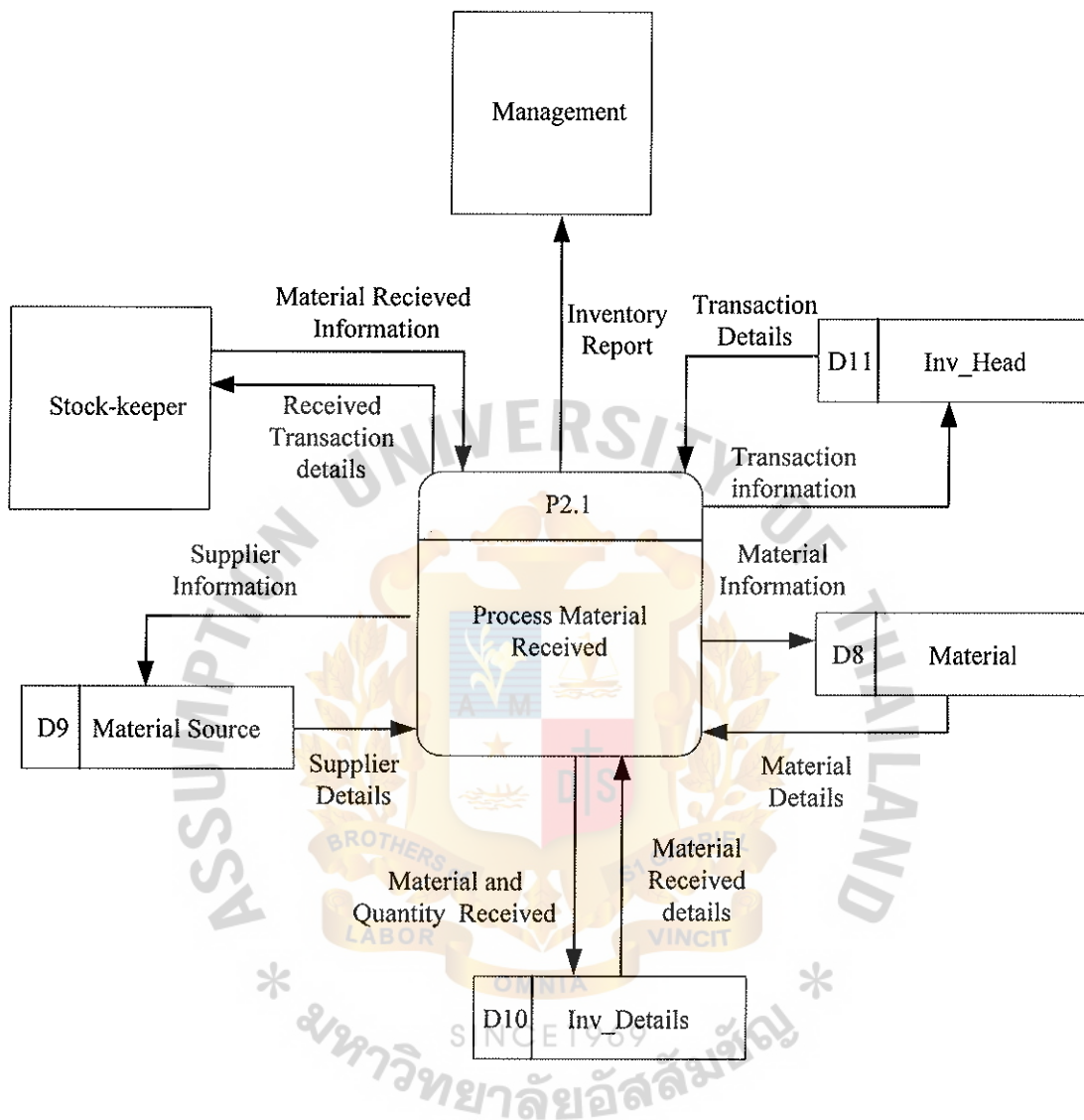


Figure 3.11. Data Flow Diagram Level 0 of Process Material Received.

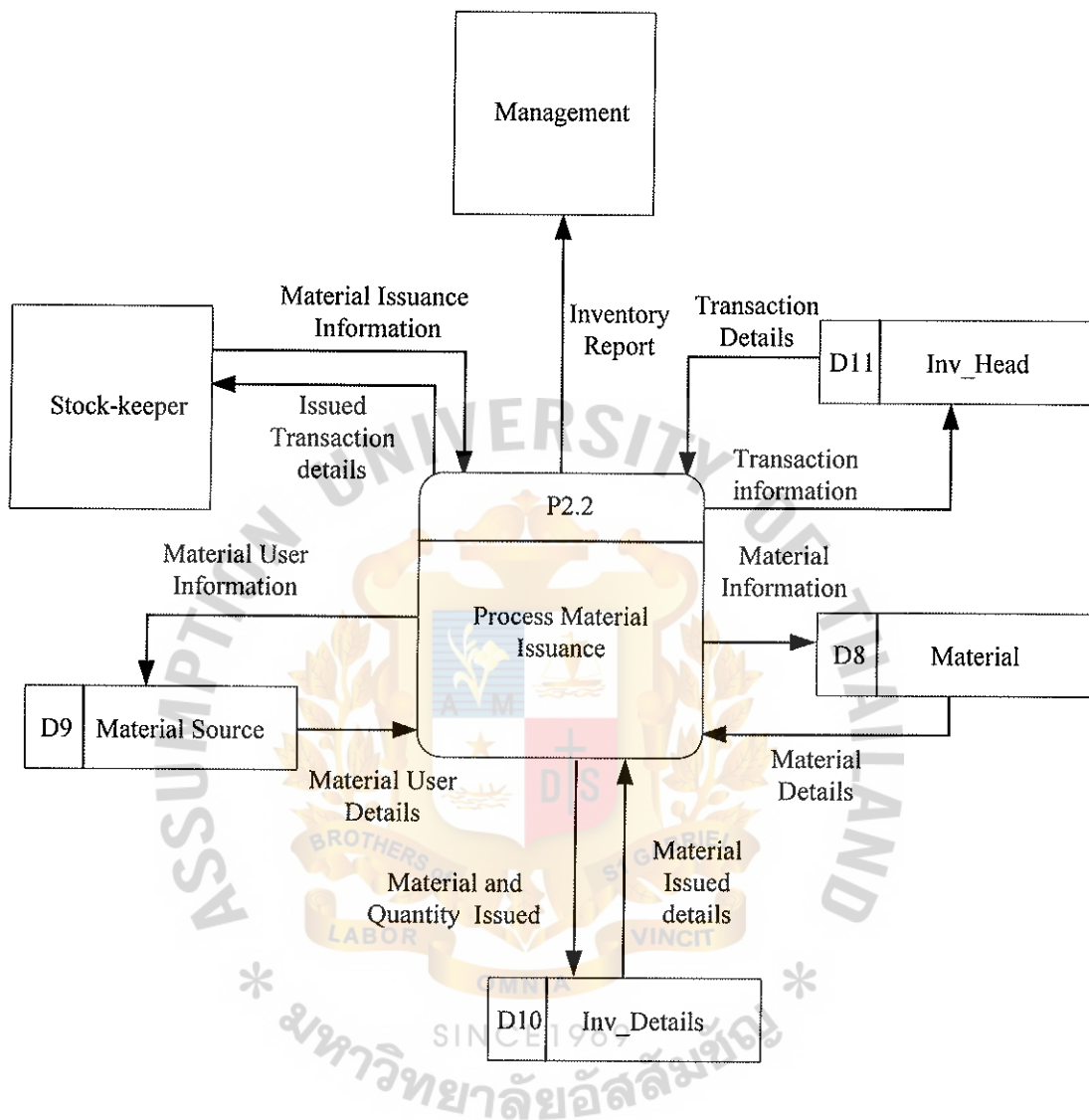


Figure 3.12. Data Flow Diagram Level 1 of the Process Material Issuance.

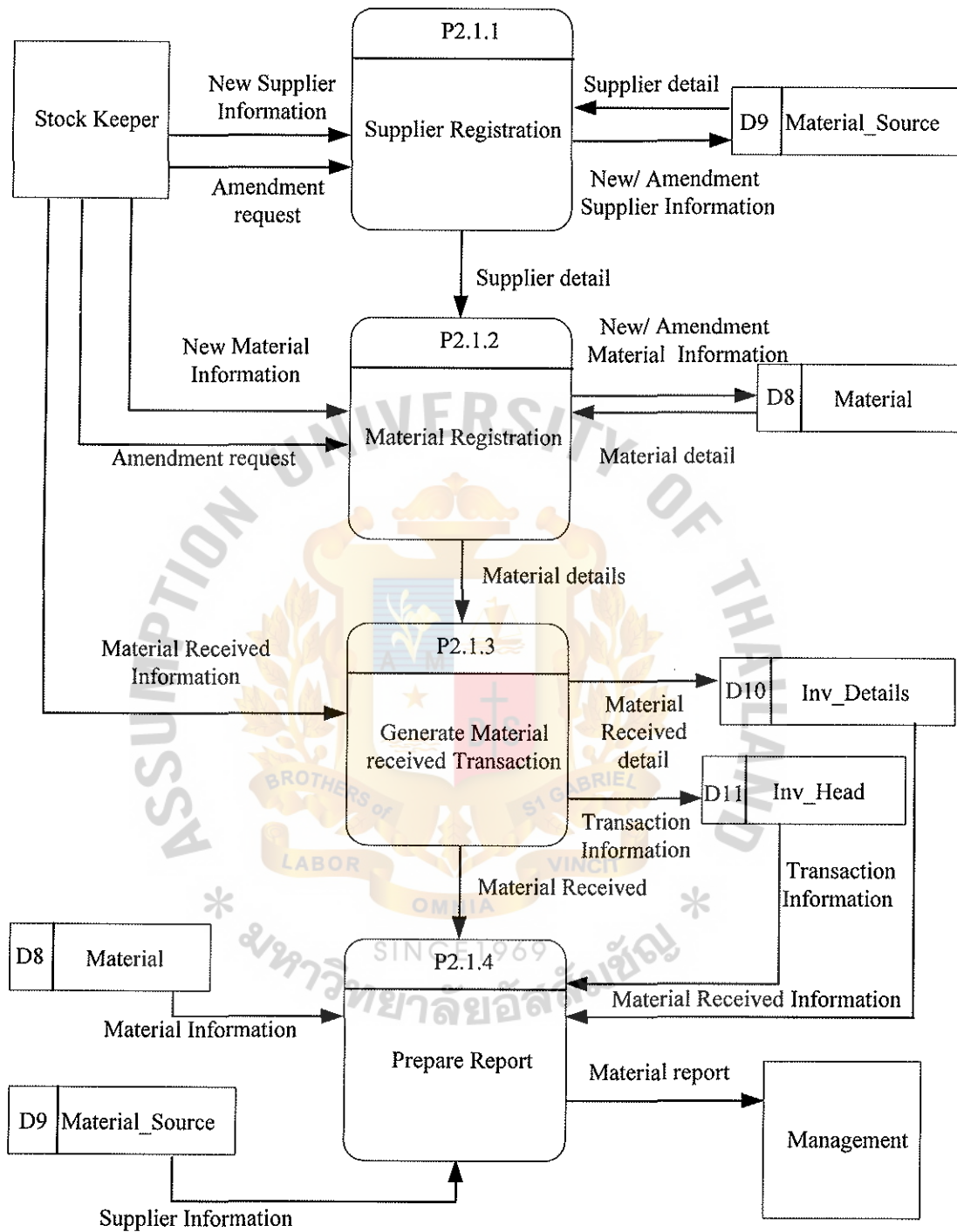


Figure 3.13. Data Flow Diagram Level 2 (New and Amendment of Material Received).

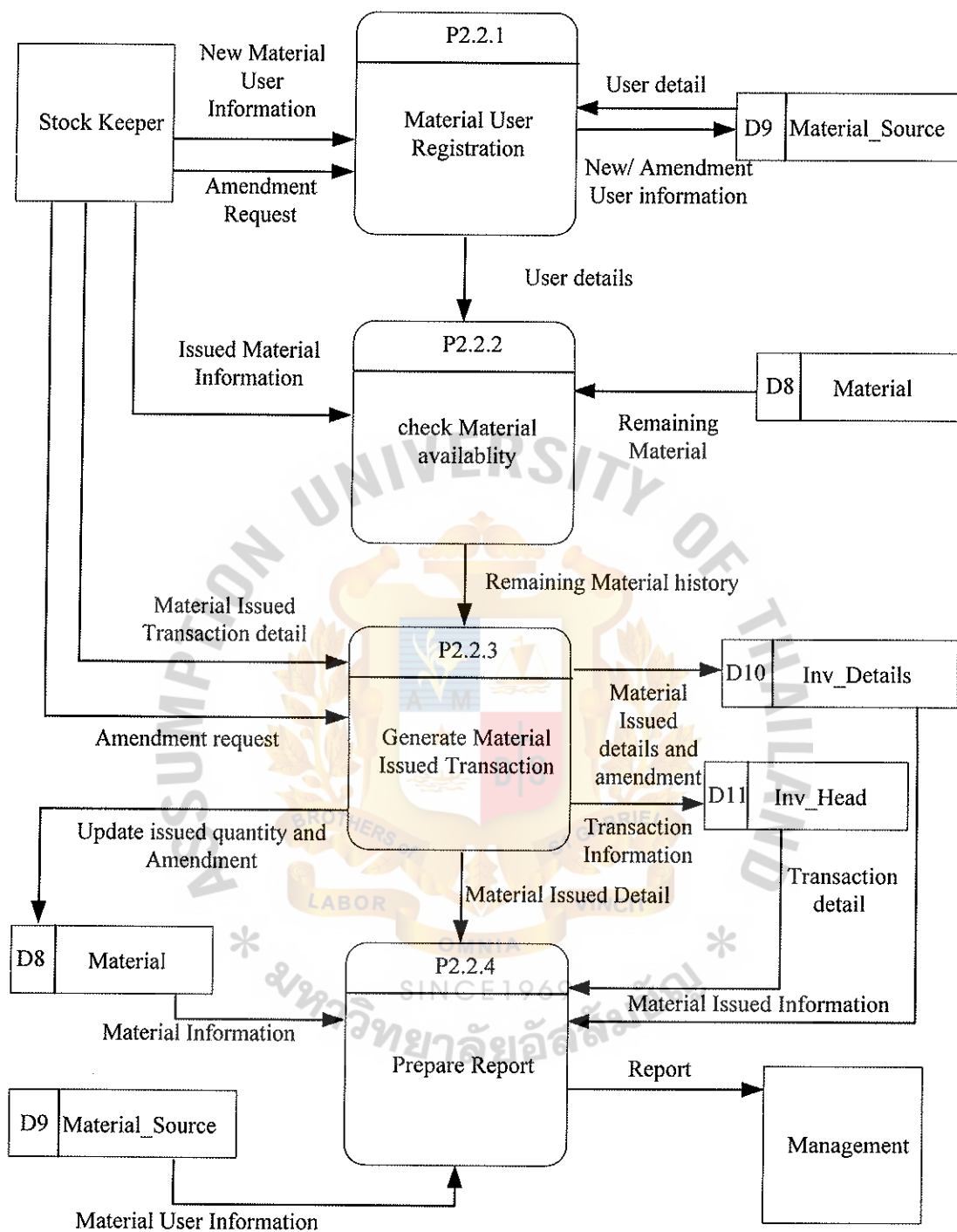


Figure 3.14. Data Flow Diagram Level 2 (New and Amendment of Material Issued).

3.5 System Design

System design can be considered a problem solving process. The main objective of system design is to create a new system that meets a set of objectives. System design also can be defined as the tasks that focus on the specification of a detailed computer-based solution.

To understand the proposed system more, the most important modeling tools is Data Flow Diagram. Data Flow Diagram are used to model system components, such as system processed, the data used by these processes, and external entities and the information flows in the system. After that coding and testing can be done. Therefore, it is necessary to have the program design.

(a) Database Design

Database design is the process of translating logical data model, which is the entity relationship diagram into the physical database schema.

A database schema is the physical model for a database based on the chosen database technology. The rules for transforming a logical data model into a physical database schema are as follows:

- (1) Each entity becomes a table.
- (2) Each attribute becomes a field (column in the table).
- (3) Each primary and secondary key becomes an index into the table.
- (4) Each foreign key implements a possible relationship between instances to the table.

The entity relationship diagram (ERD) in a fully attributed data model that has already been depicted in Figure 3.3. The physical database schema and file layout is shown in Appendix A.

(b) Input Design

To design system input, it requires the information from data flow diagram. These system inputs are represented as the data flows that connect external entities to process, and process to process. The selected attributes are reviewed to define the appropriate caption or label that clearly identifies these attributes appearing on the input screen.

Input control is applied to ensure that the data input to the computer is accurate and that the system is protected against accidental and intentional errors and abuse, including fraud.

After reviewing input requirement, the Sales Order form screen and Inventory Transaction are designed to accept the sales order and material transaction entry from system users. Each form screen is divided into two main parts, which are General information part and product or material details part. The other input screens, which are table reservation, data maintenance and generating report, are also designed to serve other tasks for the user. *

(c) Output Design

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

The following general principles are important for output design:

- (1) The outputs should be simple to read and interpret.
- (2) The timing of outputs is important.

- (3) The distribution of outputs must be sufficient to assist in all relevant system users.
- (4) The outputs must be acceptable to the system users who will receive and has to operate with them.

As shown on Data Flow Diagram of the proposed system, there are three reports that are designed to support system users and management. The system reports are sales transaction report, inventory transaction report, Table reservation report. The examples of report design are in Appendix D.

3.6 Hardware and Software Requirement

The system developed will be based on client/server model. The clients will run and execute Restaurant Information System application. The program will be installed and run on the client machine to improve application efficiency and reduce network traffic, information will be stored in server.

The proposed system requires the following hardware components:

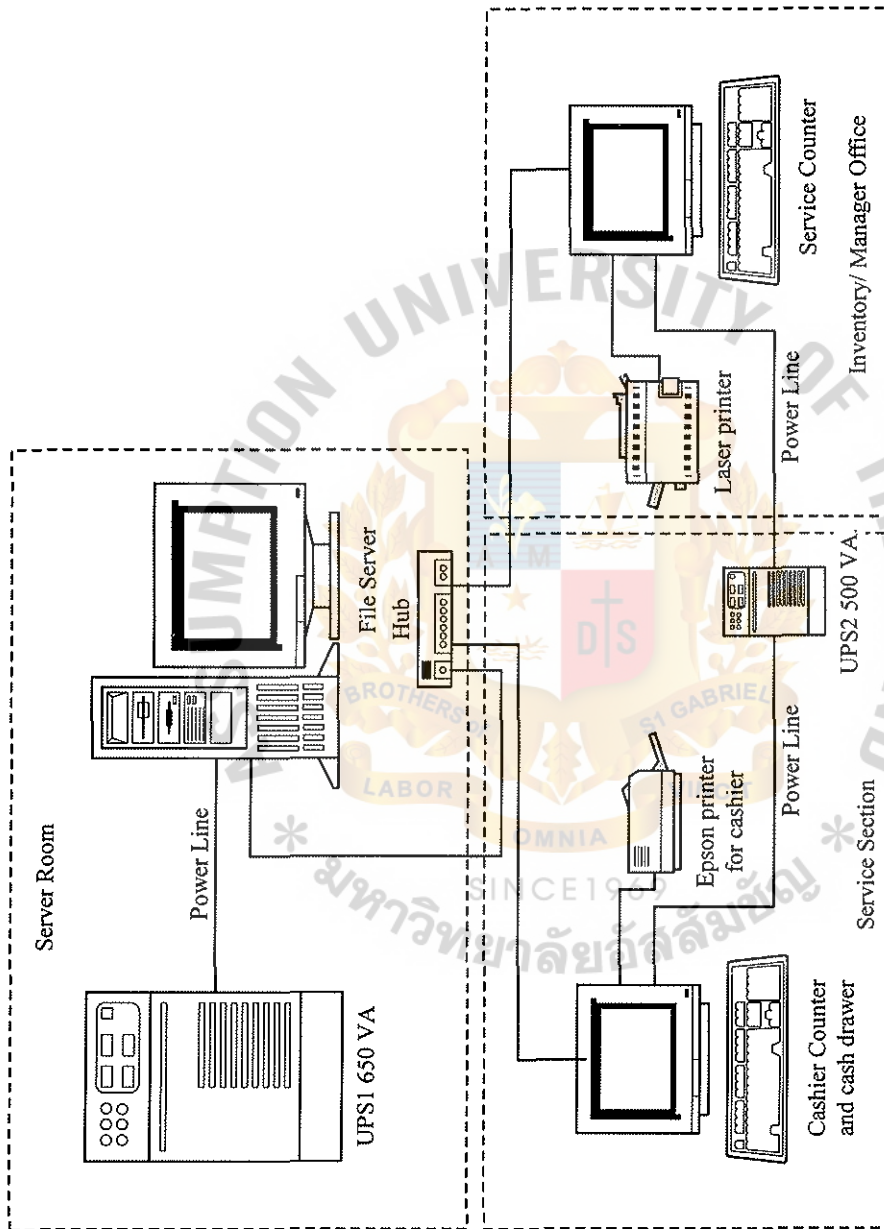


Figure 3.15. Network Configuration of the Proposed System.

Table 3.4. The Hardware Specification for Restaurant Information System Server.

Hardware	Specification
CPU	Pentium III 800 MHz.
Cache	256 KB.
Memory	256 KB.
Hard Disk	20 GB.
CD-Rom Drive - CDRW	16X
Floppy Drive	1.44 MB.
Display	14" color monitor
Network Adapter	Ethernet 10-Base T
Display Adapter	SVGA card
UPS	650 VA
Keyboard and Mouse	Standard

Table 3.5. The Software Specification for Restaurant Information System Server.

Software	Specification
Operating System	MS Windows 2000 Server
Database Server	Microsoft SQL Server Version 2000

Table 3.6. The Hardware Specification for Each Clients Machine (2 Clients).

Hardware	Specification
CPU	Celeron II 667 MHz.
Cache	256 KB.
Memory	128 MB.
Hard Disk	15 GB.
Floppy Disk	1.44 MB.
Network Adapter	Ethernet 10-Base T
Display Adapter	SVGA card
Display	14" SVGA color monitor
UPS	500 VA
Printer	HP Deskjet 840c HP Laserjet 1200

Table 3.7. The Software Specification for Each Client Machines.

Software	Specification
Operating System	Microsoft Windows 98 SE
Application Software	Visual Basic

3.7 Security and Controls

To shift from a manual to computerized system, the data security and control plays a vital role in system development. The computerized system is especially vulnerable to failure or threat for the following reasons:

- (a) A complex information system cannot be replicated manually.
- (b) Computerized procedures appear to be invisible and are not easily understood or audited.
- (c) Although the chances of disaster in automated systems are no greater than in manual systems, the effect of a disaster can be much more extensive. In some cases, all of system's records can be destroyed and lost forever.

