



Inventory Information System for  
T S N Manufacture Company Limited

by

Mr. Lanchakorn Ekthavonkit

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

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

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Project Title	Inventory information System for T S N Manufacture Company Limited.
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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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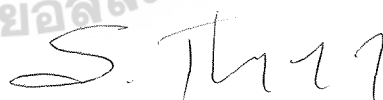
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## ABSTRACT

This project presents the understanding of the Inventory Information System of T N S Manufacture Company Limited providing an overview of the company structure, process, workflow and data transactions. From the study of the existing system, the major problem of the existing use of the manual system. Although there are working papers to control each steps of processes, the transactions are not accurate. The quantity of physical products (Fastener Screws) in storeroom is not equal with reporting figures by manual system. And it is very difficult and takes more time to search the information such as level of the outstanding balance in stock. This inconsistency is major cause of shortage of products in storeroom when customers requirements. And cost from not running production line is a serious problem which company needs to eliminate as first priority too. The existing system is a manually tracked paper work system. As cost of the system is increasing every year due to company expansion in new production line based on business opportunity. So the accuracy and efficiency system is required to achieve the company goal.

To develop the inventory system from the existing system, which is a manual system, to computerized system is the main objective of this project. The proposed system concentrates on inventory transactions from starting point till ended consumptions in each production line. This project does not require huge initial investment and the payback period of the project is not very long. The company needs to invest in both hardware and software which is costly first year of the investment, which will be recovered in a few years. So it will be very useful for the company to change its system to be a computerized system.

## ACKNOWLEDGEMENTS

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## I. INTRODUCTION

### 1.1 Background of the Project

“ *T S N Manufacture Company Limited*” is the company which manufactures *Fastener Screw* such as machine screws, bolts, nuts, and so on, and then sells to the customers and the retailers that have been dramatically growing. The necessary functions include keeping information records, stocking, ordering, purchasing and reporting.

The crucial problem which makes company's in efficiency operation that is work redundancy. Some work process may be more complicated to be performed by staffs and some process overlapped the others. Manual processes caused human errors and inaccurate data. Sometime company also spends more time in generating the various report and paper work manually. This also increases more human efforts and operating cost of company. Using information technology is considered to be one best solution for a company that would like to maintain current business among competitors.

Inventory information system is a new proposed project in developing company's information system for T S N manufacture company. This information system will accelerate company's work process effectively, reduce and redundancy and increase company's profit. Company will be studied about work processes in order to identify specific problems within the whole process. The analysis and design of new proposed system will be conducted in order to relevant the most suitable computer system which is best suited for business conditions



## **1.2 Objectives of the Project**

- (1) To study the existing system in order to understand the operation of the company.
- (2) To work together between the end-user and the management as the project team, and to find out the best operating system for the company.
- (3) To deliver efficient and effective customer service to its customers.
- (4) To operate the data in a consistent and timely manner.
- (5) To increase the ability to control the inventory system.
- (6) To provide the timely, completely and accurately information.
- (7) To minimize the error of the data in the system.
- (8) To reduce the redundant data collection in the inventory system.
- (9) To easily record or retrieve the information about the products.
- (10) To provide the up-to-date data to the customers and the officers.

## **1.3 Scope of the System**

- (1) The boundary of the new logical system includes only the inventory system.
- (2) The system is able to prepare the inventory reports and prints out the report to the officer.
- (3) The system will set to use FIFO method of inventory whereby the company will sell the first come-in stock. Moreover, the system will code the identification numbers to each product item, so that when the company sells the products, the first come-in stock will be sold first accurately.
- (4) To record customers' profiles. The system is able to keep record of the customers' information as the customer profiles.
- (5) To create the user-friendly interface which is easy to use.

- (6) To improve the operating system of the company in order to achieve the goal of company.
- (7) To provide the accurate and efficient information to the customers and officers.
- (8) The system will update the record of the stock daily.

#### **1.4 Deliverables**

The deliverables of the project on Inventory System as follows :

- (1) An application of Fastener Screws Inventory system developed by Microsoft Access.
- (2) Screen layout or Interfaces for end users.
- (3) Manage Information system used for decision making.
- (4) Various reports as shown below:
  - Customers Information Report
  - Fastener Screws Information Report
  - Daily / Monthly sale report
  - Daily / Monthly purchase report
  - Top Parts Value Sales Statistic Report

#### **1.5 Project Plan**

The project team study and analyze the existing system and identify all the problems. Then, the project team has designed the flow chart for the existing system in order to provide the more clearly vision of its operation. They know all the problems of the existing system so they will develop the existing system to be more efficiency and effectively. After that, they will design the new system by defining the objectives and scope of the new system. They should provide the suitable hardware and software

requirements for the new system. After that, they will analysis and design the proposed system. It consists of Entity-Relationship Diagram, Database Design, Data Flow Diagram and Interface Design. A user interface must be designed to allow the user to perform his or her job as effectively as possible. After they design the new system, they will implement the proposed system. They will test the new system in order to make sure that the new system works appropriately.