(1) User Oriented Access Control

The user id and Password is being used and given to the authorized person. Each authorized person will be assigned for individual ID and password. The system will allow for the accessibility differently between individual user depending on their responsibility and functions. An update and amendment of information will apply or restricted only to the specific user.

(2) The back up and recovery

The failure of the main electricity supply causes interruption to the function of the computer facility or telecommunication network. UPS (Uninterrupted Power Supply) is used to supply power in case of main electricity supply shortage.

The staff has to back up the important database everyday to prevent the damage in hard disk or server. The tape for daily back up is provided one tape per day with a total of 7 tapes. And the system has

one tape for monthly back up.

(3) Virus Protection

A virus-checking program will be installed for both client and server machine and scanning virus before running any program. The staff has to update the virus-checking program every 3 months.

(4) Physical Security

Only the authorized staff will be allowed to enter or work in the computer room. The staff will not be allowed eating, drinking, or smoking in the computer room since these may cause the risk or damage to the computer.

3.8 Cost/Benefit Analysis

To consider financial aspects of the new system that is to be implemented, cost comparison should be made between the existing system and the proposed system. Cost Analysis of the proposed system should be considered on investment costs, implementation costs and annual operating costs between cost of manual system and computerized system. The existing system cost analysis and the estimation of development costs and operating costs for candidate system solution 1, 2, and 3 from Table 3.1 are displayed as follows:

(1) Cost of Existing Manual System.

Table 3.8. Existing Manual System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Typewriter 2 units @8,500	3,400.00	3,400.00	3,400.00	3,400.00	3,400.00
Calculator 2 units @2,150	860.00	860.00	860.00	860.00	860.00
Total Fixed Cost	4,260.00	4,260.00	4,260.00	4,260.00	4,260.00
Operating Cost					
Salary					
Cashier 2 persons @7,500	15,000.00	16,200.00	17,496.00	18,895.68	20,407.33
Service Officer 7 persons @6,500	45,500.00	49,140.00	53,071.20	57,316.90	61,902.25
Chef 3 person @12,000	36,000.00	38,880.00	41,990.40	45,349.63	48,977.60
Total Monthly Salary Cost	96,500.00	104,220.00	112,557.60	121,562.21	131,287.18
Total Annual Salary Cost	1,158,000.00	1,250,640.00	1,350,691.20	1,458,746.50	1,575,446.22
Office Supplies & Miscellaneous Cost					
Stationary (Per Annual)	7,000.00	7,350.00	7,717.50	8,103.38	8,508.54
Paper (Per Annual)	8,000.00	8,400.00	8,820.00	9,261.00	9,724.05
Utility (Per Annual)	102,000.00	107,100.00	112,455.00	118,077.75	123,981.64
Miscellaneous (Per Annual)	4,000.00	4,200.00	4,410.00	4,630.50	4,862.03
Total Annual Office Supplies & Misc. Cost	121,000.00	127,050.00	133,402.50	140,072.63	147,076.26
Total Annual Operating Cost	1,279,000.00	1,377,690.00	1,484,093.70	1,598,819.12	1,722,522.47
Total Existing System Cost	1,283,260.00	1,381,950.00	1,488,353.70	1,603,079.12	1,726,782.47
Accumulated Cost	1,283,260.00	2,665,210.00	4,153,563.70	5,756,642.82	7,483,425.29

(2) Estimated Costs for Candidate System Solution 1.

Table 3.9. Estimated Costs for Candidate Solution 1, Baht.

Cost items	Years				
	1	2	3	4	5
Development Cost					
New Hardware Cost					
Server Cost (1 unit x THB 45,000)	45,000.00	-	-	-	-
Workstation Cost (2 units x THB 22,500)	45,000.00	-	-	-	-
Printer (2 units Laser THB 14,250)	28,500.00	-	-	-	-
New Software Cost					
Operating Software	35,000.00	-	-	-	-
Restaurant Software	20,000.00	-	-	-	-
Implementation Cost					
Training & Set up Cost	25,000.00	-	-	-	-
Total Development Cost	198,500.00	-	-	-	-
Operating Cost					
Personel Cost					
Cashier 2 persons @7,500	180,000.00	194,400.00	209,952.00	226,748.16	244,888.01
Service Officer 6 persons @6,500	468,000.00	505,440.00	545,875.20	589,545.22	636,708.83
Chef 3 person @12,000	432,000.00	466,560.00	503,884.80	544,195.58	587,731.23
Maintenance Cost	10,000.00	15,000.00	20,000.00	25,000.00	30,000.00
Office Supplies & Miscellaneous Cost					
- Annual Stationary Cost	6,500.00	6,955.00	7,441.85	7,962.78	8,520.17
- Annual Paper Cost	7,500.00	8,025.00	8,586.75	9,187.82	9,830.97
- Annual Utility Cost	110,000.00	117,700.00	125,939.00	134,754.73	144,187.56
- Annual Miscellaneous Cost	3,500.00	3,745.00	4,007.15	4,287.65	4,587.79
Total Annual Operating Cost	1,217,500.00	1,317,825.00	1,425,686.75	1,541,681.94	1,666,454.57
Total Cost of Candidate System 1	1,416,000.00	1,317,825.00	1,425,686.75	1,541,681.94	1,666,454.57
Accumulated Cost	1,416,000.00	2,733,825.00	4,159,511.75	5,701,193.69	7,367,648.26

(3) Estimated Costs for Candidate System Solution 2.

Table 3.10. Estimated Costs for Candidate System Solution 2, Baht.

Cost items	Years				
	1	2	3	4	5
<u>Development Cost</u>					
<u>New Hardware Cost</u>					
Server Cost (1 unit x THB 40,000)	40,000.00	-	-	-	-
Workstation Cost (2 units x THB 15,000)	30,000.00	-	-	-	-
Printer (Laser x 10,000, Deskjet x 5,000)	15,000.00	-	-	-	-
<u>New Software Cost</u>					
Operating Software	35,000.00	-	-	-	-
Restaurant Software	50,000.00	-	-	-	-
<u>Implementation Cost</u>					
Training & Set up Cost	35,000.00	-	-	-	-
Total Development Cost	205,000.00	-	-	-	-
<u>Operating Cost</u>					
<u>Personel Cost</u>					
Cashier 2 persons @7,500	180,000.00	192,600.00	206,082.00	220,507.74	235,943.28
Service Officer 6 persons @6,500	468,000.00	500,760.00	535,813.20	573,320.12	613,452.53
Chef 3 person @12,000	432,000.00	462,240.00	494,596.80	529,218.58	566,263.88
<u>Maintenance Cost</u>	-	-	8,500.00	9,200.00	10,500.00
<u>Office Supplies & Miscellaneous Cost</u>					
- Annual Stationary Cost	5,000.00	5,350.00	5,724.50	6,125.22	6,553.98
- Annual Paper Cost	7,000.00	7,490.00	8,014.30	8,575.30	9,175.57
- Annual Utility Cost	110,000.00	117,700.00	125,939.00	134,754.73	144,187.56
- Annual Miscellaneous Cost	3,000.00	3,210.00	3,434.70	3,675.13	3,932.39
Total Annual Operating Cost	1,205,000.00	1,289,350.00	1,388,104.50	1,485,376.82	1,590,009.19
Total Cost of Candidate System 2	1,410,000.00	1,289,350.00	1,388,104.50	1,485,376.82	1,590,009.19
Accumulated Cost	1,410,000.00	2,699,350.00	4,087,454.50	5,572,831.32	7,162,840.51

(4) Estimated Costs for Candidate System Solution 3.

Table 3.11. Estimated Costs for Candidate System Solution 3, Baht.

Cost items	Years				
	1	2	3	4	5
Development Cost					
New Hardware Cost					
Server Cost (1 unit x THB 40,000)	40,000.00	-	-	-	-
Workstation Cost (2 units x THB 18,000)	36,000.00	-	-	-	-
Printer (2 units Laser THB 12,500)	25,000.00	-	-	-	-
New Software Cost					
Operating Software	35,000.00	-	-	-	-
Restaurant Software	100,000.00	-	-	-	-
Implementation Cost					
Training & Set up Cost	35,000.00	-	-	-	-
Total Development Cost	271,000.00	-	-	-	-
Operating Cost					
Personel Cost					
Cashier 2 persons @7,500	180,000.00	189,000.00	198,450.00	208,372.50	218,791.13
Service Officer 6 persons @6,500	468,000.00	491,400.00	515,970.00	541,768.50	568,856.93
Chef 3 person @12,000	432,000.00	453,600.00	476,280.00	500,094.00	525,098.70
Maintenance Cost	50,000.00	55,000.00	60,500.00	66,550.00	73,205.00
Office Supplies & Miscellaneous Cost					
- Annual Stationary Cost	6,000.00	6,420.00	6,869.40	7,350.26	7,864.78
- Annual Paper Cost	7,000.00	7,490.00	8,014.30	8,575.30	9,175.57
- Annual Utility Cost	102,000.00	109,140.00	116,779.80	124,954.39	133,701.19
- Annual Miscellaneous Cost	3,500.00	3,745.00	4,007.15	4,287.65	4,587.79
Total Annual Operating Cost	1,248,500.00	1,315,795.00	1,386,870.65	1,461,952.60	1,541,281.08
Total Cost of Candidate System 3	1,519,500.00	1,315,795.00	1,386,870.65	1,461,952.60	1,541,281.08
Accumulated Cost	1,519,500.00	2,835,295.00	4,222,165.65	5,684,118.25	7,225,399.32

Also, there are both tangible and intangible benefits, For the tangible benefit the new system can reduce the expense and increase more benefit than the manual system paid for the stationery. Labor costs a lot on checking stock, take care of inventory and process sales report to manager which takes time to process. To analyze cost and benefit, existing system cost and the proposed system cost will be calculated. Intangible benefits reduce the problem of timeliness, accuracy, reliability and validity.

(a) Tangible benefits

Tangible benefits are those that can be easily quantified or can be calculated.

- (1) Fewer processing errors. The proposed system operates with more accuracy and completeness.
- (2) Increased throughput. The performance of the proposed system is better. The number of customer that information system can service per day is increased.
- (3) Decreased response time. The response or operation processing time for each customer e.g. process of payment or receipt is reduced. The system responses to the transactions and requests faster.
- (4) Elimination of job steps. The new system is able to provide or operate some works instead of people work so staff can save a lot of time such as summary report or statistical report.
- (5) Reduced expenses. The restaurant can reduce a lot of paperwork and documenting involving the sales order data and information.

(b) Intangible benefits

Intangible benefits are those benefits believed to be difficult or impossible to quantify.

- (1) Improved customer goodwill. The new system provides quick and efficient services for the customer so the customer will have a good pleasure to the servicing of the restaurant and would like to come back again.
- (2) Improve employee morale. The new system provides more user friendly and accurate data and information so it is convenient for the staff to use and does not have problems to disturb their work.
- (3) Better service to community. The system not only is able to provide services for the customer but also able to provide services for other related departments in the restaurant such as provide information report as required.
- (4) Better decision-making. The system is able to generate more accuracy and deeply in details as required for the reports related to the operating system e.g. statistic report to the head department in order have enough information to make the decision.

Cost-Effectiveness is the technique to access economic feasibility. There are three popular techniques: breakeven analysis, payback analysis and net present value. In order to analyze the candidate system 1,2 and 3 by these techniques, we need to refer to the development cost and operating cost in Tables 3.8, 3.9, 3.10 and 3.11 respectively. The breakeven analysis, payback analysis and net present value for each candidate system are displayed as follows:

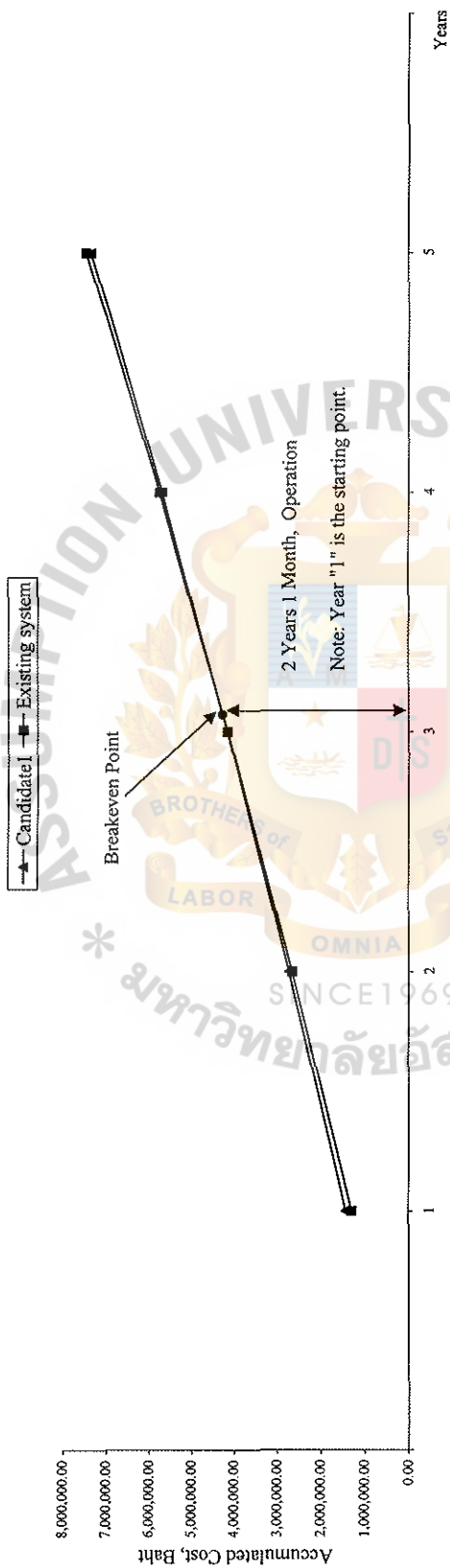


Figure 3.16. Cost Comparison between Existing System and Candidate System 1.

Table 3.12. Payback Analysis for Candidate System 1, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost	-198,500.00	-	-	-	-	-
Operation & maintenance cost	-	-1,217,500.00	-1,317,825.00	-1,425,686.75	-1,541,681.94	-1,666,454.57
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Time-adjusted costs (adjusted to present value)	-198,500.00	-1,107,925.00	-1,093,794.75	-1,069,265.06	-1,048,343.72	-1,033,201.83
Cumulative time-adjusted costs over lifetime	-198,500.00	-1,306,425.00	-2,400,219.75	-3,469,484.81	-4,517,828.53	-5,551,030.37
Existing System Operation Cost	0.00	1,283,260.00	1,381,950.00	1,488,353.70	1,603,079.12	1,726,782.47
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Time-adjusted benefits (current of present value)	0.00	1,167,766.60	1,147,018.50	1,116,265.28	1,090,093.80	1,070,605.13
Cumulative time-adjusted benefits over lifetime	0.00	1,167,766.60	2,314,785.10	3,431,050.38	4,521,144.18	5,591,749.31
Cumulative lifetime time-adjusted cost + benefits	-198,500.00	-138,658.40	-85,434.65	-38,434.44	3,315.64	40,718.94
The Payback Period is approximately 4 years.						
Lifetime ROI = (Estimated lifetime benefits - Estimated lifetime costs) / Estimated lifetime costs = 0.06*100 = 6%						

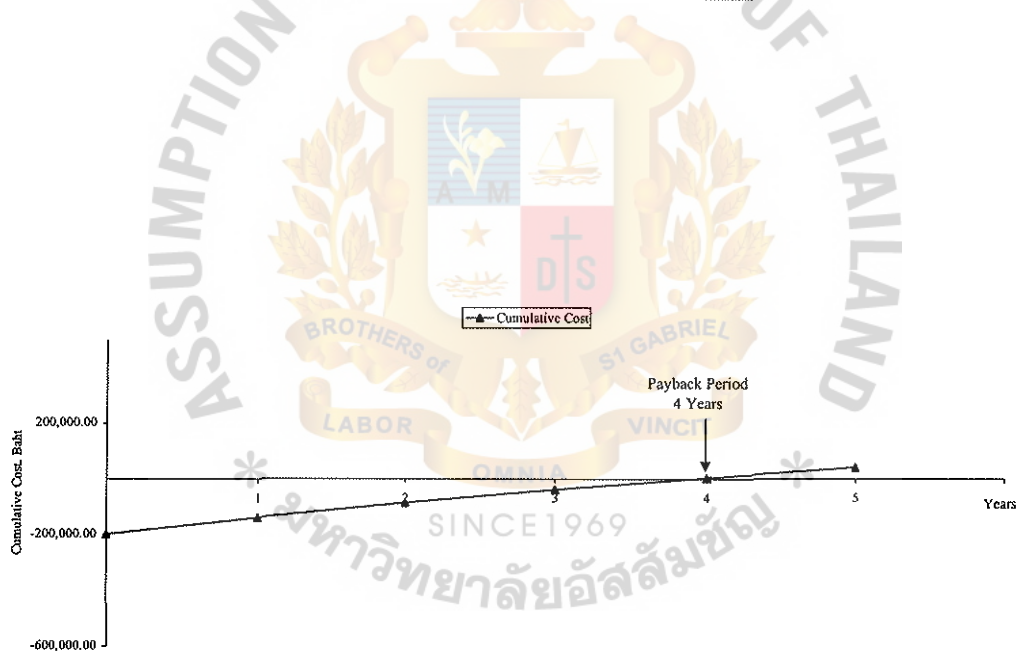


Figure 3.17. Payback Analysis for Candidate System 1.

Table 3.13. Net Present Value Analysis for Candidate System 1, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost	-198,500.00	-	-	-	-	-
Operation & maintenance cost	-	-1,217,500.00	-1,317,825.00	-1,425,686.75	-1,541,681.94	-1,666,454.57
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Present value of annual costs	-198,500.00	-1,107,925.00	-1,093,794.75	-1,069,265.06	-1,048,343.72	-1,033,201.83
Total present value of lifetime costs	-	-	-	-	-	-5,551,030.37
Existing System Operation Cost	0.00	1,283,260.00	1,381,950.00	1,488,353.70	1,603,079.12	1,726,782.47
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Present value of annual benefits	0.00	1,167,766.60	1,147,018.50	1,116,265.28	1,090,093.80	1,070,605.13
Total present value of lifetime benefits	-	-	-	-	-	5,591,749.31
NET PRESENT VALUE OF THIS ALTERNATIVE	-	-	-	-	-	40,718.94
The Net Present Value of this candidate system is 40,718.94						

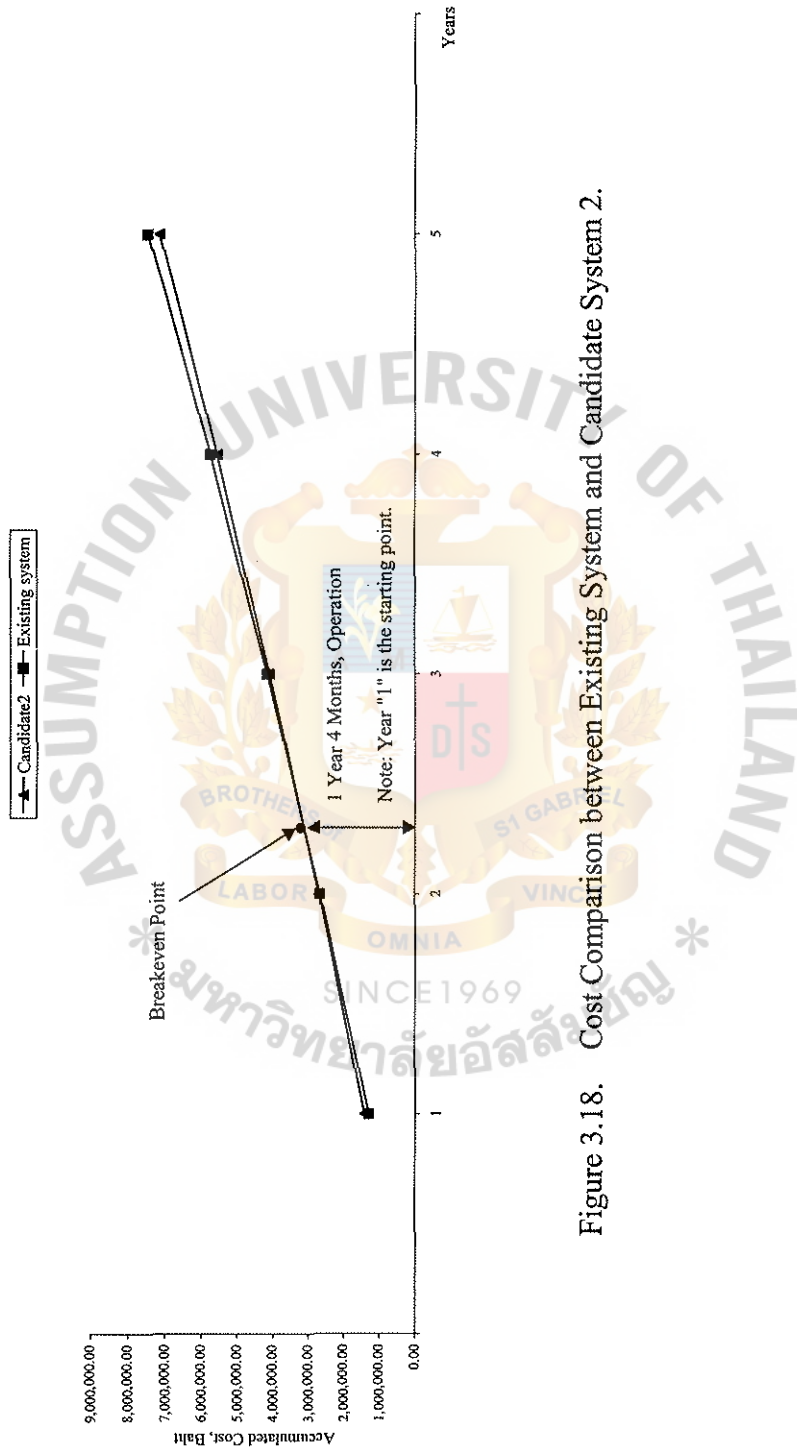


Figure 3.18. Cost Comparison between Existing System and Candidate System 2.

Table 3.14. Payback Analysis for Candidate System 2, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost	-205,000.00	-	-	-	-	-
Operation & maintenance cost	-	-1,205,000.00	-1,289,350.00	-1,388,104.50	-1,485,376.82	-1,590,009.19
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Time-adjusted costs (adjusted to present value)	-205,000.00	-1,096,550.00	-1,070,160.50	-1,041,078.38	-1,010,056.24	-985,805.70
Cumulative time-adjusted costs over lifetime	-205,000.00	-1,301,550.00	-2,371,710.50	-3,412,788.88	-4,422,845.11	-5,408,650.81
Existing System Operation Cost	0.00	1,283,260.00	1,381,950.00	1,488,353.70	1,603,079.12	1,726,782.47
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Time-adjusted benefits (current of present value)	0.00	1,167,766.60	1,147,018.50	1,116,265.28	1,090,093.80	1,070,605.13
Cumulative time-adjusted benefits over lifetime	0.00	1,167,766.60	2,314,785.10	3,431,050.38	4,521,144.18	5,591,749.31
Cumulative lifetime time-adjusted cost + benefits	-205,000.00	-133,783.40	-56,925.40	18,261.50	98,299.06	183,098.50

The Payback Period is approximately 2.9 years.

Lifetime ROI = (Estimated lifetime benefits - Estimated lifetime costs) / Estimated lifetime costs = 0.15*100 = 15%

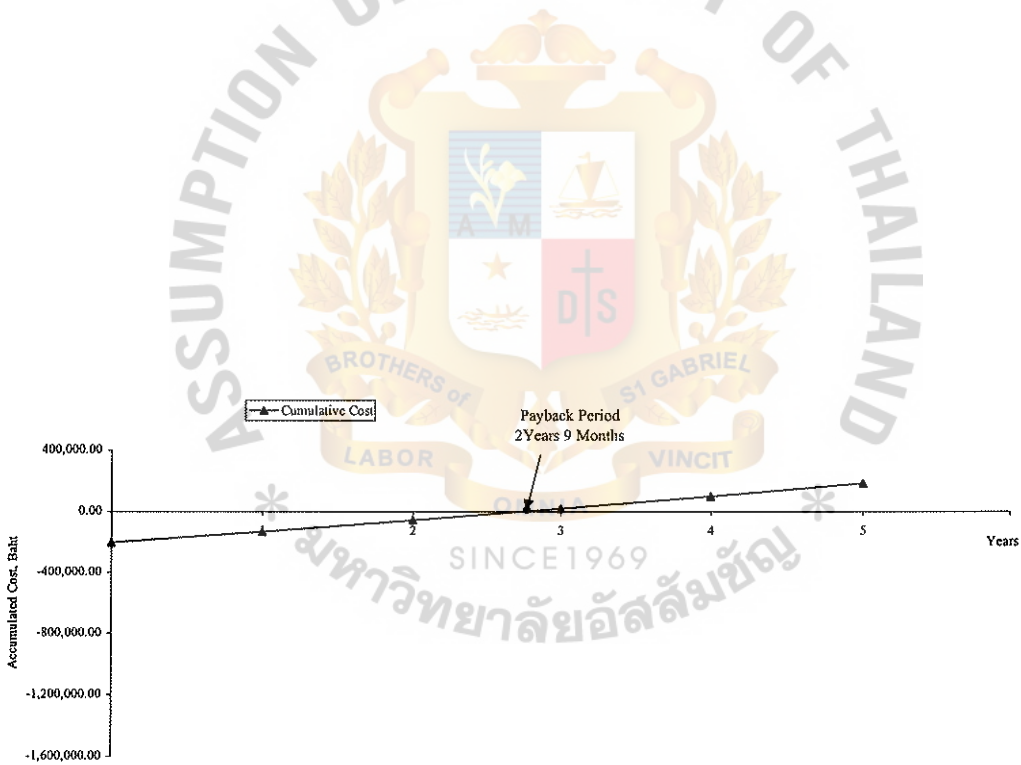


Figure 3.19. Payback Analysis for Candidate System 2.

Table 3.15. Net Present Value Analysis for Candidate System 2, Baht.

Cost Items	Years				
	0	1	2	3	4
Development Cost	-205,000.00	-	-	-	-
Operation & maintenance cost	-	-1,205,000.00	-1,289,350.00	-1,388,104.50	-1,485,376.82
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68
Present value of annual costs	-205,000.00	-1,096,550.00	-1,070,160.50	-1,041,078.38	-985,805.70
Total present value of lifetime costs	-	-	-	-	-5,408,650.81
Existing System Operation Cost	0.00	1,283,260.00	1,381,950.00	1,488,353.70	1,603,079.12
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68
Present value of annual benefits	0.00	1,167,766.60	1,147,018.50	1,116,265.28	1,090,093.80
Total present value of lifetime benefits	-	-	-	-	5,591,749.31
NET PRESENT VALUE OF THIS ALTERNATIVE	-	-	-	-	183,098.50
The Net Present Value of this candidate system is 183,098.50					

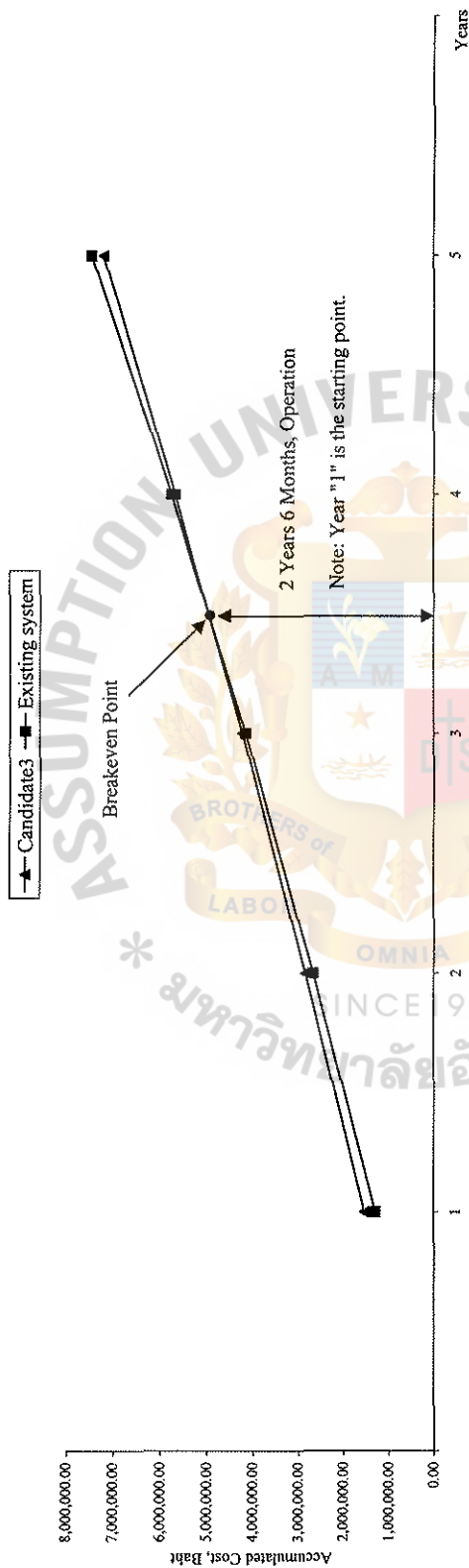


Figure 3.20. Cost Comparison between Existing System and Candidate System 3.

Table 3.16. Payback Analysis for Candidate System 3, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost	-271,000.00	-	-	-	-	-
Operation & maintenance cost	-	-1,248,500.00	-1,315,795.00	-1,386,870.65	-1,461,952.60	-1,541,281.08
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Time-adjusted costs (adjusted to present value)	-271,000.00	-1,136,135.00	-1,092,109.85	-1,040,152.99	-994,127.77	-955,594.27
Cumulative time-adjusted costs over lifetime	-271,000.00	-1,407,135.00	-2,499,244.85	-3,539,397.84	-4,533,525.61	-5,489,119.88
Existing System Operation Cost	0.00	1,283,260.00	1,381,950.00	1,488,353.70	1,603,079.12	1,726,782.47
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Time-adjusted benefits (current of present value)	0.00	1,167,766.60	1,147,018.50	1,116,265.28	1,090,093.80	1,070,605.13
Cumulative time-adjusted benefits over lifetime	0.00	1,167,766.60	2,314,785.10	3,431,050.38	4,521,144.18	5,591,749.31
Cumulative lifetime time-adjusted cost + benefits	-271,000.00	-239,368.40	-184,459.75	-108,347.46	-12,381.43	102,629.43

The Payback Period is approximately 4.1 years.

Lifetime ROI = (Estimated lifetime benefits - Estimated lifetime costs) / Estimated lifetime costs = $0.04 \times 100 = 4\%$

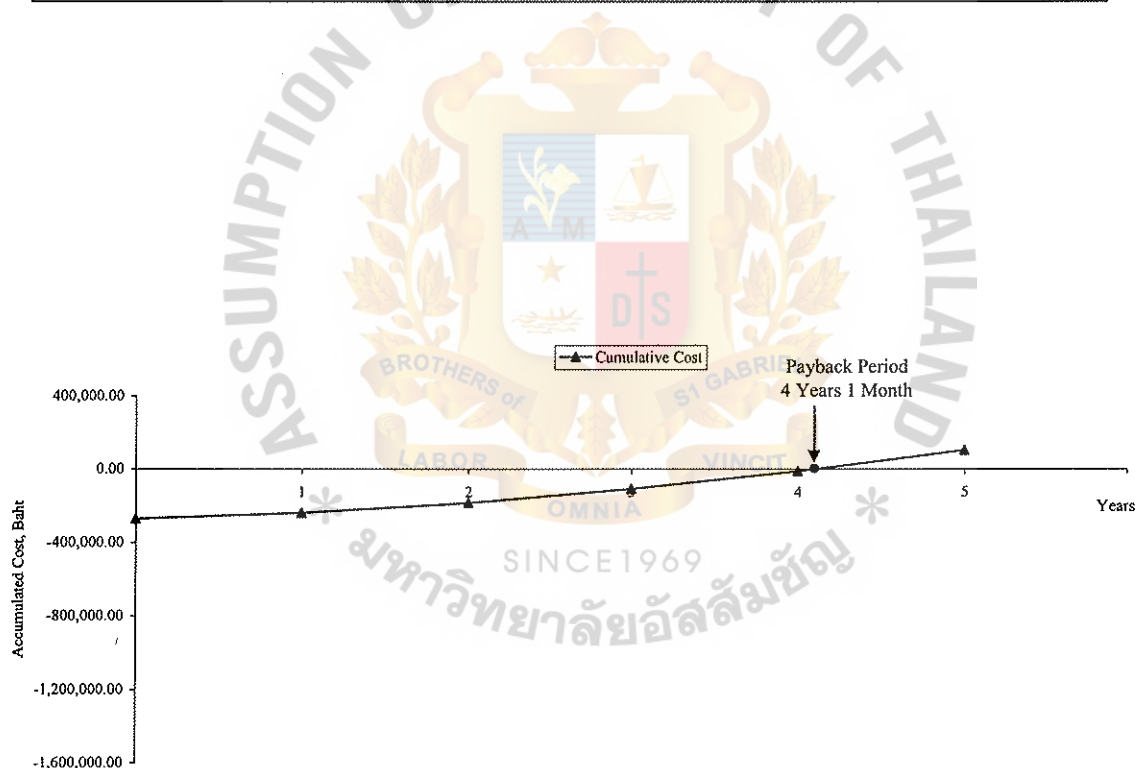


Figure 3.21. Payback Analysis for Candidate System 3.

Table 3.17. Net Present Value Analysis for Candidate System 3, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost	-271,000.00	-	-	-	-	-
Operation & maintenance cost	-	-1,248,500.00	-1,315,795.00	-1,386,870.65	-1,461,952.60	-1,541,281.08
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Present value of annual costs	-271,000.00	-1,136,135.00	-1,092,109.85	-1,040,152.99	-994,127.77	-955,594.27
Total present value of lifetime costs	-	-	-	-	-	-5,489,119.88
Existing System Operation Cost	0.00	1,283,260.00	1,381,950.00	1,488,353.70	1,603,079.12	1,726,782.47
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Present value of annual benefits	0.00	1,167,766.60	1,147,018.50	1,116,265.28	1,090,093.80	1,070,605.13
Total present value of lifetime benefits	-	-	-	-	-	5,591,749.31
NET PRESENT VALUE OF THIS ALTERNATIVE	-	-	-	-	-	102,629.43
The Net Present Value of this candidate system is 102,629.43						

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

Since analysis and design of the proposed system have been done, it is ready to be implemented in the existing operation. Two main stages are classified for implementing the proposed system. The details are as follows:

(1) Construction Stage

This stage aims to develop the information system that can fulfill the business objectives. After the system development is complete, testing needs to be done to ensure that it would operate properly. Prior to the system testing, the following tasks must be completed first - hardware and software acquisition and installation and site and data preparation.

(2) Delivery Stage

The objective of this stage is to make the system conversion to be as smooth as possible without any disruption to the existing system. It includes network configuration, training manual preparation and conversion plan. After the proposed system is launched in the production environment, users should evaluate the system performance in order to identify the difficulties that are discovered in the operation.

4.2 The Construction Phase

The purpose of the construction phase is to develop and test a functional system that fulfills business and design requirements and to implement the interfaces between the new system and existing production systems. The main activities of restaurant information system construction are as follows:

- (1) Build and Test Databases
- (2) Write and Test New Program

4.3 The Implementation Phase

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

- (1) Conduct System Test

The step before the installation of any system is the acceptance testing. This activity test every component in the system: hardware, the proposed software, the end users, the procedures, and the data. The system owner has a review to determine whether the system meets expectations and where improvements are needed. And to check whether the proposed system can be compatible and suitable for the existing problem.

- (a) Testing with Test Data

*Programs are written according to the system specifications and individually tested. To ensure that the proposed software can be combined into an operational system, it needs to be thoroughly tested. The purpose of the system test is to validate all software, input and output, procedures and the database.

To test the Service information system, the first stage is to test each subsystem. The tests are operated and modifications are made until all subsystems or cycle function properly. At this point the entire system is tested as a unit. Testing and modification of the delivery information system continue until the components of the system work

properly and all input/ output are validated.

(b) Testing with Live Data

The second stage of the system testing is done with live data. Live data are actual data that have already been processed through the existing system. Testing with live data provides an extra level of assurance that the system will work properly after the implementation.

During system testing with live data, the targeted end users must be involved. A representative group of users is trained set loose on the system, by entering the live data to perform routine transaction. During this stage of testing, the user manual, help screens and system procedures are given a good test. Test and modifications are continued until the proposed system proves satisfactory.

User's manual is the manual that end users rely heavily on during the familiarization and learning period. Afterwards, they use it as a reference manual and training tool.

(2) Prepare Conversion Plan

This project selects the parallel conversion to convert the old system to the new system. Both the old and new systems are operated for some time to ensure that all major problems in the new system have been solved before the old system is discarded.

(3) Train Users

Training involves the capacity to support staff's familiarity with the new system and general basic task system. Users will be guided and train how to use on various items for working purposed, starting from entering system and input data in appropriate manner and able to create output reports

as they need. Otherwise, they must also know how to solve with the problem, error and malfunctions and able to detect these problem. The staff members must know the procedure or process in order to succeed in their work.

(4) Convert to New System

The key input to this task is the conversion plan that was created in the implementation phase task. The principal deliverable is the operational system that is placed into production business. This task also involves a system audit. The system owner and system user will provide the valuable feedback pertaining to the actual use of the new system. The system users are the source of the majority of the feedback used to measure the system's acceptance.



V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this paper, Ho Ho Restaurant information system is a case study. The existing system of this restaurant is a manual system. The problem of existing system is the work redundancy and increasing number of customers. Therefore, the new computerized system which is more effective and well designed is proposed for improving the capacity of staff and eliminating unnecessary tasks so as to satisfy customer and provide the better services.

Studying from the existing system, the operation is done manually, it causes problems of inputting inaccurate and redundant data, takes more time to provide response or service to the customer. The inventory of restaurant is another problem of the existing system. Since the inventory management was done manually, the problem of material out of stock and expiry has been major concerns for manager and management. The existing stock system keeps all materials in log books that contain no back up and only one staff can access at a time. It is also difficult to track the history of any material and check current stock quantity. The new computerized system will facilitate the inventory management to access the information quickly and easily. The proposed system is developed based on the client/ server configuration.

The new computerized system provides a lot of tangible and intangible benefit, in terms of data accuracy, efficiency and control. The proposed system will reduce the tedious manual works, provide new integrated interactive system with fast communication and data accuracy. To accomplish the task, it requires automation of system providing database for all records in the restaurant such as sales order, material inventory, table reservation, food & beverage menu etc. The proposed system also

produced operation and management report automatically. And the more important is that the new system is proposed with lowest investment on the current infrastructure and labour current cost which is a tangible benefit to organization in the short term.

System design addresses data, processing and geography from perspectives. It has designed inputs, outputs, files, databases and the other computer components. In Process design, physical data flow is being used to represent plan implementation of an input or output from a physical process. Client/ Server computing was used as an information system database, software and interfaces are distributed across network of clients and server. Two-tiered client/ server will apply in which the data and data manipulation layers are placed on the server, and the application logic, presentation logic and presentation are placed on the clients with the Local Area Network (LAN).

The degree of achievement of the proposed system compared with the existing system can be seen in table below. It shows that the proposed system reduces the time spent on each process a lot, because the proposed system takes much less time to retrieve the required information. It has the capabilities to sort the information as required and calculate the number automatically. Therefore, the information can be in the requested format and easy to use.

Table 5.1. Comparison of the Degree of Achievement between the Existing System and Proposed System.

Process	Existing System	Proposed System
Sales Transaction Recording	None	20 mins
Check and Receive order	10 mins	8 mins.
Prepare Sales Report	2 hrs	5 mins
Checking remaining material in stock	15 mins	5 mins.
Find Supplier of the requested item	1 min	30 secs.
Prepare Inventory report	2 hrs	5 mins

5.2 Recommendations

Further enhancement for the restaurant information system is dealing with implementing Touch screen for Point of sales or service counter. This trend of technology will help user to work on and process the order quickly and easily.

Another enhancement is to implement the technology of World Wide Web Internet. Internet can be accessed directly by customer for table reservation and extend to home delivery service. The customer is able to make table reservation directly from any place for 24 hours service.

Since the system is applicable for a small-scale restaurant, the proposed system should be able to expand its capacity in case there is an expansion from small-scale restaurant to medium or larger size business or open new branches.

In the future, the system should be able to inform the manager in advance about the payment due date of the material so that she can prepare for liquidity or cash flow of the restaurant. The Bar code technology may be considered as alternative data input method.



Table A.1. Order_Tr_Head.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	CustomerNo	Character	7	-	C-99999
2.	TableNo	Numeric	2	-	-
3.	OrdNumofVisitor	Integer	4	-	-
4.	OrdOpen_time	Date/ Time	8	-	mm/dd/yyyy hh:mm
5.	OrdTotal_Amt	Numeric	8	2	999,999.99
6.	OrdDisc	Numeric	5	2	999.99
7.	OrdDisc_Amt	Numeric	8	2	999,999.99
8.	OrdBillDate	Date	8	-	mm/dd/yyyy
9.	OrdBillTime	Time	4	-	hh:mm

Table A.2. Order_Tr_Detail.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	OrderNo	Text	13	-	Addmmyyhhm mss
2.	CustomerNo	Text	7	-	C-99999
3.	ProductID	Numeric	4	-	9999
4.	OrdQty	Integer	3	-	-
5.	OrdPriceperUnit	Numeric	7	2	99,999.99
6.	OrdAdd_item	Text	15	-	-
7.	OrdAdd_priceunit	Numeric	7	2	99,999.99

Table A.3. Product.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	ProductID	Numeric	4	-	-
2.	ProdDescription	Character	20	-	-
3.	CategoryID	Numeric	2	-	-
4.	ProdS_Price	Numeric	7	2	99,999.99
5.	ProdCostperunit	Numeric	7	2	99,999.99
6.	ProdAvailability	Logic (T/F)	1	-	-

Table A.4. Category.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	CategoryID	Numeric	2	-	-
2.	CatDescription	Character	20	-	-

Table A.5. Table_Info.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	TableNo	Numeric	2	-	99
2.	TabDescription	Character	15	-	-
3.	TabAvailability	Logic (T/F)	1	-	-

Table A.6. Payment.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	PaymentID	Numeric	7	-	999-9999
2.	CustomerNo	Text	7	-	C-99999
3.	PaymentType	Character	10	-	-
4.	Cash_RecAmt	Numeric	7	2	99,999.99
5.	Credit_RecAmt	Numeric	7	2	99,999.99
6.	CrCode	Character	10	-	-
7.	CrNo	Numeric	16	-	-
8.	CrName	Character	20	-	-
9.	CrExpDate	Date	4	-	mm/yy
10.	Total_RecAmt	Numeric	7	2	99,999.99
11.	Rec_Date/Time	Date/ Time	8	-	mm/dd/yyyy hh:mm
12.	Rec_printDate/Time	Date/ Time	8	-	mm/dd/yyyy hh:mm
13.	PayCancel *	Logic (T/F)	1	*-	-

Table A.7. Cr_Bank_Type.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	CrCode	Text	2	-	-
2.	CrDescription	Character	20	-	-

Table A.8. Material.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	MaterialID	Character	6	-	G-9999
2.	MatDescription	Character	20	-	-
3.	MatMinOrder	Numeric	3	-	999
4.	MatMinStrock	Numeric	3	-	999
5.	MatMaxStock	Numeric	4	-	9999
6.	MatSafetyStock	Numeric	4	-	9999
7.	MatReOrderPoint	Numeric	4	-	9999
7.	MatCurrentQty	Numeric	4	-	9999
8.	MatDel/LeadTime	Text	10	-	-
9.	MatLifetime	Text	10	-	-
10.	MatExpDate/Time	Date/ Time	8	-	mm/dd/yyyy hh:mm

Table A.9. Material_Source.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	SourceID	Text	6	-	S-0003
2.	SrcName	Character	20	-	-
3.	SrcDept	Character	15	-	-
4.	SrcAdd1	Character	35	-	-
5.	SrcAdd2	Character	35	-	-
6.	SrcTel	Numeric	9	-	(99)999 9999
7.	SrcFax	Numeric	9	-	(99)999 9999

Table A.9. Material_Source (Continued).

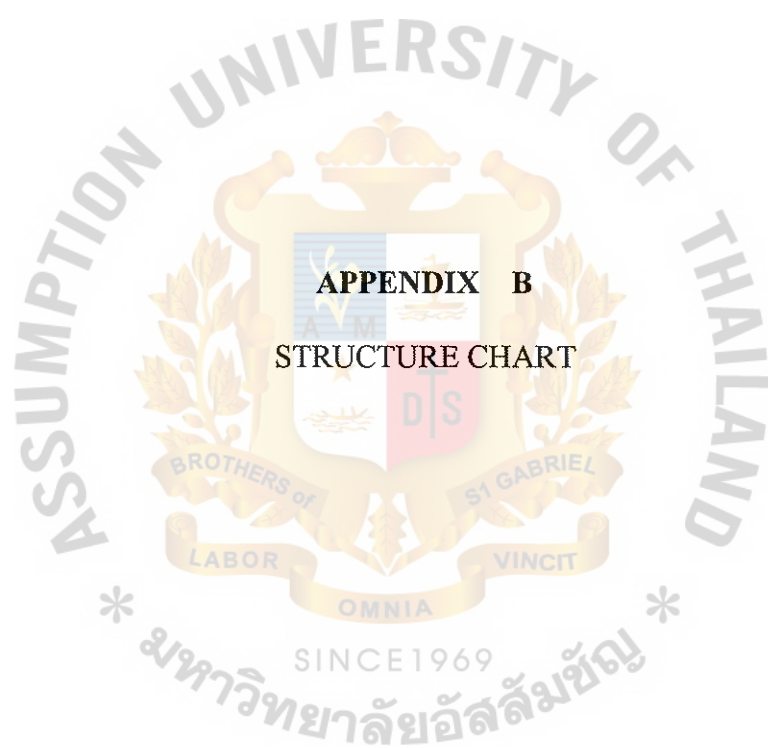
No.	Field Name	Data Type	Length	Decimal	Remark
8.	SrcActive	Logic	Logic (T/F)	-	-
9.	SrcTotalOrder	Numeric	4	-	9,999
10.	SrcTotalOrderAmt	Numeric	7	2	99,999.99

Table A.10. Inv_Detail.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	TransactionID	Character	7	-	R-99999
2.	Tr_Sequence	Numeric	7	-	-
3.	MaterialID	Character	6	-	G-9999
4.	TrQty	Integer	4	-	9999
5.	TrCostperUnit	Numeric	7	2	99,999.99
6.	TrRemainingQty	Integer	4	-	9999

Table A.11. Inv_Head.

No.	Field Name	Data Type	Length	Decimal	Remark
1.	TransactionID	Character	7	-	R-99999
2.	Transactiondate	Date	8	-	mm/dd/yyyy
3.	TrBy	Character	15	-	-
4.	TrRec_Issue_Flag	Logic (T/F)	1	-	-
5.	TrRef_Inv_Date	Date	8	-	mm/dd/yyyy
6.	TrRef_Inv_No	Text	10	-	-
7.	SourceID	Text	6	-	S-9999



APPENDIX B
STRUCTURE CHART

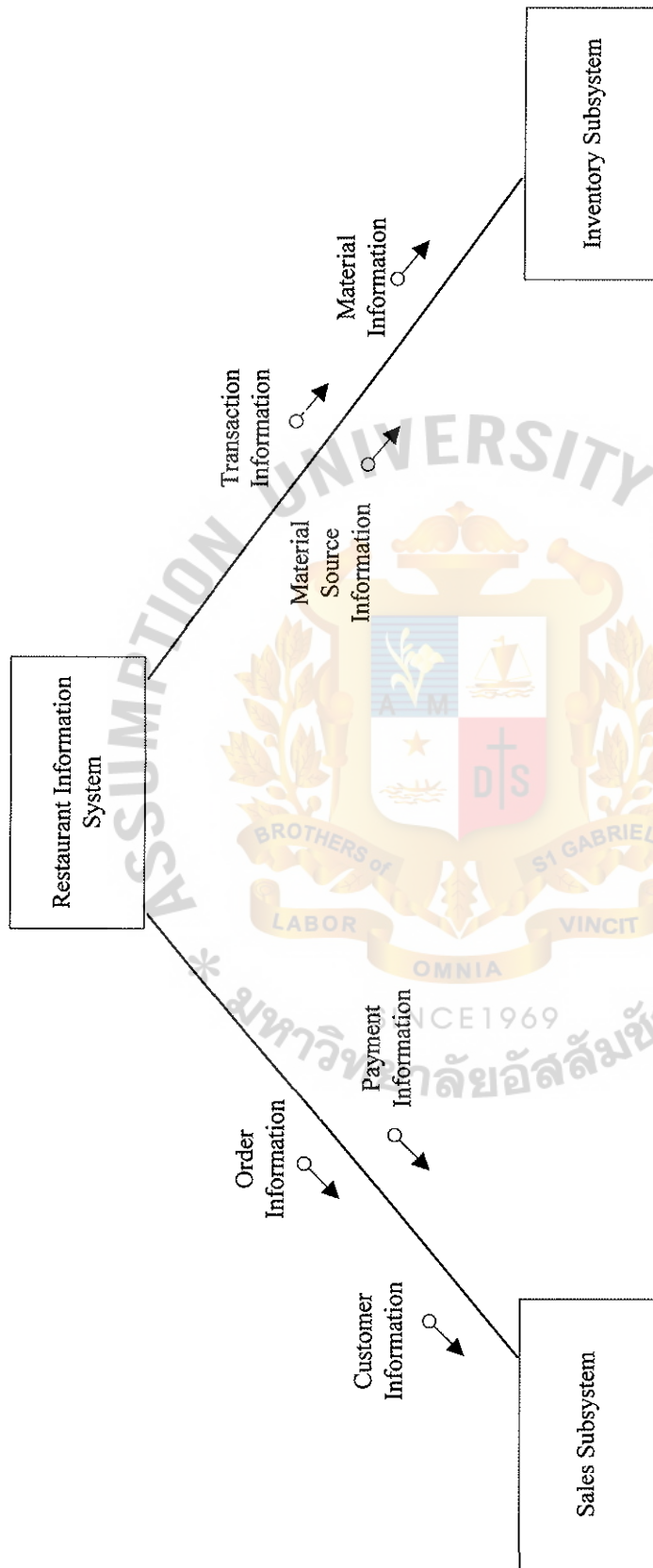


Figure B.1. Structure Chart of Restaurant Information System.

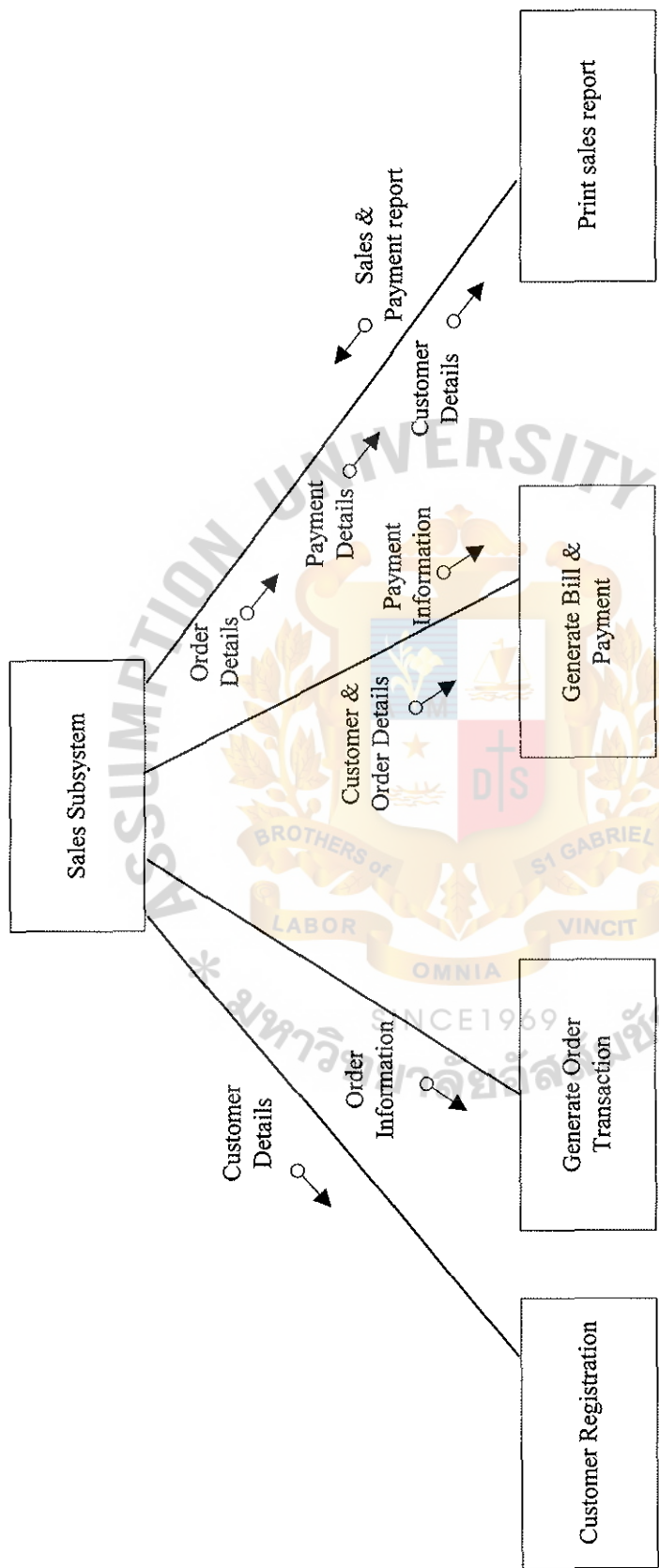


Figure B.2. Structure Chart of Sales Subsystem.

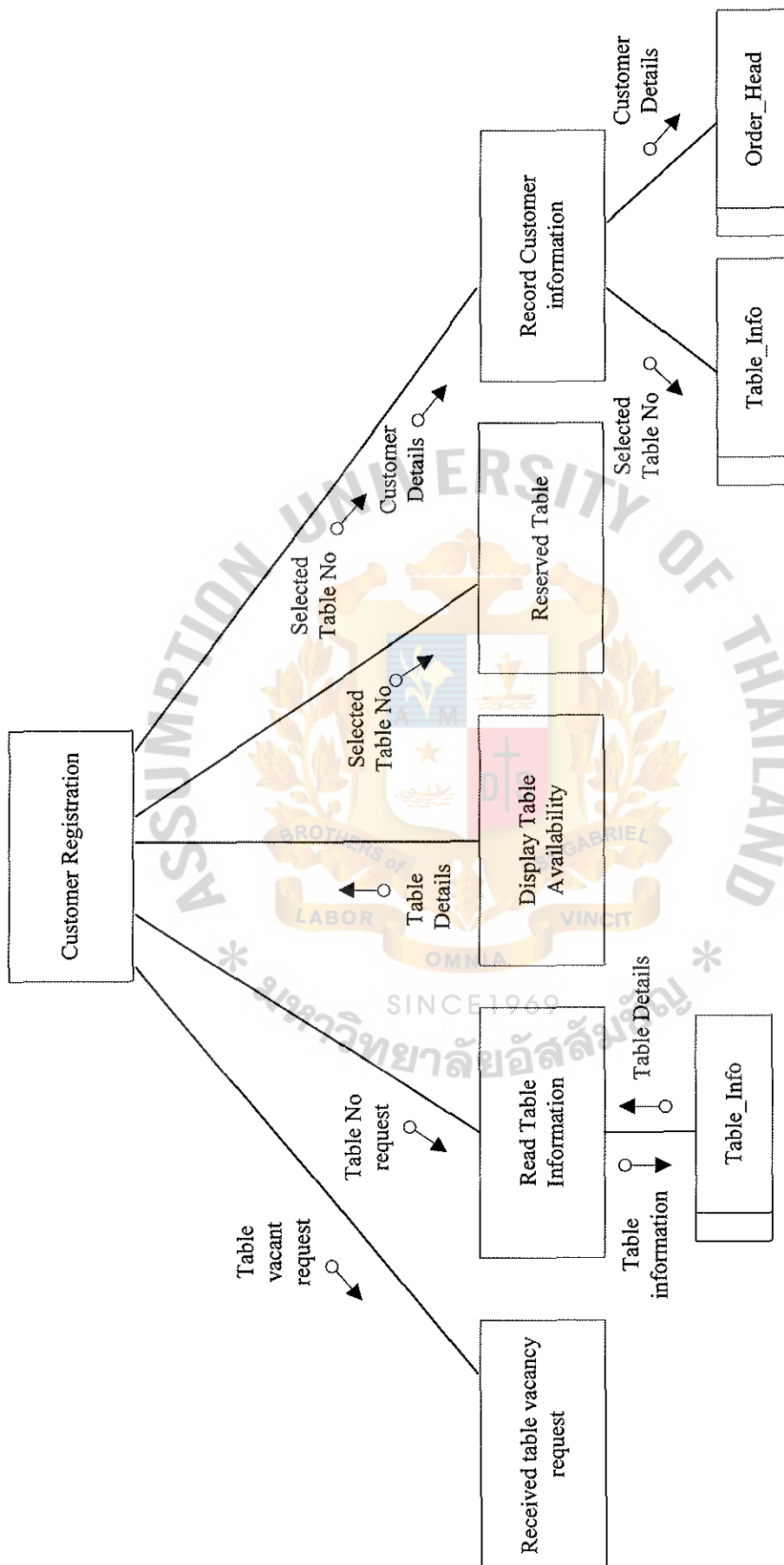


Figure B.3. Structure Chart of Customer Registration.

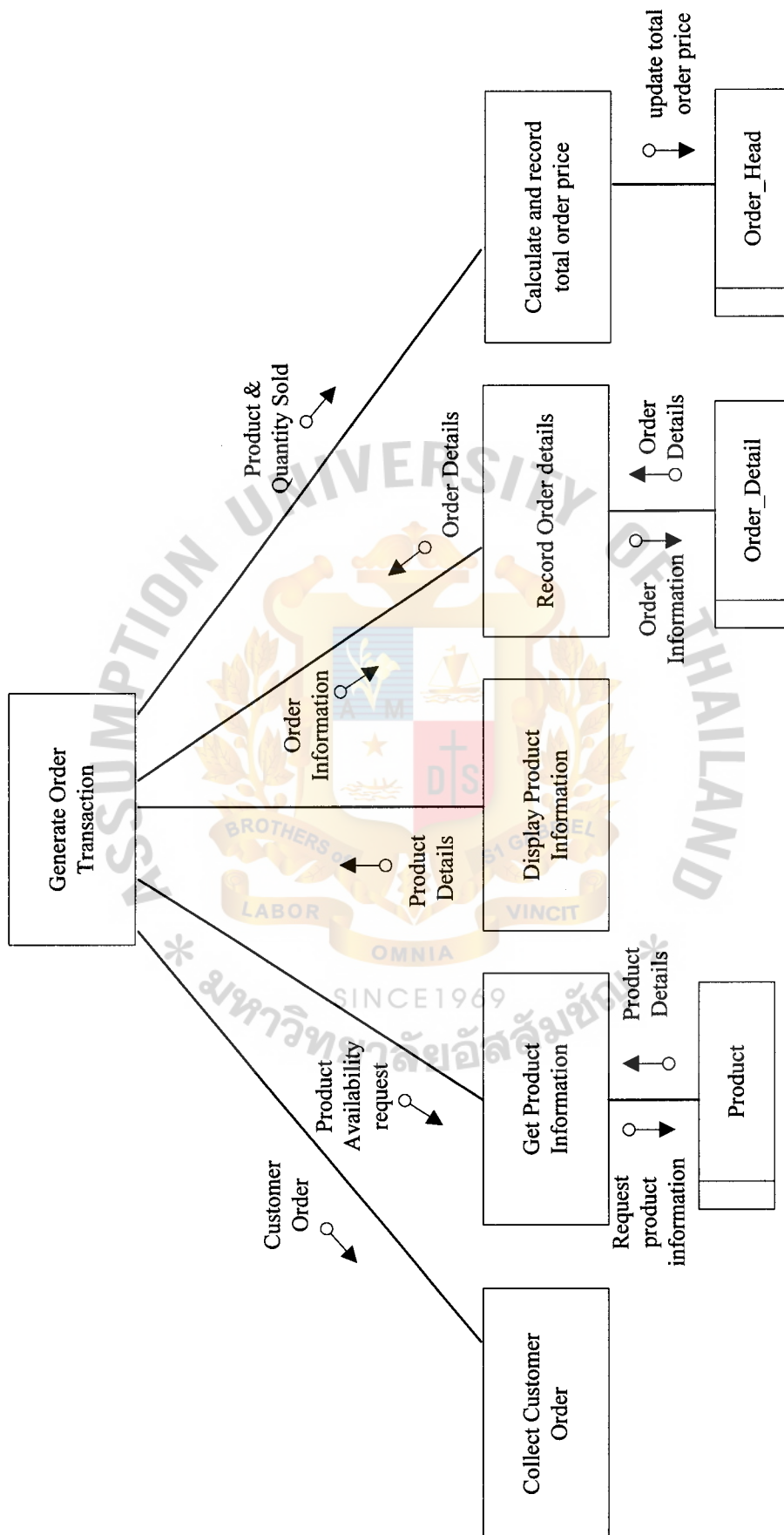


Figure B.4. Structure Chart of Generate Order Transaction.

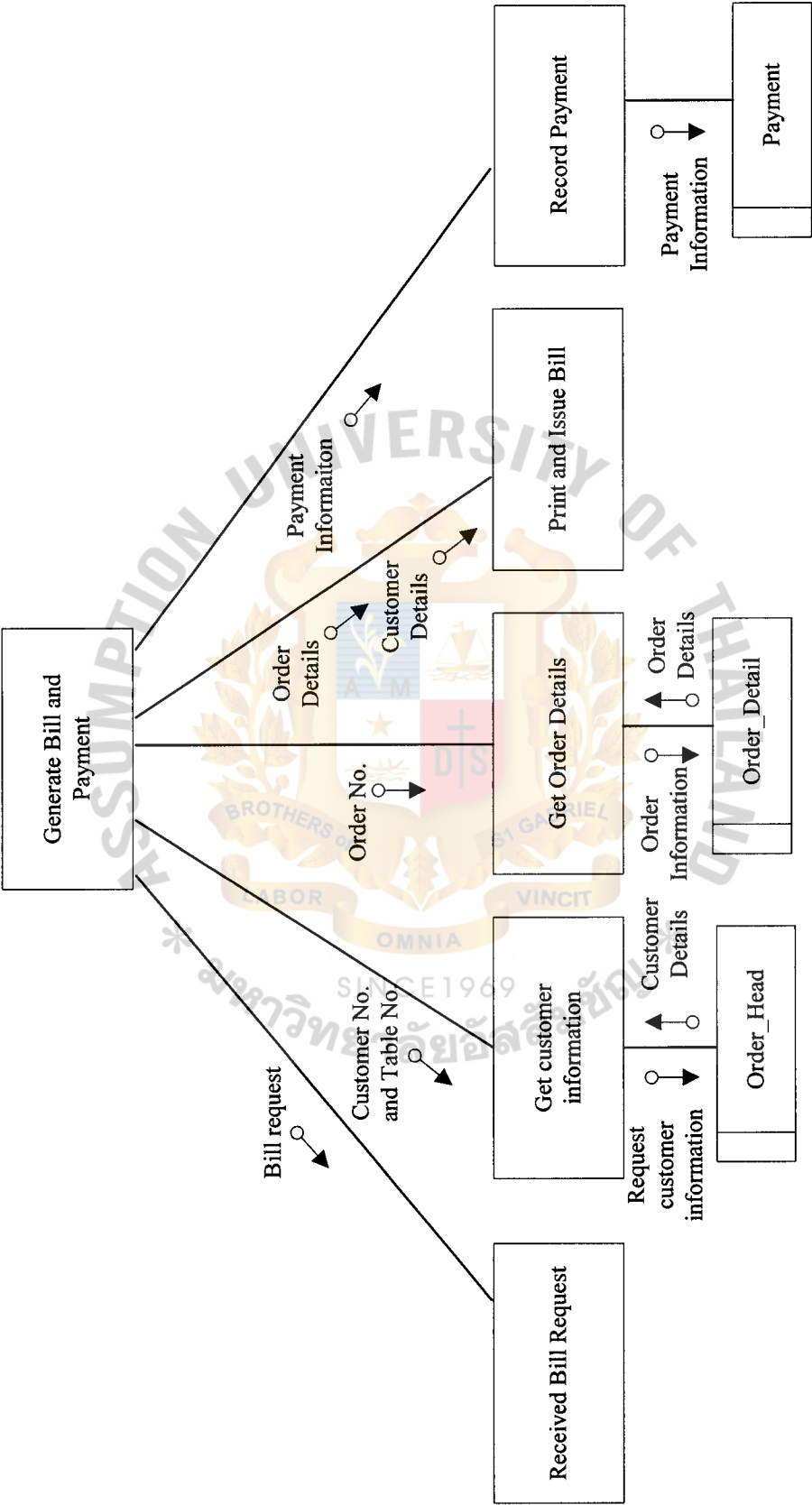


Figure B.5. Structure Chart of Generate Bill & Payment.

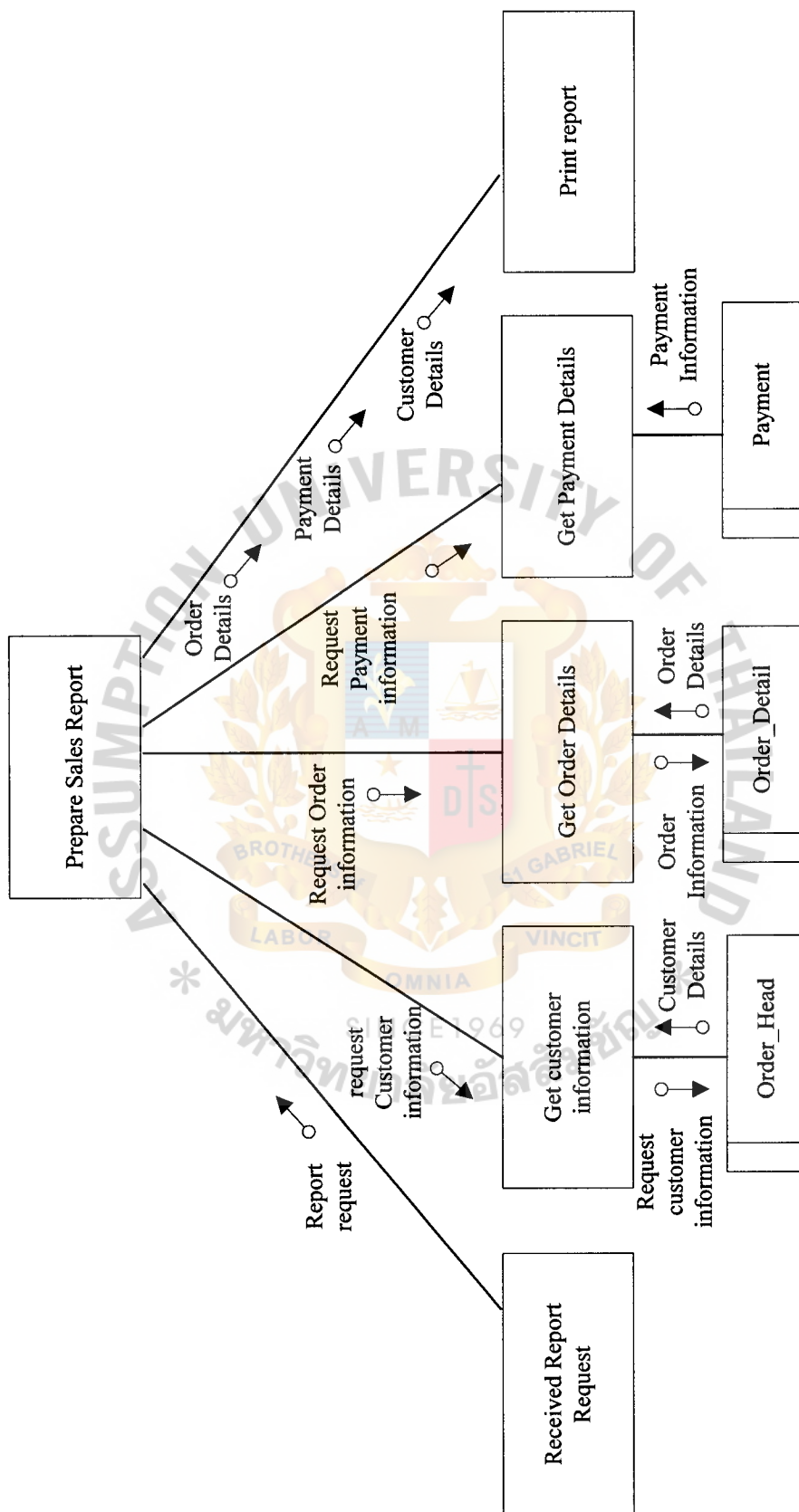


Figure B.6. Structure Chart of Print Sales Report.

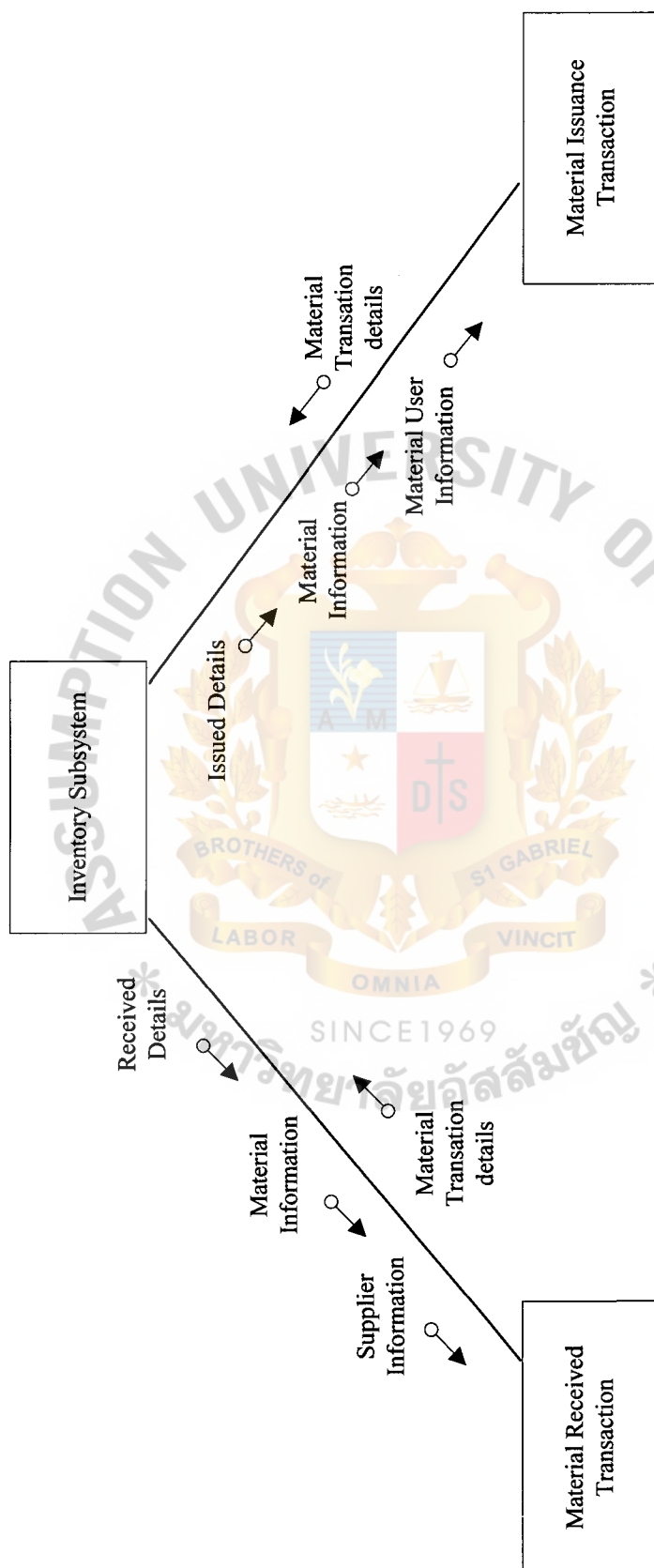


Figure B.7. Structure Chart of Inventory Subsystem.

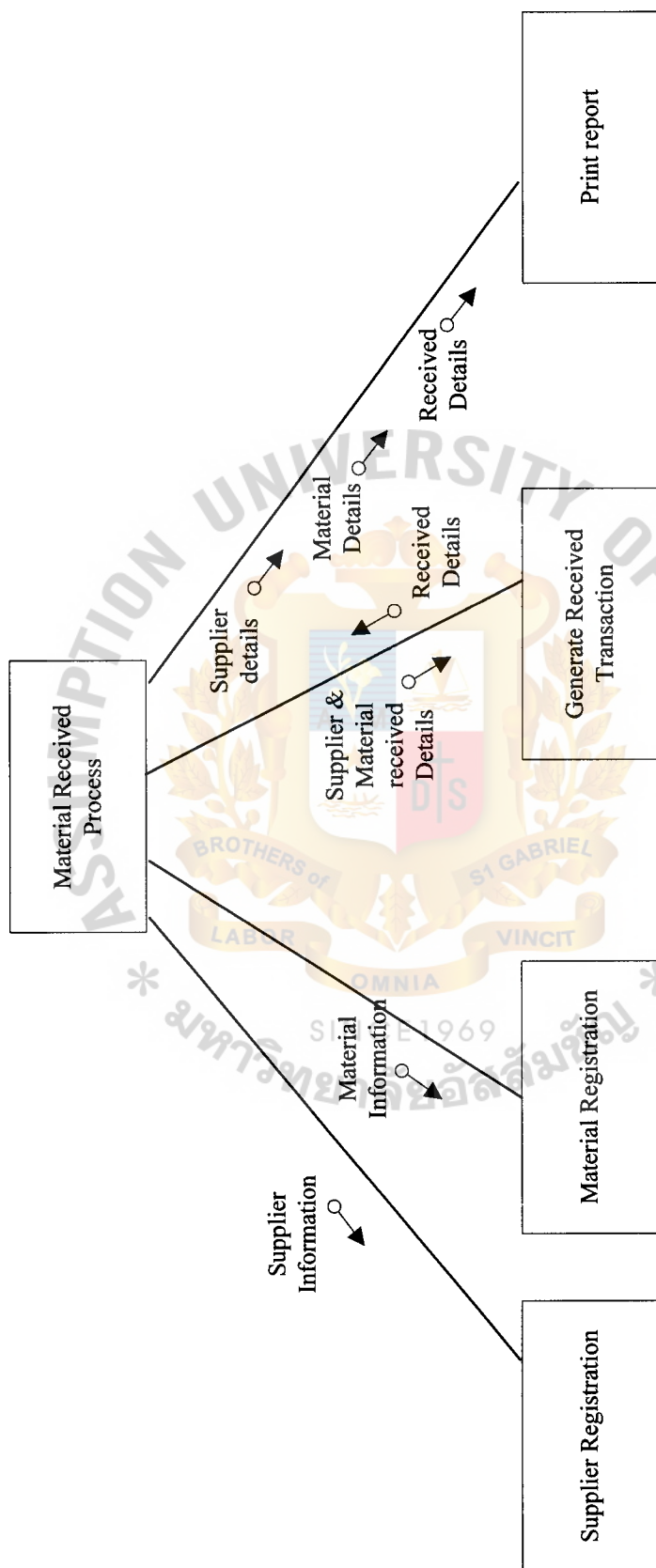


Figure B.8. Structure Chart of Material Received Process.

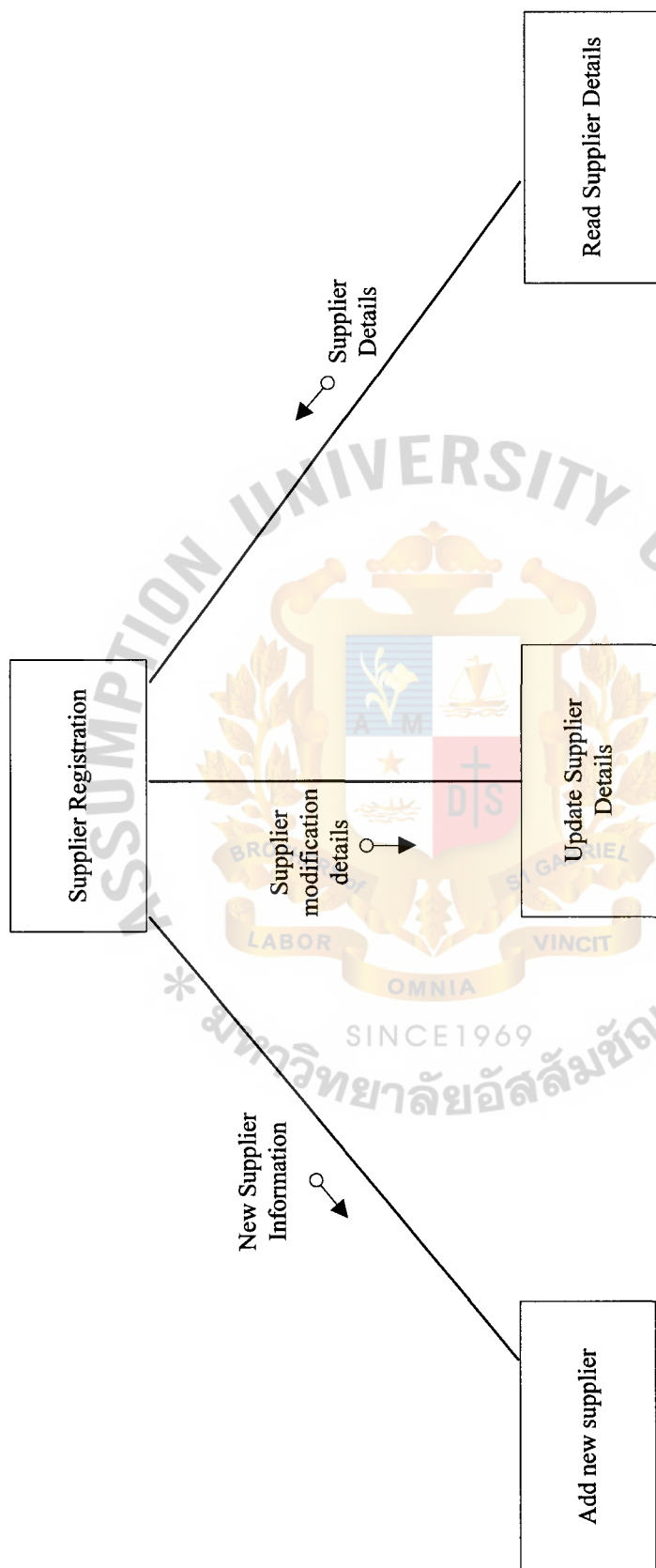


Figure B.9. Structure Chart of Supplier Registration.

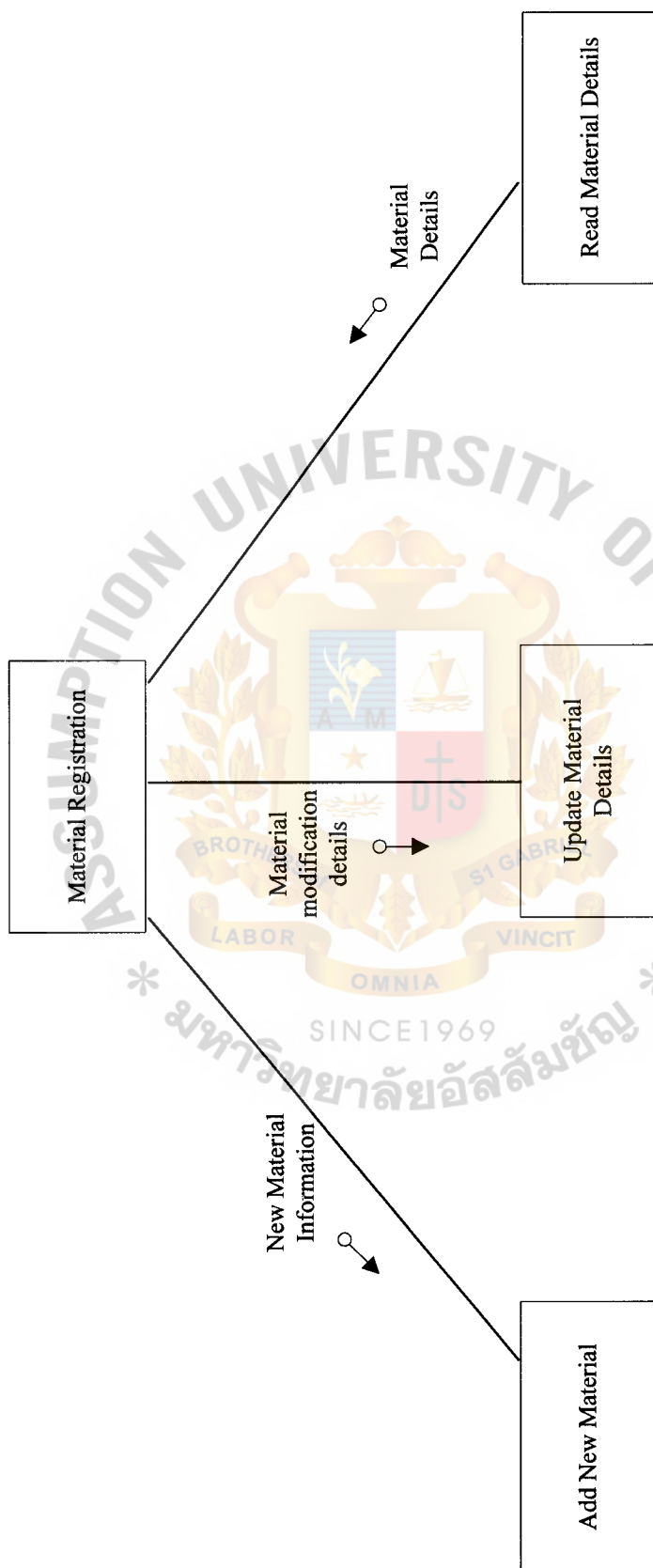


Figure B.10. Structure Chart of Material Registration.

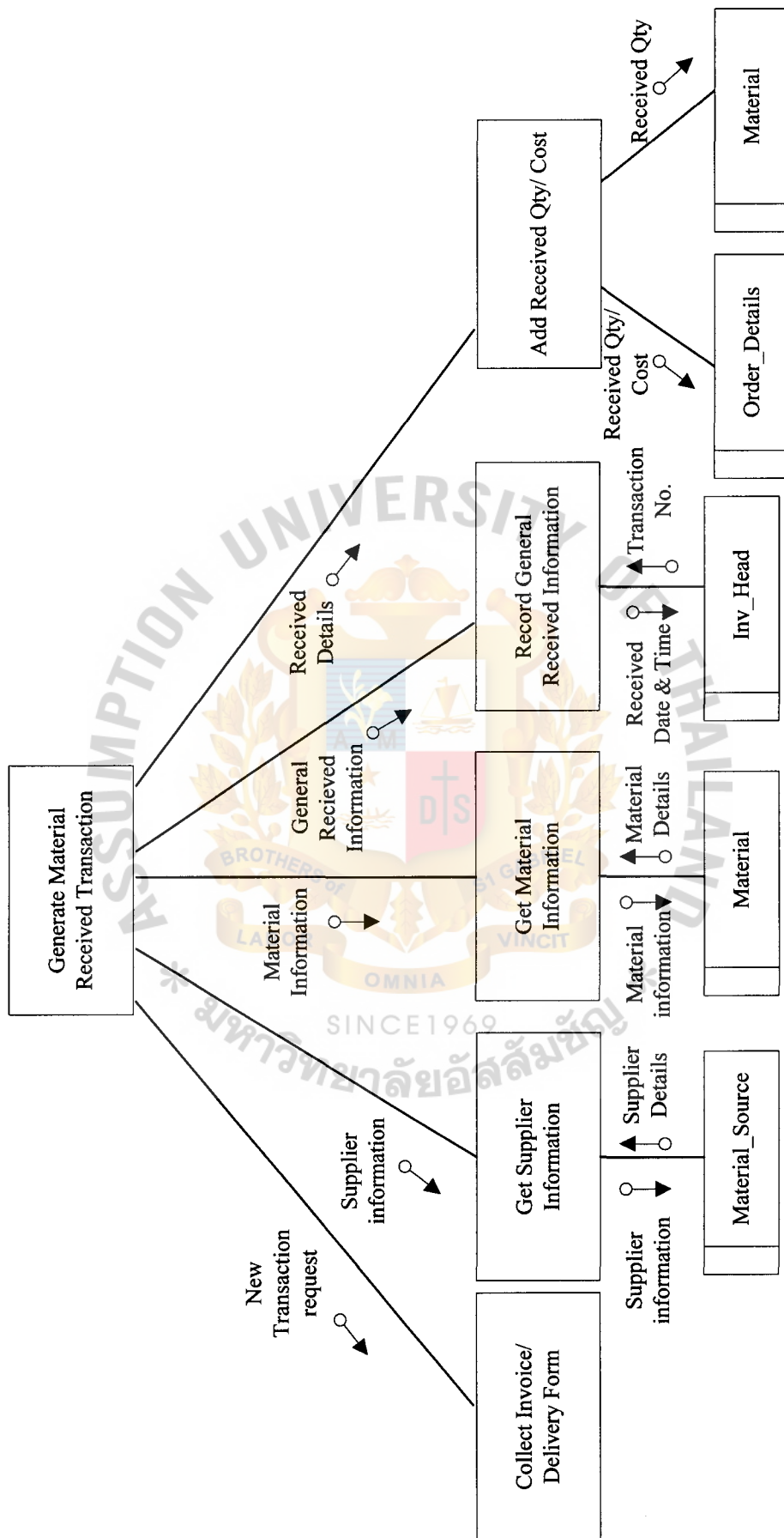


Figure B.11. Structure Chart of Generate Material Received Transaction.

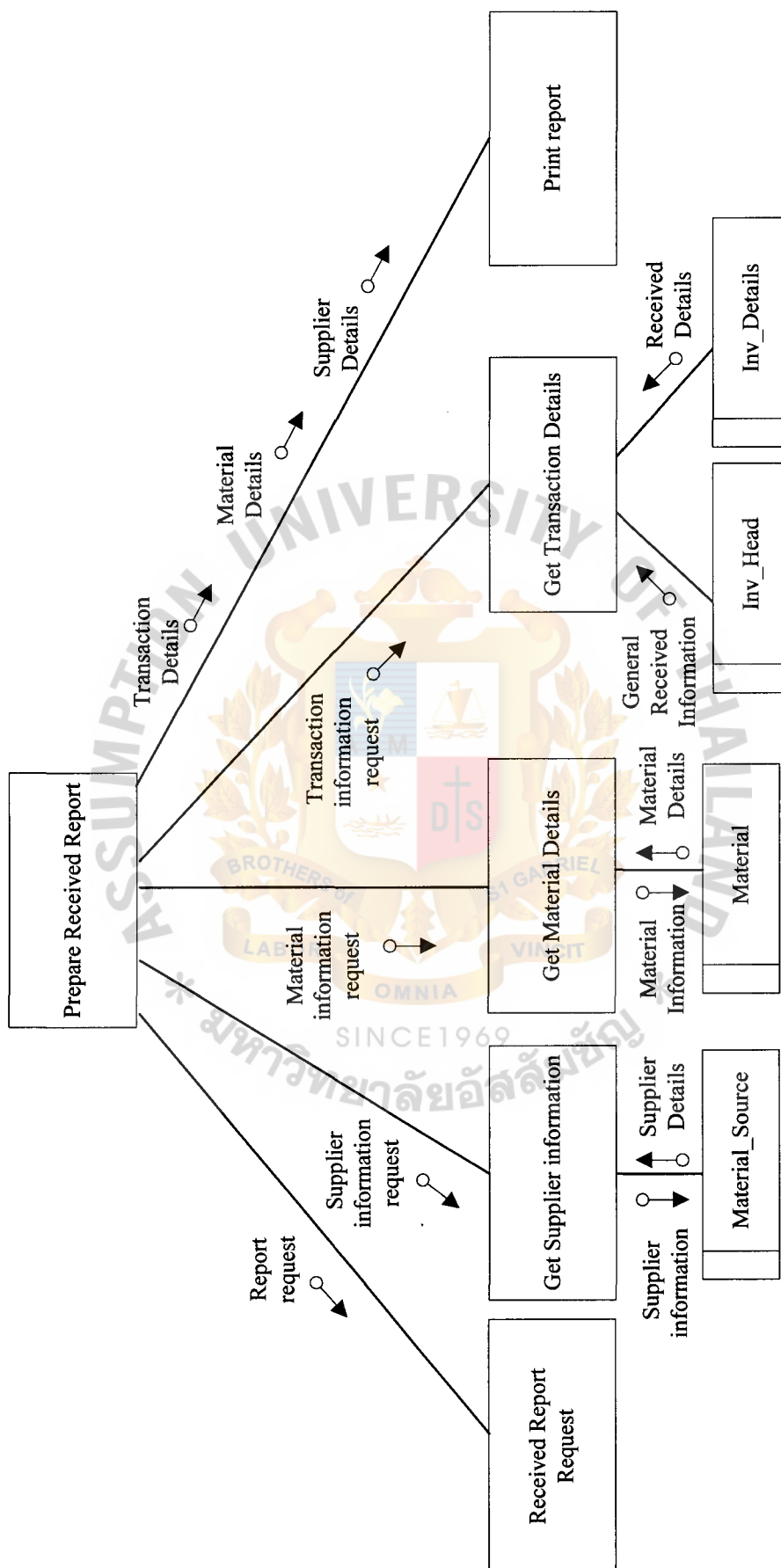


Figure B.12. Structure Chart of Print Material Received Report.

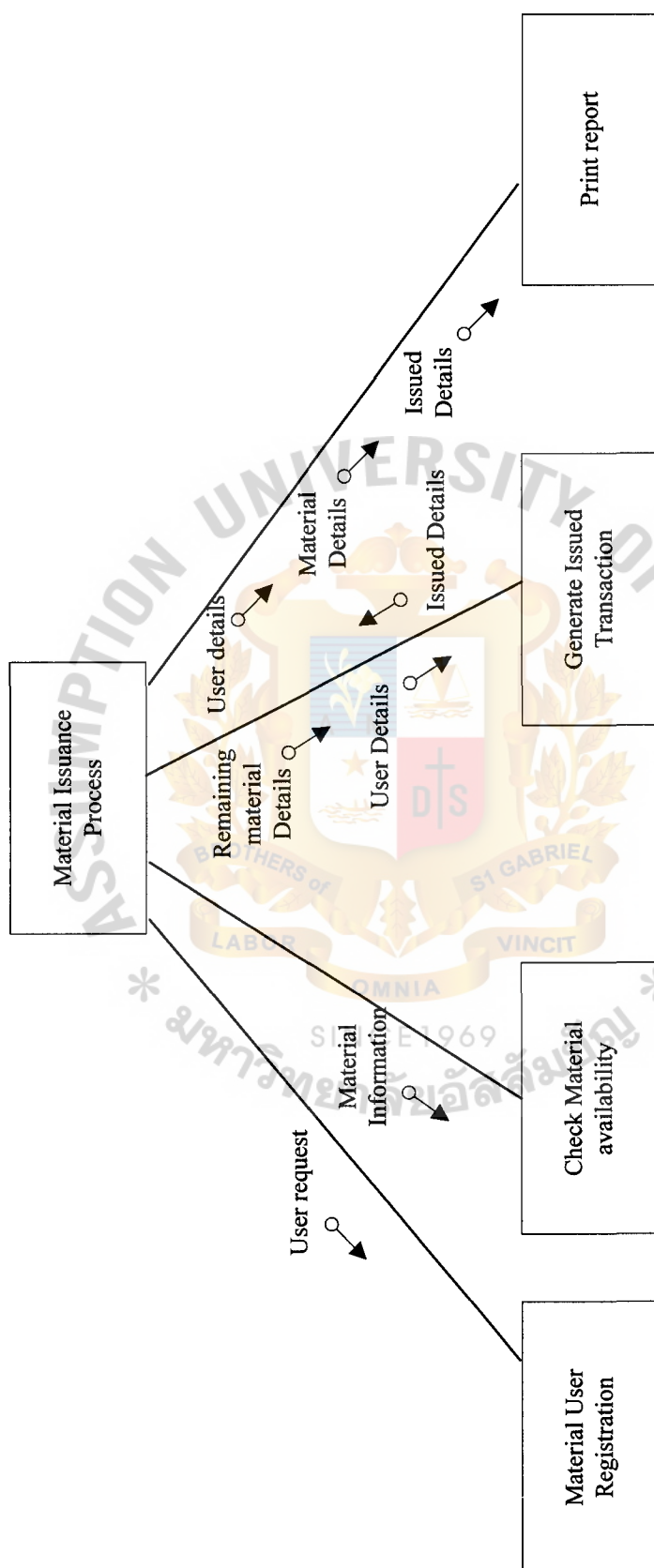


Figure B.13. Structure Chart of Material Issuance Process.

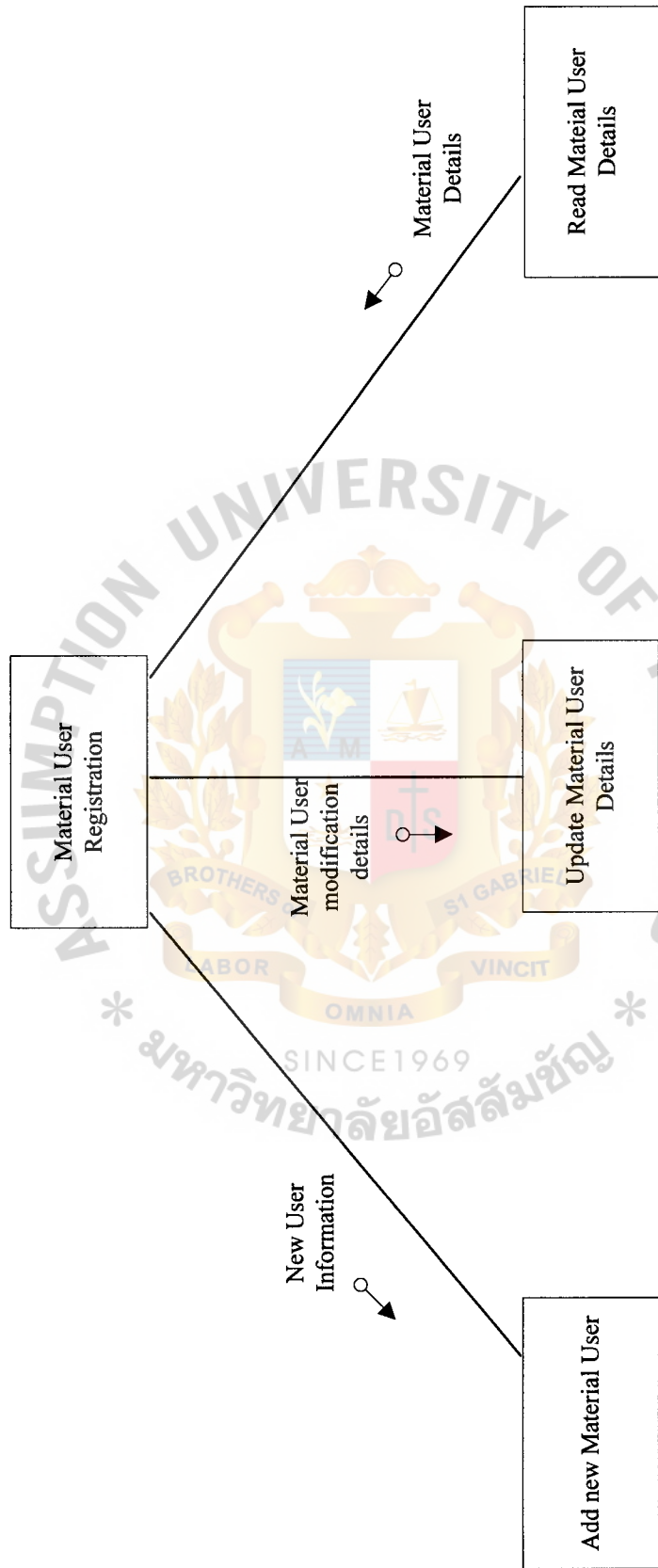


Figure B.14. Structure Chart of Material User Registration.

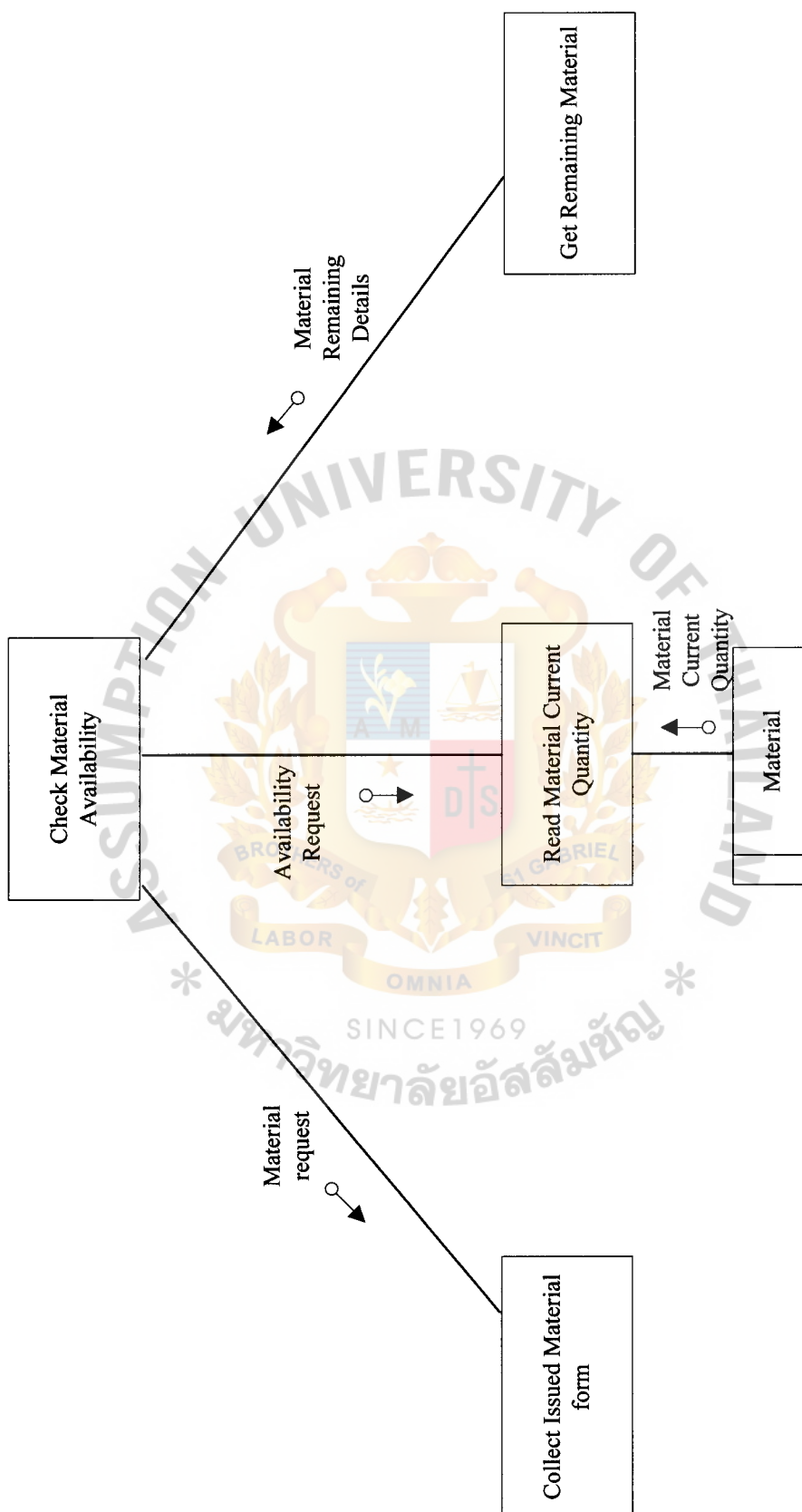


Figure B.15. Structure Chart of Check Material Availability.

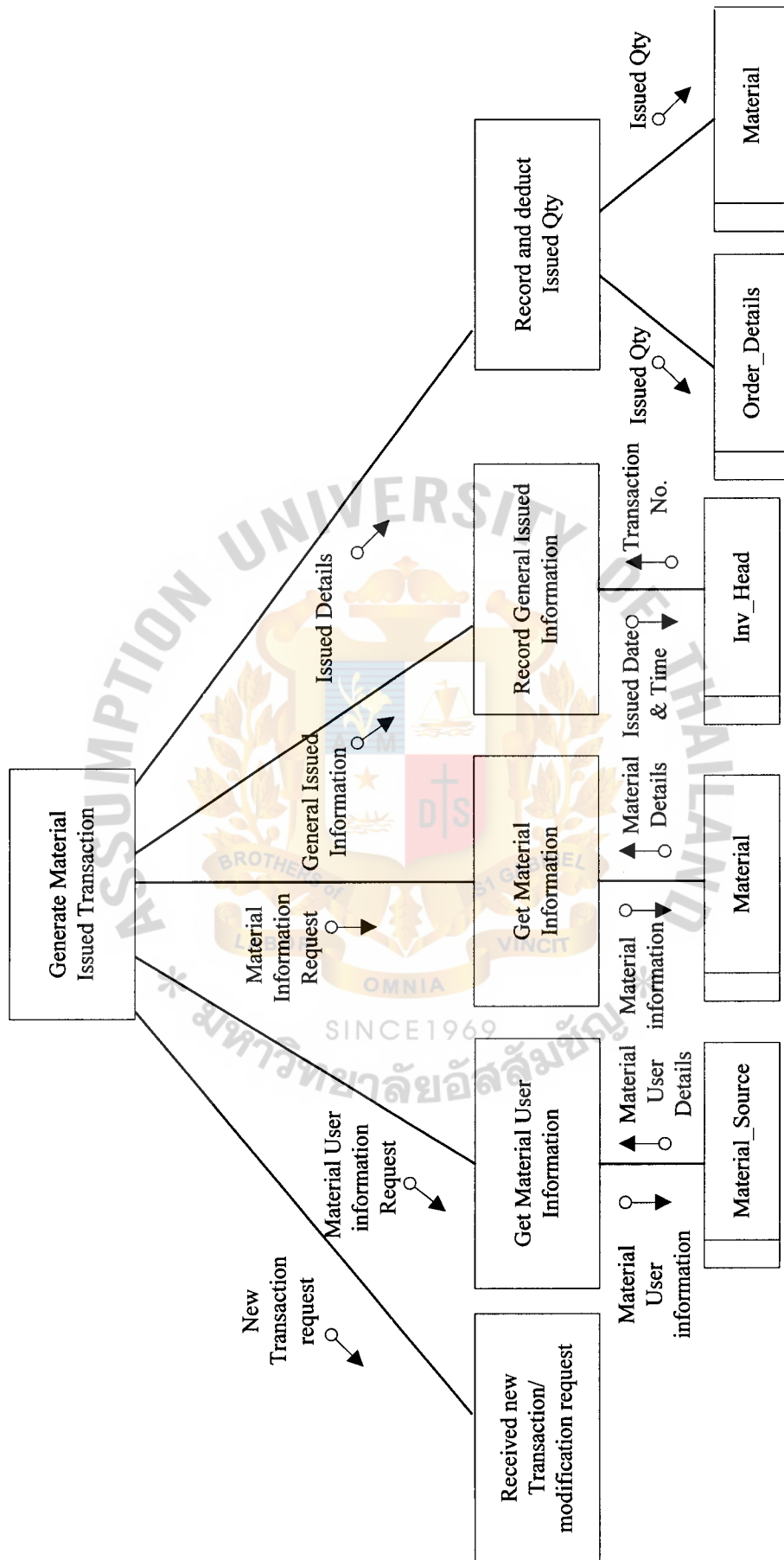


Figure B.16. Structure Chart of Generate Material Issued Transaction.

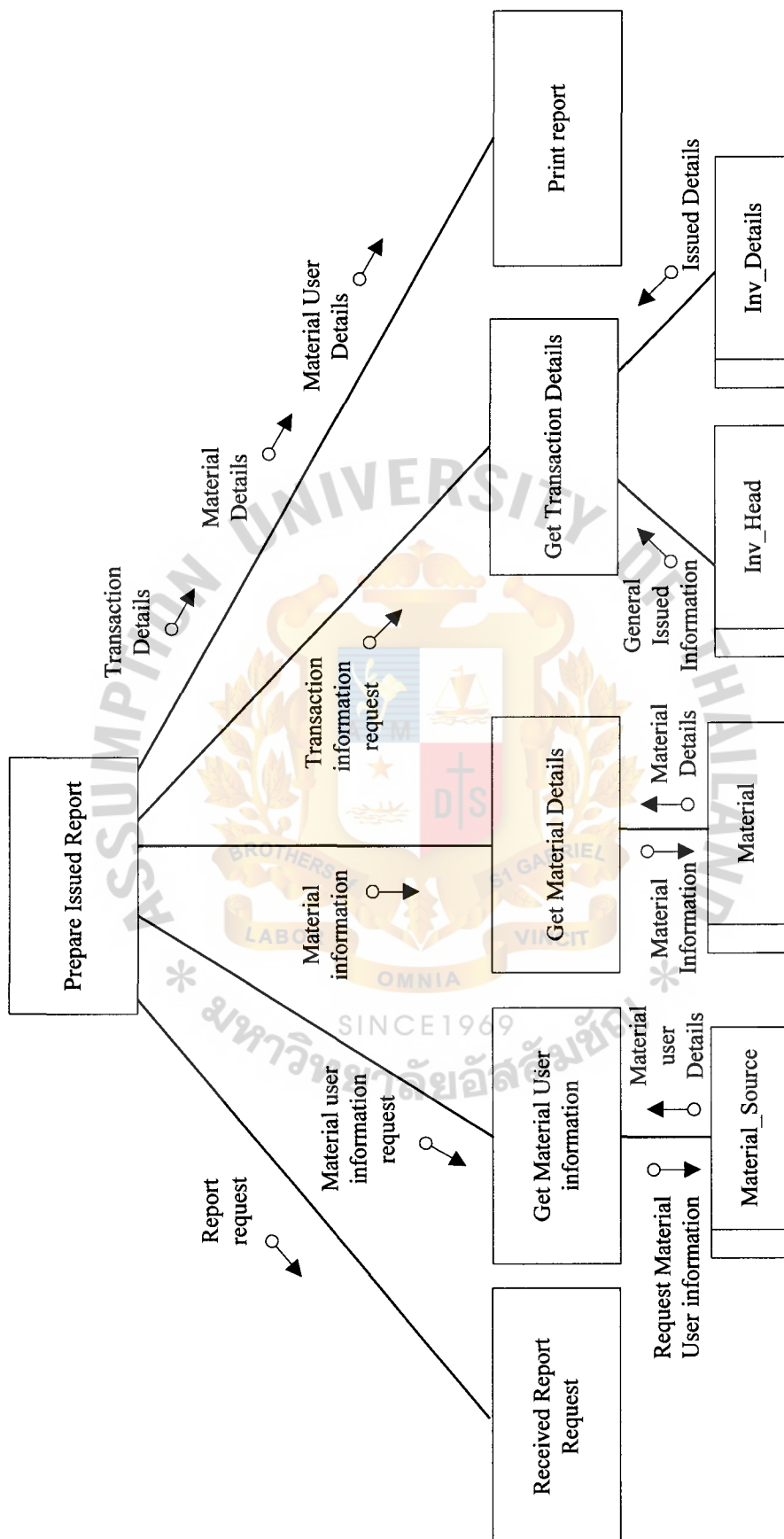


Figure B.17. Structure Chart of Print Material Issued Report.



APPENDIX C

INPUT DESIGN

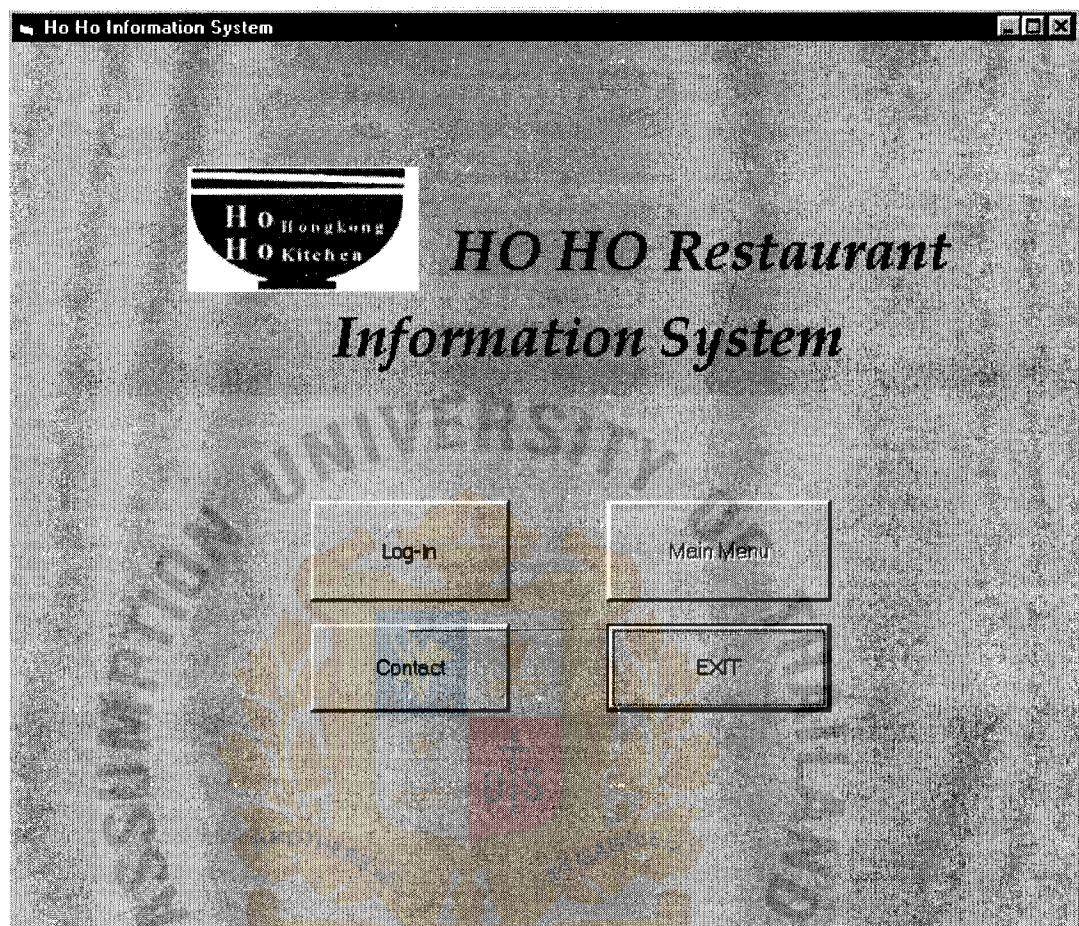


Figure C.1. Startup Form.

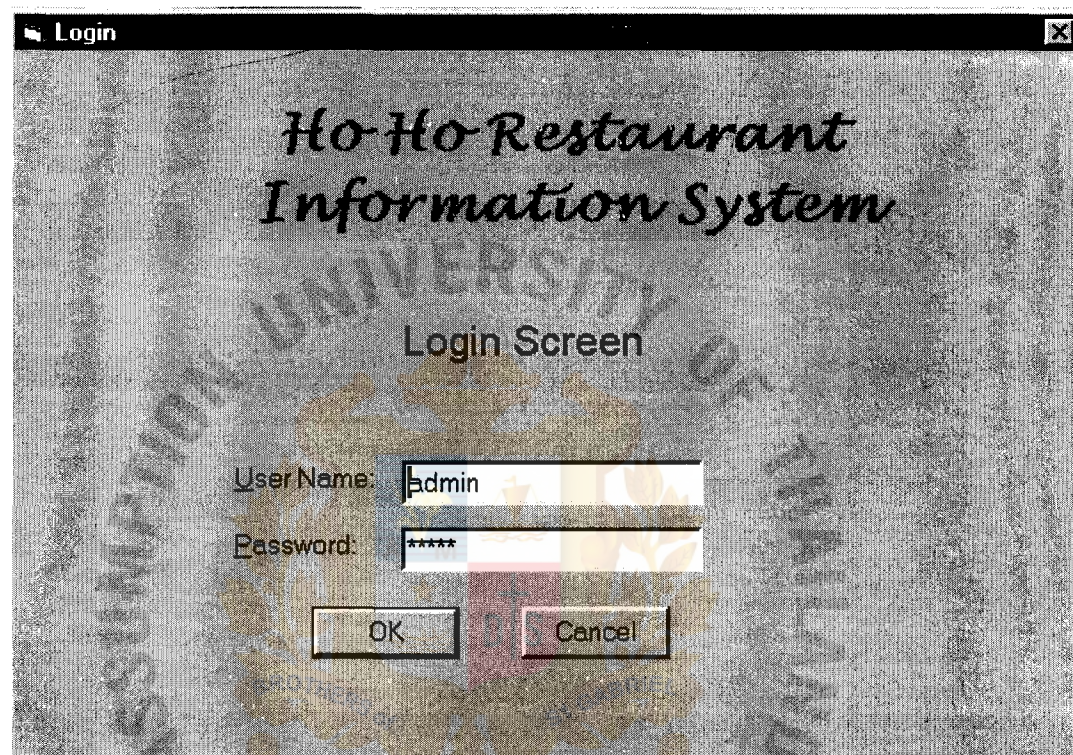


Figure C.2. Login Screen

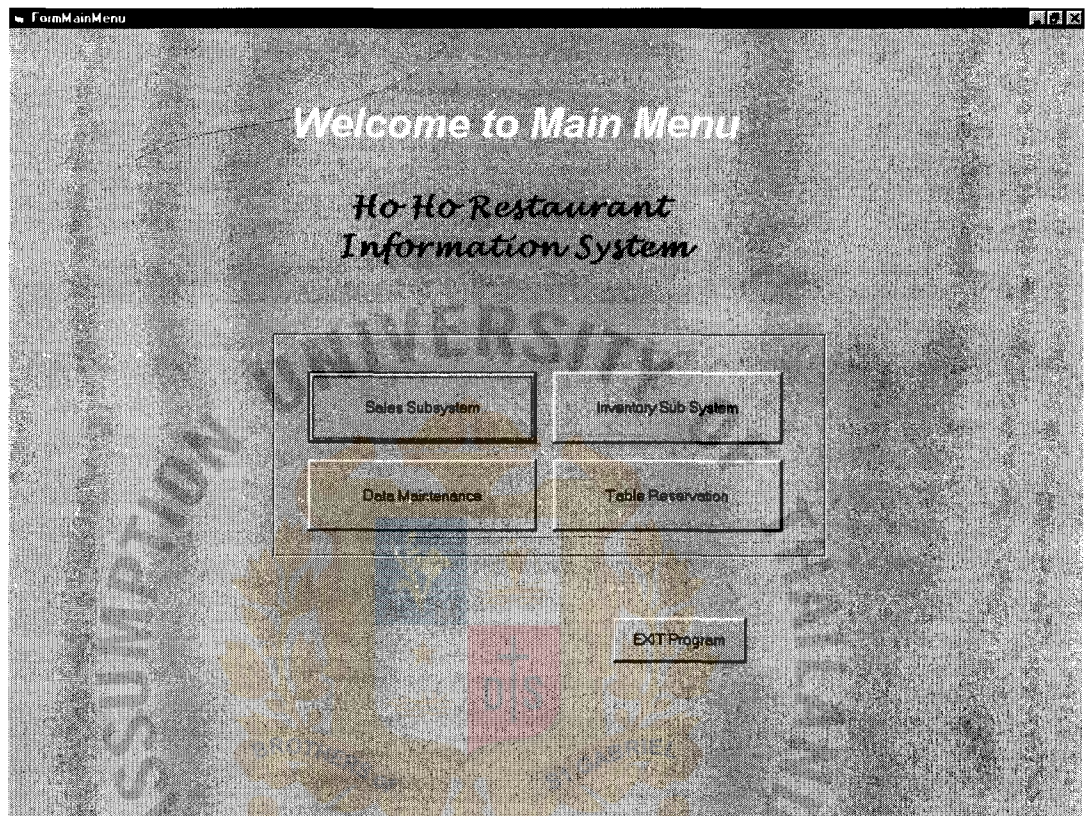


Figure C.3. Main Menu Screen.



Figure C.4. Sales Sub-System Screen.

Ho Ho Order Entry

Sales Subsystem
Order Entry

Customer Information
 Customer No: Table No: Date:

Product Code	Description	Category	Selling Price	Quantity	Total Amount
<div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); opacity: 0.3; font-size: 48px; pointer-events: none;">UNIVERSITY</div>					

Product Selection

Product Description
 Product ID: Product Name:
 Category ID: Category Name:

Product Price
 Unit price: Quantity:
 Add. price:
 Total price: Selling price:

Sub Total:

Discount:

Tax: %

Total Amount:

Payment

Figure C.5.E1 Sales Order Screen.

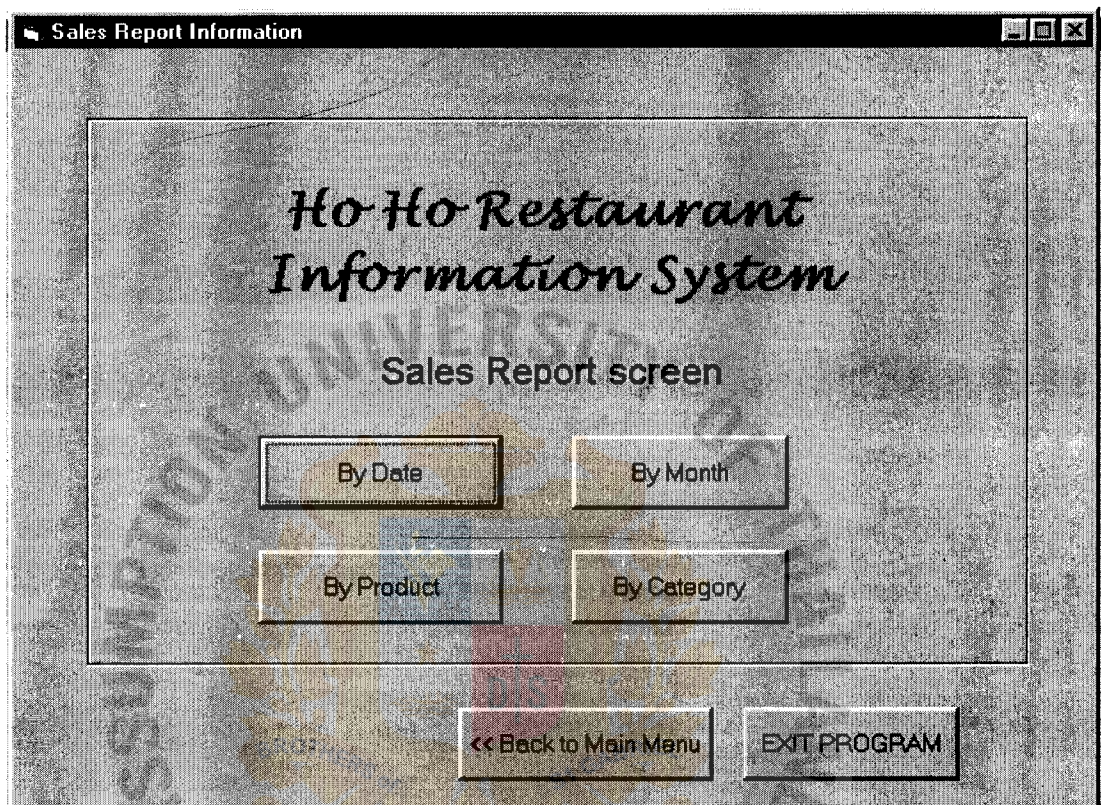


Figure C.6. E 1 Sales Report Screen.



Figure C.7. Inventory Subsystem Screen.

Inventory Transaction Information

New Transaction
 Save
 Search
 Delete
 Print Order Slip
 Exit

Inventory Subsystem

Transaction Details
 Transaction No: Date:
 Transaction Status: ☒ Material Received ☐ Material Issued

Reference
 Document No:
 Document Date:

Material Source

Source: Name: Department:
 Address: Tel:
 Fax:

Code	Description	Category	Unit Cost	Quantity	Total Amount
G1001	Salt	Grocery Product	20.00		200.00
G1003	Suger	Grocery Product	15.00		450.00

Raw Material Information

MaterialID: Sequence: Total Cost:
 Description:

Figure C.8. Inventory Transaction Screen.

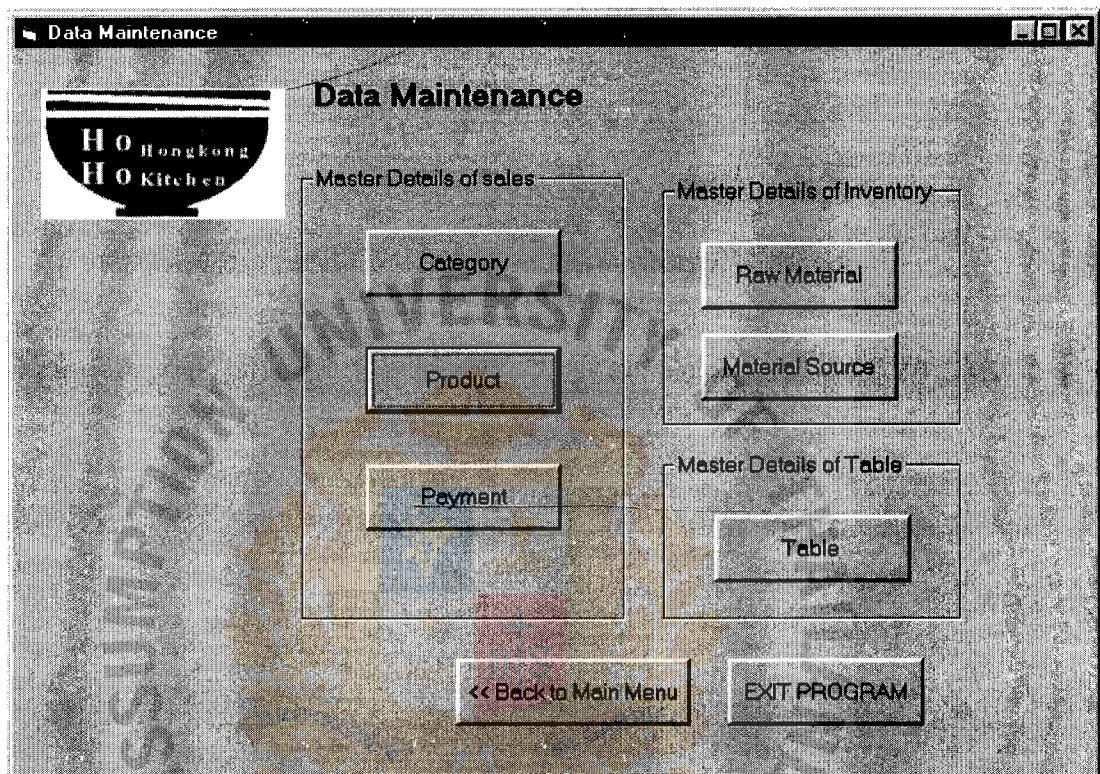


Figure C.9. Data Maintenance Screen.

Category

Category Code : p2

Category Name : BarBQ

Description : Barbequed Pork, Suckipig, Roaste

Add Delete Find save Cancel EXIT

Figure C.10. Data Maintenance Screen for Category of Product.

Food & Beverage Information

Food and Beverage Menu

Category

Category Code : 1

Category Name : Beverage

Product details

Product Code : 1011

Product Name : Chivas Regal Whisky

Cost/ Unit : 800

Selling Price : 1500

Status : ☒ Available ☐ Unavailable

Add Update Delete Save Cancel Find EXIT

Figure C.11. Data Maintenance Screen for Food & Beverage Product.

CC Payment Information

Credit Card Services Information

Credit Card Services: Visa

Status: ☒ Available ☐ Unavailable

EXIT

Add Update Delete Save Cancel Find

Figure C.12. Data Maintenance Screen of Credit Card Payment.

Raw Material Information

Raw material

Material Information

Material ID:	G-1001	
Material Name:	Salt	
Minimum Order:	30	Unit of measurement: Pax
MIN Stock:	10	MAX Stock: 100
Safety Stock:	20	Reorder Point: 30
Current Quantity:	45	

EXIT

Add Update Delete Save Cancel Find

Figure C.13. Data Maintenance Screen of Raw Material.

Material Source Information

Contact Information

Source ID: S-0003

Source: Tong Hua Department:

Address: 16/31 Latprao Road
Latprao, Bangkok

Tel: 02 2820001 Fax: 02 2821112

Status: ☒ Active ☐ Non-active

EXIT

Add Update Delete Save Cancel Find

Figure C.14. Data Maintenance Screen of Material Source.

Table Information

Table Number: 08 No. Of Seats: 4

Description: Window seat

Status: ☒ Available ☐ Unavailable

EXIT

Add Update Delete Save Cancel Find

Figure C.15. Data Maintenance Screen of Table Information.

Table Reservation Information

Table Reservation Information

Table Number: No. Of Persons:

Reservation Name:

Reservation Date: Reservation Time:

Contact Person:

Tel:

Reservation Fee: Status:

EXIT

Add Update Delete Save Cancel Find

Figure C.16. Data Maintenance Screen of Table Reservation.



APPENDIX D

OUTPUT DESIGN

Ho Ho Enterprise Co., Ltd.
265/387 Silom Rd., Bangrak
Bangkok 10500

RECEIPT

BILL NO: 00001

DATE: 19/10/2002

CUSTOMER NO: C-00020

PAYMENT TYPE: Cash

NO.	Item ID.	TITLE	Quantity	Unit Price (Baht)	Discount (Baht)
1.	9061	Congee	1	60.00	60.00
2.	6352	Fried Rice	2	150.00	300.00
3.	1081	Soft Drink	2	25.00	50.00
REMARK:			Total Price		410.00
			Total		381.30
			VAT		28.7
			Grand Total		410.00

Authorized Signature

Figure D.1. Receipt for Customer.

Sales report by Category

Date: 21 September, 2002

<i>CatID</i>	<i>CatName</i>	<i>Amount</i>	<i>Quantity</i>	<i>%Amount</i>	<i>%Quantity</i>
4	Seafood	21,000.00	21	50.14%	9.72%
6	Specialty	10,365.00	61	24.75%	28.24%
2	Barbequed	3,710.00	19	8.86%	8.80%
1	Drink	2,445.00	47	5.84%	22.69%
8	Noodle	1,825.00	27	4.36%	12.50%
9	Congee	1,365.00	33	3.26%	15.28%
3	Shark's Fin	750.00	1	1.79%	0.46%
7	Hot Pot	300.00	2	0.72%	0.93%
5	Soup	125.00	3	0.30%	1.39%
Total		41,185.00	216	100%	100%

Saturday, September 21, 2002

Page 1 of 1

Figure D.2. Sales Report by Category.

Sales report by Product
(Top Five Best Seller product of the day)

Date: 15 September, 2002

<i>ProductID</i>	<i>ProductName</i>	<i>Amount</i>	<i>Quantity</i>	<i>TotalAmount</i>
2091	Barbequed pork	120.00	18	2,160.00
2051	Roasted duck	170.00	19	9,230.00
6361	Fried rice H.K.	160.00	15	2,720.00
6451	Fried rice noodle (Beef)	160.00	15	2,720.00
8031	Shrimp wantan soup	55.00	11	605.00
Total			289	17,435.00

Saturday, September 21, 2002

Page 1 of 1

Figure D.3. Sales Report by Product (Ranking Top Five Best Seller Dish).

Ho Ho Restaurant



Hourly sales report

<u>Time</u>	<u>No. of Customer</u>	<u>Sales Amount</u>
1:00		
2:00		
3:00		
4:00		
5:00		
6:00		
7:00		
8:00		
9:00		
10:00		
11:00	6	410.88
12:00	20	9,536.11
13:00	24	9,594.17
14:00	12	2,698.01
15:00		
16:00		
17:00		
18:00		
19:00		
20:00		
21:00		
22:00		
23:00		
0:00		
END OF DAY SALES :		<u>22,239.17</u>

Figure D.4. Hourly Sales Report.

Ho Ho Order Entry

Sales Subsystem
Order Entry

Customer Information
 Customer No: C-00001 Table No: 09 Date: 24/ Oct/2002

Product Code	Description	Category	Selling Price	Quantity	Total Amount
2081	Barbequed Pork Spare Rib	Barbequed	240.00	1	240.00
1091	Soft Drink	Drink	25.00	2	50.00

Product Selection

Product Description
 Product ID: 5011 Product Name: Soup of the day
 Category ID: 05 Category Name: Soup

Product Price

Unit price: 150 Quantity: 2
 Add. price: 150
 Total price: 150 Selling price: 150

Sub Total: 290.00
 Discount: 0.00
 Tax: 7 % Total Amount: 290.00

Figure D.5. Output Order Screen.

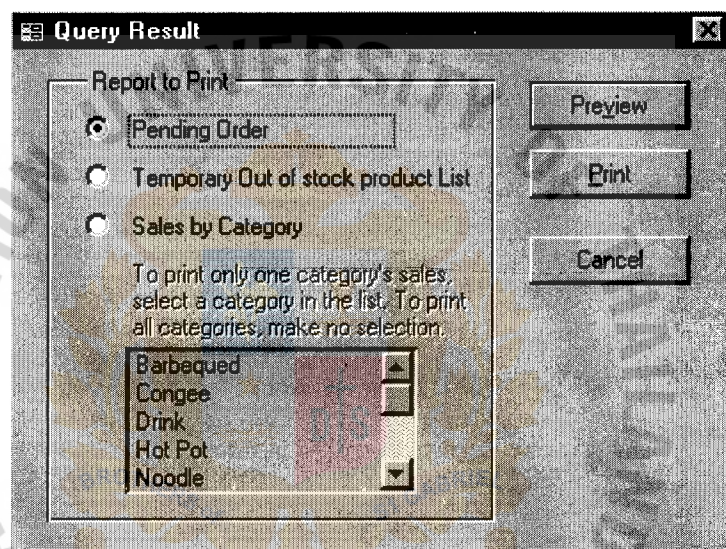


Figure D.6. Query Result.

Query of Pending Order - Report

Pending Order Query Result

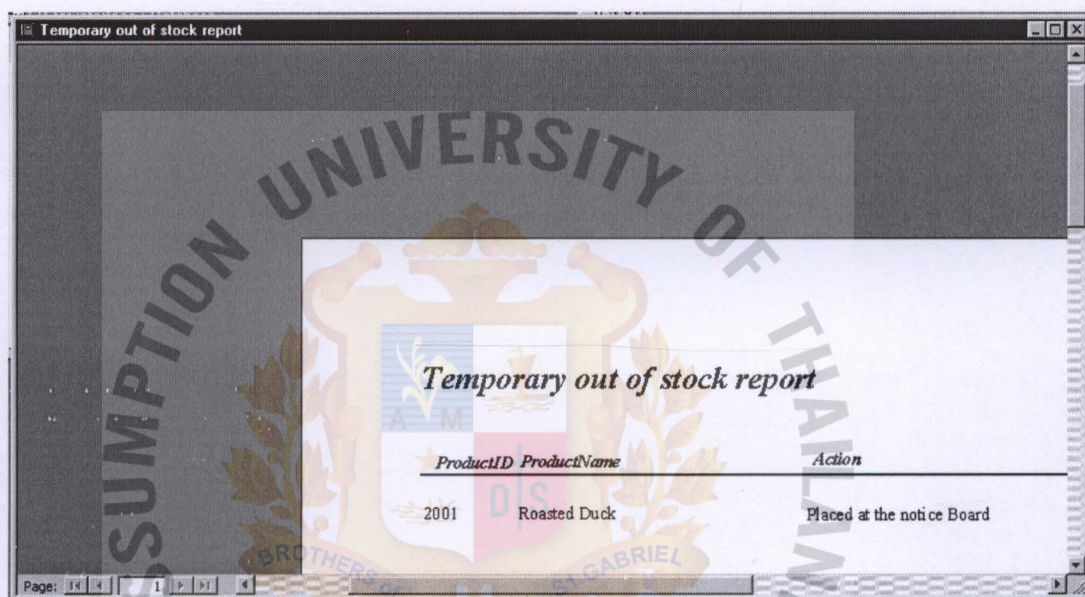
Number of Pending Order: 7
Date: 21 September, 02 Time: 14:00hrs

Table #1		
Time: 11:41 am		
Guests: 3		
Server: Kai		
9061	Congee	1
6352	Fried Rice	2
1081	Soft Drink	2

Table #6		
Time: 12:02pm		
Guests: 7		
Server: Dang		
8001	Wonton Soup	2
2081	Barbequed pork	1
1071	Tea Pot	2
5011	Corn Soup	1
4012	Red sauce Fish Fried	1
2082	Peking Duck	2

Page 1 of 1

Figure D.7. Query Pending Order Screen.



*
Figure D.8. Query of Product Out of Stock Screen.
*
มหาวิทยาลัยอัสสัมชัญ
SINCE 1969

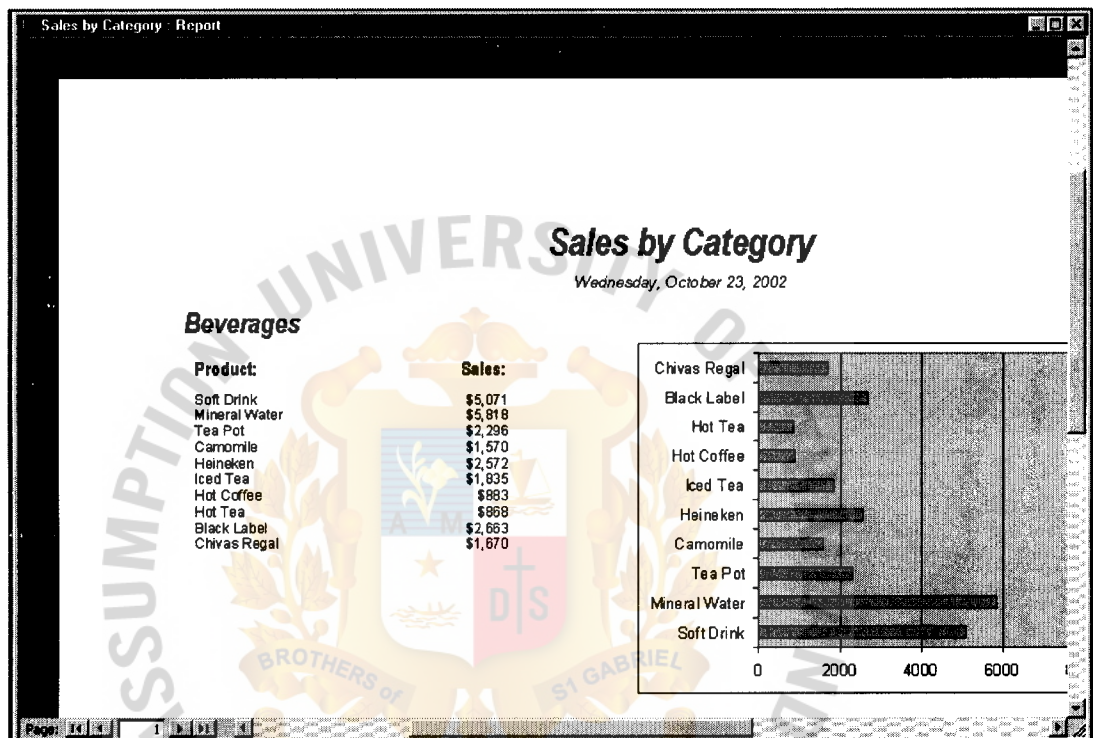


Figure D.9. Query of Sales by Category Screen.

Sales Performance Graph Report (by quarter)

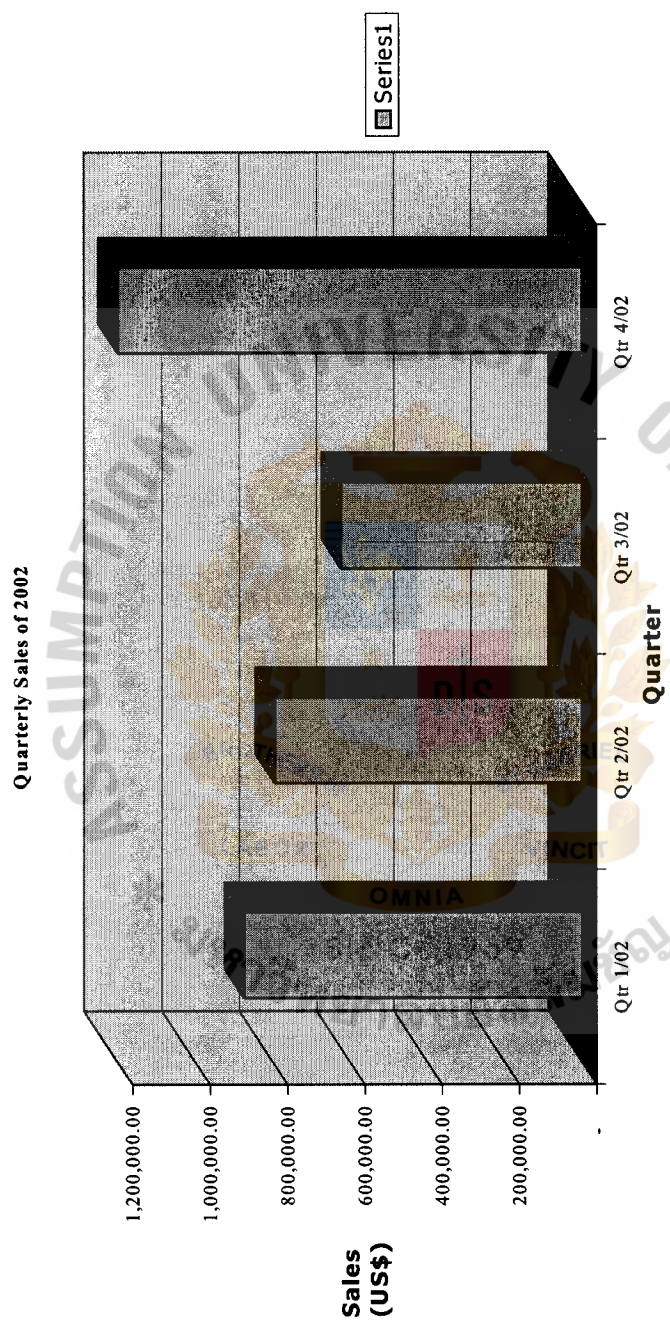


Figure D.10. Sales Performance Graph Report.

Pie Chart of Sales Performance by Category



Figure D.11. Chart of Sales Performance by Category.

Sales Performance Graph Report (By Category)

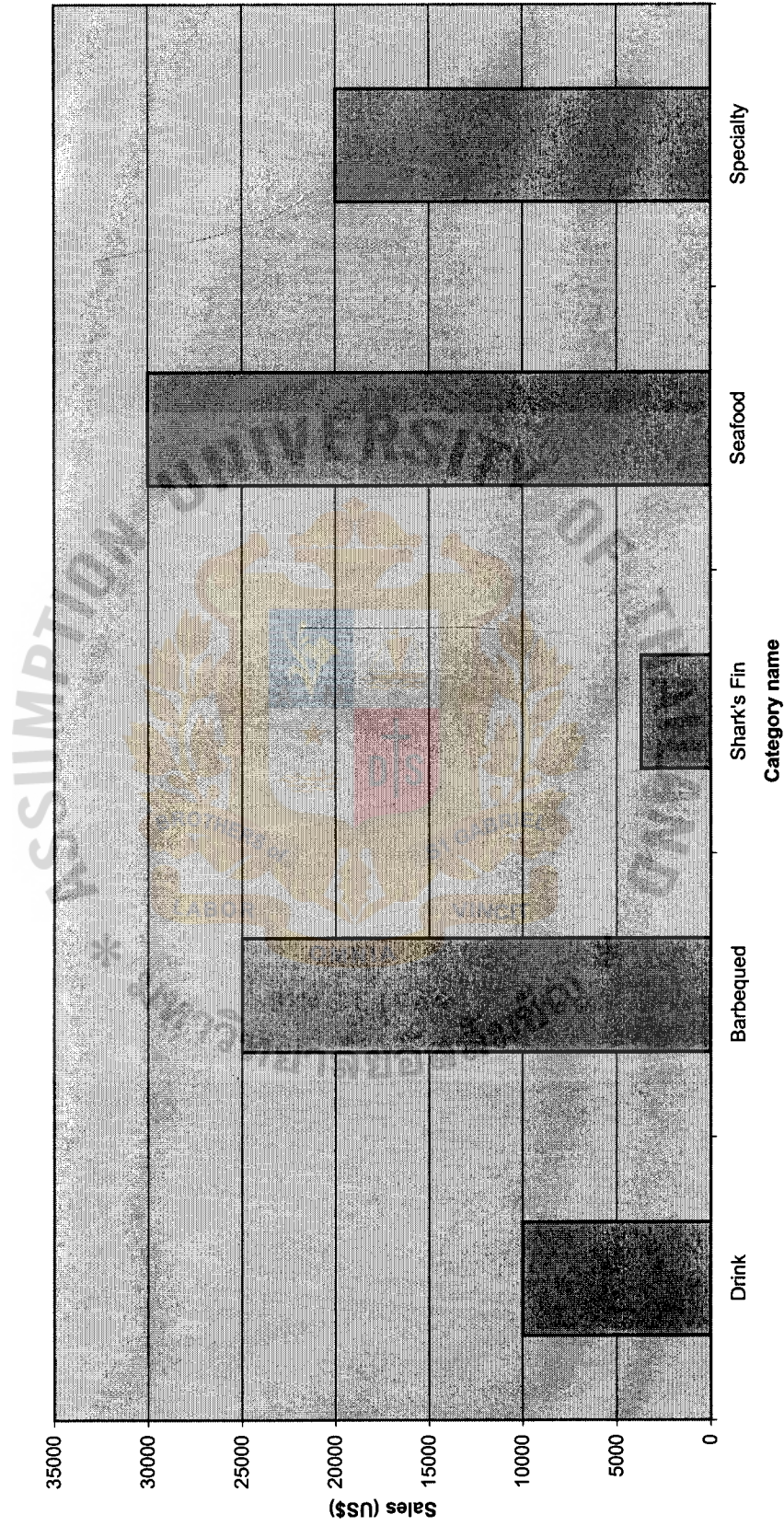


Figure D.12. Graph Report of Sales Performance by Category.

Supplier Report (Sorted by Name in Ascending Order)

SupCoName	SupplierID	Add1	Add2	Tel	Fax	Active
Ah Lee	4	341/24 Sukhumvit 101/	Bangjak, PhraKhanong	(02) 7478551	(02)7478552	<input type="checkbox"/>
Bangkok Meat	5	57/4 Chokchai Ruammi		(02) 3141252	(02) 3141520	<input type="checkbox"/>
I.A.S. Food supply	2	718 Ramkhamhaeng	Huamark	(02) 7895410	(02)7815411	<input checked="" type="checkbox"/>
T. ThaiCharoen	1	31/1 Soi Ngamduplee,	Yannawa	(02) 2335541	(02) 2338644	<input checked="" type="checkbox"/>
Tong Hua	3	12/1 Latprao soi 15	Latprao Rd.	(02) 2311001	(02) 7351001	<input checked="" type="checkbox"/>

Wednesday, November 27, 2002

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Figure D.13. Supplier Report.

Material Transaction Report

Tr_MatID	TI-00001	Date	16/10/2002
Supplier :	Bangkok Meat	SupplierID	S-0001

MatID	Description	Qty	CostPerUnit	Amount
F00002	Meat	10	100 kgs	1000
F00003	Ham	10	150 kgs	1500
F00004	Sausage	20	120 kgs	2400

				Total :	4900
-------------------------------------------------------------------------------------	--	--	--	----------------	------

Wednesday, November 27, 2002

Page 1

Figure D.14. Material Transaction Report.

Raw Material Received Report (Group by Supplier)

<i>Supplier</i>	<i>RawID</i>	<i>RawName</i>	<i>Qty in Stock</i>
K. Seng			
	F00001	Broccoli	10 Kgs
Nanmee Product			
	G00001	Salt	20 Pax
	G00002	Sugar	22 Pax



Wednesday, November 27, 2002

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Figure D.15. Material Received Report.

Raw Material Current Report

<i>RawID</i>	<i>RawName</i>	<i>Supplier</i>	<i>Qty in Stock</i>
F00001	Broccoli	K. Seng	10
G00001	Salt	Nanmee Product	20
G00002	Sugar	Nanmee Product	22

Wednesday, November 27, 2002

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Figure D.16. Material Current Report.

Material ID: G00001
Material : Salt

MATERIAL HISTORY REPORT

Date: 16 October 02

Transaction No.	Date	Quantity	Pax	Remaining Quantity
R-00002	01/10/2002	50	Pax	20
I-00004	05/10/2002	-10	Pax	-
I-00006	10/10/2002	-15	Pax	-
R-00002	11/10/2002	50	Pax	50
I-000011	12/10/2002	-5	Pax	-
				Current Quantity in Stock
				70

Figure D.17. Material Transaction History Report.

Raw Material Order (by Supplier)

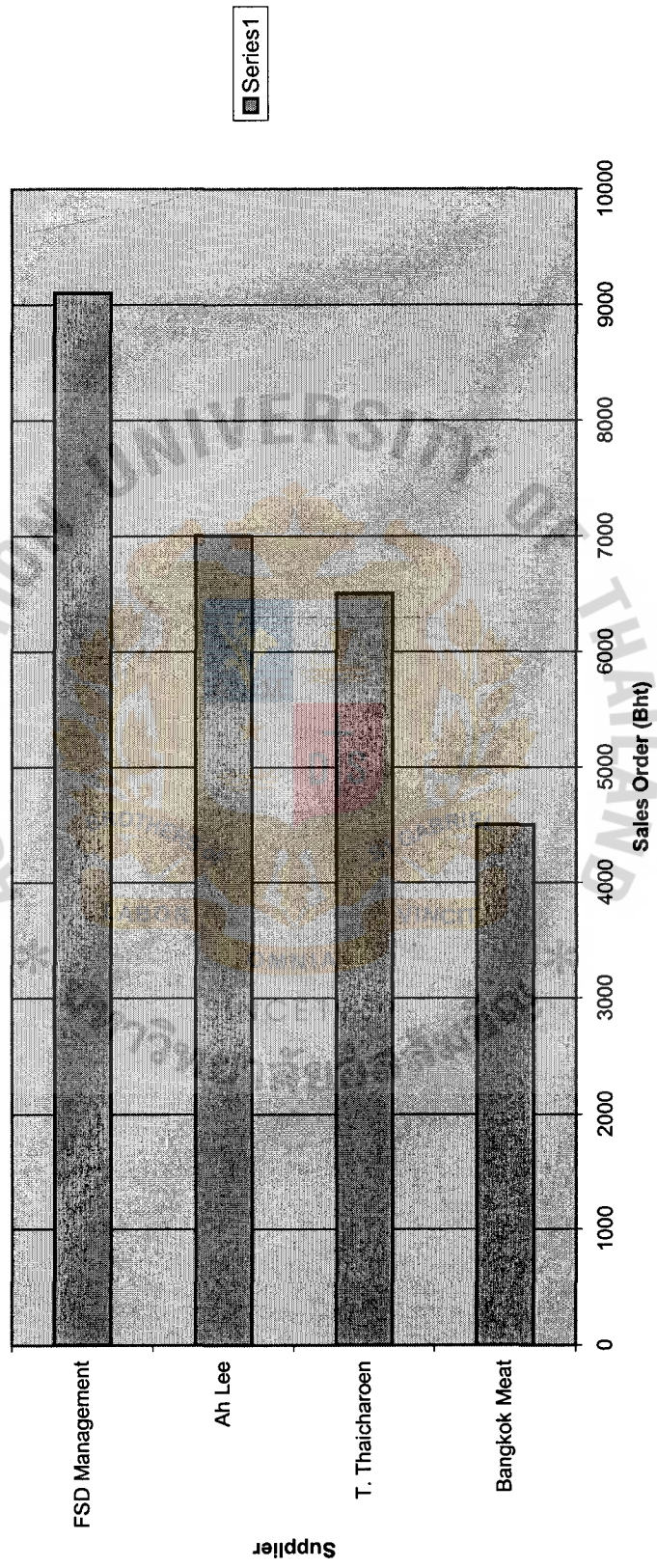


Figure D.18. Material Received Report by Supplier.

Percentage Chart of Raw material order by Supplier



Figure D.19. Percent Share by Supplier Graph Report.

BALANCE SHEET
Ho Ho Enterprise Co., Ltd.



For September 2002

REVENUE ITEMS - Baht

• Food:	1,127,583.00
• Beverage:	257,884.00
Total Revenue:	1,385,467.00
VAT7%	<u>96,982.69</u>
Revenue Exclude VAT	1,288,484.30

EXPENSE - Baht

• Cost of goods sold	369,765.00
• Utilities cost	350,000.00
• Salary	127,560.00
• Electricity	8,950.00
• Water	1,589.00
• Phone	<u>1,852.00</u>
Total Expense	859,716.00

Gross Profit **428,768.30**

Figure D.20. Monthly Accounting Report.



APPENDIX E

PROCESS SPECIFICATION

PROCESS SPECIFICATION

Table E.1. Process Specification of Process 1.1.

Items	Description
Process Name:	Customer Registration
Data In:	Table Vacancy Request Table Number Arrival Date and Time
Data Out:	Customer Information
Process:	(1) Receive Table Vacancy request (2) Read Table Information (3) Receive Selected Table No. (4) Receive General Customer information such as arrival date and time (5) Record general information
Attachment:	(1) Table_Info (2) Order_Tr_Head

Table E.2. Process Specification of Process 1.2.

Items	Description
Process Name:	Generate Order Transaction
Data In:	Order Information Table Number
Data Out:	Update order information Total amount order
Process:	(1) Receive customer order (2) Select Product Information (3) Record product order and quantity (4) Calculate total order price (5) Update total order price
Attachment:	(1) Product (2) Order_Tr_Head (3) Order_Tr_Details

Table E.3. Process Specification of Process 1.3.

Items	Description
Process Name:	Generate Bill & Payment
Data In:	Bill request Customer Details Order Details Payment Information
Data Out:	Order Details Total Order Price
Process:	(1) Receive Bill request (2) Retrieve Customer Details (3) Retrieve Order Details and total order price (4) Print the customer bill (5) Receive Payment and information (6) Record Payment details of customer
Attachment:	(1) Order_Tr_Head (2) Order_Tr_Details (3) Product (4) Payment

Table E.4. Process Specification of Process 1.4.

Items	Description
Process Name:	Prepare sales report
Data In:	Order Details Payment Details
Data Out:	Sales Report
Process:	(1) Read Product Information (2) Retrieve sales order information (3) Retrieve Payment Information (4) Select Report Type (5) Select Report Format
Attachment:	(1) Product (2) Order_Tr_Head (3) Order_Tr_Details (4) Payment

Table E.5. Process Specification of Process 1.2.1.

Items	Description
Process Name:	Select Product
Data In:	Customer Order
Data Out:	Product Selected
Process:	(1) Received customer order (2) Enter product ID and product name
Attachment:	(1) Product

Table E.6. Process Specification of Process 1.2.2.

Items	Description
Process Name:	Show Product Details
Data In:	Product Selected
Data Out:	Product Details
Process:	(1) Get Product ID and product name (2) Retrieve product information (3) Display Product's attribute
Attachment:	(1) Product

Table E.7. Process Specification of Process 1.2.3.

Items	Description
Process Name:	Record Quantity
Data In:	Customer Order Product Information
Data Out:	Order Completed
Process:	(1) Get quantity order from sales order (2) Enter Quantity order
Attachment:	(1) Order Tr Details

Table E.8. Process Specification of Process 1.2.4.

Items	Description
Process Name:	Calculate Total Amount
Data In:	Order Transaction information
Data Out:	Amount of sales
Process:	(1) Get quantity order and selling price (2) Amount = Selling Price x Quantity order (3) Display total amount order
Attachment:	(1) Order_Tr_Details (2) Product

Table E.9. Process Specification of Process 2.1.

Items	Description
Process Name:	Process Material Received
Data In:	Material Delivery/ Invoice Material Information Supplier Information Received Details
Data Out:	Material Received Details
Process:	(1) Receive Material Delivery/ Invoice (2) Supplier Registration (3) Material Registration (4) Generate Received Transaction (5) Print Inventory received report
Attachment:	(1) Material (2) Material_Source (3) Inv_Head (4) Inv_Details

Table E.10. Process Specification of Process 2.2.

Items	Description
Process Name:	Process Material Issuance
Data In:	Material Issuance Form Material Information Material User Information Issued Details
Data Out:	Payment Method Information Check In Information
Process:	(1) Received Material Issuance Form (2) Material User Registration (3) Check Material Availability (4) Generate Material Issuance Transaction (5) Print Inventory Report
Attachment:	(1) Material_Source (2) Material (3) Inv_Head (4) Inv_Details

Table E.11. Process Specification of Process 2.1.1.

Items	Description
Process Name:	Supplier Registration
Data In:	New or amendment Supplier Information
Data Out:	Update Supplier Details
Process:	(1) Received Material Delivery/ Invoice (2) Get Supplier Information (3) Retrieve Supplier information (4) Record new or amendment supplier information
Attachment:	(1) Material_Source

Table E.12. Process Specification of Process 2.1.2.

Items	Description
Process Name:	Material Registration
Data In:	New or Amendment Material Information
Data Out:	Update Material Details
Process:	(1) Get Material Information (2) Retrieve material information (3) Record new or amendment Material information
Attachment:	(1) Material

Table E.13. Process Specification of Process 2.1.3.

Items	Description
Process Name:	Generate Material Received Transaction
Data In:	Material Received Information Transaction Information
Data Out:	Material Received Details
Process:	(1) Get Supplier Information (2) Get Material Information (3) Get Material Received Information (4) Record General Received Information (5) Record Received Quantity and cost in Transaction (6) Update Received quantity to current Quantity
Attachment:	(1) Material_Source (2) Material (3) Inv_Head (4) Inv_Details

Table E.14. Process Specification of Process 2.1.4.

Items	Description
Process Name:	Print Received Report
Data In:	Request Report Material Information Supplier Information Transaction Information Received Details
Data Out:	Received Report
Process:	(1) Receive report request (2) Get Material Information (3) Get Supplier Information (4) Get Transaction Information (5) Get Received Information (6) Print out the report to management
Attachment:	(1) Material (2) Material_Source (3) Inv_Head (4) Inv_Details

Table E.15. Process Specification of Process 2.2.1.

Items	Description
Process Name:	Material User Registration
Data In:	Material Issuance Form New or Amendment Material user request
Data Out:	Supplier Details
Process:	(1) Receive material issuance form (2) Get Material User Information (3) Retrieve Material User information (4) Record new or amendment user information
Attachment:	(1) Material_Source

Table E.16. Process Specification of Process 2.2.2.

Items	Description
Process Name:	Check Material Availability
Data In:	Issued Material Name and quantity
Data Out:	Material Remaining Quantity
Process:	(1) Select Material to be Issued (2) Retrieve current quantity in stock (3) Get Remaining material information
Attachment:	(1) Material

Table E.17. Process Specification of Process 2.2.3.

Items	Description
Process Name:	Generate Material Issued Transaction
Data In:	Remaining Material Information Issued Material Information
Data Out:	Update Issued material Information
Process:	(1) Select General Issued Information (2) Select Material to be issued (3) Read Received Transaction of material with remaining quantity ≤ 0 (4) Retrieve the earliest received date (5) If remaining quantity $<$ issued quantity then read next transaction. Else record issued quantity to issue transaction (6) Update remaining quantity to Inv_Tr_Details (7) Update current quantity to Material
Attachment:	(1) Material (2) Inv_Details (3) Inv_Head (4) Material_Source

Table E.18. Process Specification of Process 2.2.4.

Items	Description
Process Name:	Generate Issued Information Report
Data In:	Issued Report Request Issued Details
Data Out:	Issued Information Report
Process:	(1) Receive request for Issued Information Report (2) Retrieve issued details from Inv_Head and Inv_Details (3) Sort Inventory Information (4) Generate Issued information report (5) Print out report
Attachment:	(1) Inv_Head (2) Inv_Details





APPENDIX F

DATA DICTIONARY

Table F.1. Data Dictionary of Restaurant Information System.

Field Name	Meaning
Cash_RecAmt	Cash Receivable Amount
CatDescription	Category name
CategoryID	Category identification number
CrCode	Credit Card service code
CrDescription	Credit Card service name
Credit_RecAmt	Credit Receivable Amount
CrExpDate	Credit Expiry 12 September 2000
CrName	Name of credit card owner
CrNo	Credit Card Number
CustomerNo	Customer identification number
MatCurrentQty	Material Current quantity in stock
MatDel/LeadTime	Material delivery time or lead time
MatDescription	Material name
MaterialID	Material identification number
MatExpDate/Time	Material Expiry Date & Time
MatLifetime	Material Life time
MatMaxStock	Maximum quantity stock of Material
MatMinOrder	Minimum order of Materials
MatMinStock	Minimum quantity stock of Material
MatSafetyStock	Material quantity for safety stock
MatReOrderPoint	Material quantity for re-order point
OrdAdd_item	Additional item or special item that is ordered
OrdAdd_priceunit	Price of additional item ordered
OrdBillDate	Billing Date
OrdBillTime	Billing Time
OrdDisc	Discount offer or applicable to an order
OrdDisc_Amt	Discount amount applicable to an order
OrderNo	Order identification number
OrdNumofVisitor	Number of visitor or customer per order
OrdOpen_time	Opening time of an order
OrdPriceperUnit	Unit Price of product ordered
OrdQty	Quantity of product ordered
OrdTotal_Amt	Total amount of product ordered
PayCancel	Cancellation status of a payment
PaymentID	Payment identification number
PaymentType	Type of customer Payment
ProdAvailability	Availability Status of product
ProdCostperunit	Product cost per unit
ProdDescription	Product name
ProdS_Price	Selling price of product
ProductID	Product Identification number

Table F.1. Data Dictionary of Restaurant Information System (Continued).

Field Name	Meaning
Rec_Date/Time	Date/ Time of Payment Received
Rec_printDate/Time	Date/ Time of Printing receipt
SourceID	Material source identification number
SrcActive	Activate Status of Material Source
SrcAdd1	Address1 of Material source
SrcAdd2	Address2 of Material source
SrcDept	Department of Material source
SrcFax	Fax number of Material source
SrcName	Supplier name or Material requestor name
SrcTel	Phone number of Material source
SrcTotalOrder	Quantity of Material received/ issued
SrcTotalOrderAmt	Total amount of material received/ issued
TabAvailability	Status of Table Availability
TabDescription	Description of a table
TableNo	Table identification number
Total_RecAmt	Total Receivable amount of sales order
Tr_Sequence	Sequence number of material in a transaction
Transactiondate	Date of Material Transaction
TransactionID	Transaction identification number
TrBy	Material transaction processor
TrCostperUnit	Unit Cost of Material
TrQty	Quantity of material in a transaction
TrRec_Issue_Flag	Flag of Material issuance or received
TrRef_Inv_Date	Reference date of Inventory paper
TrRef_Inv_No	Reference number of Inventory paper
TrRemainingQty	Remaining quantity of material in stock

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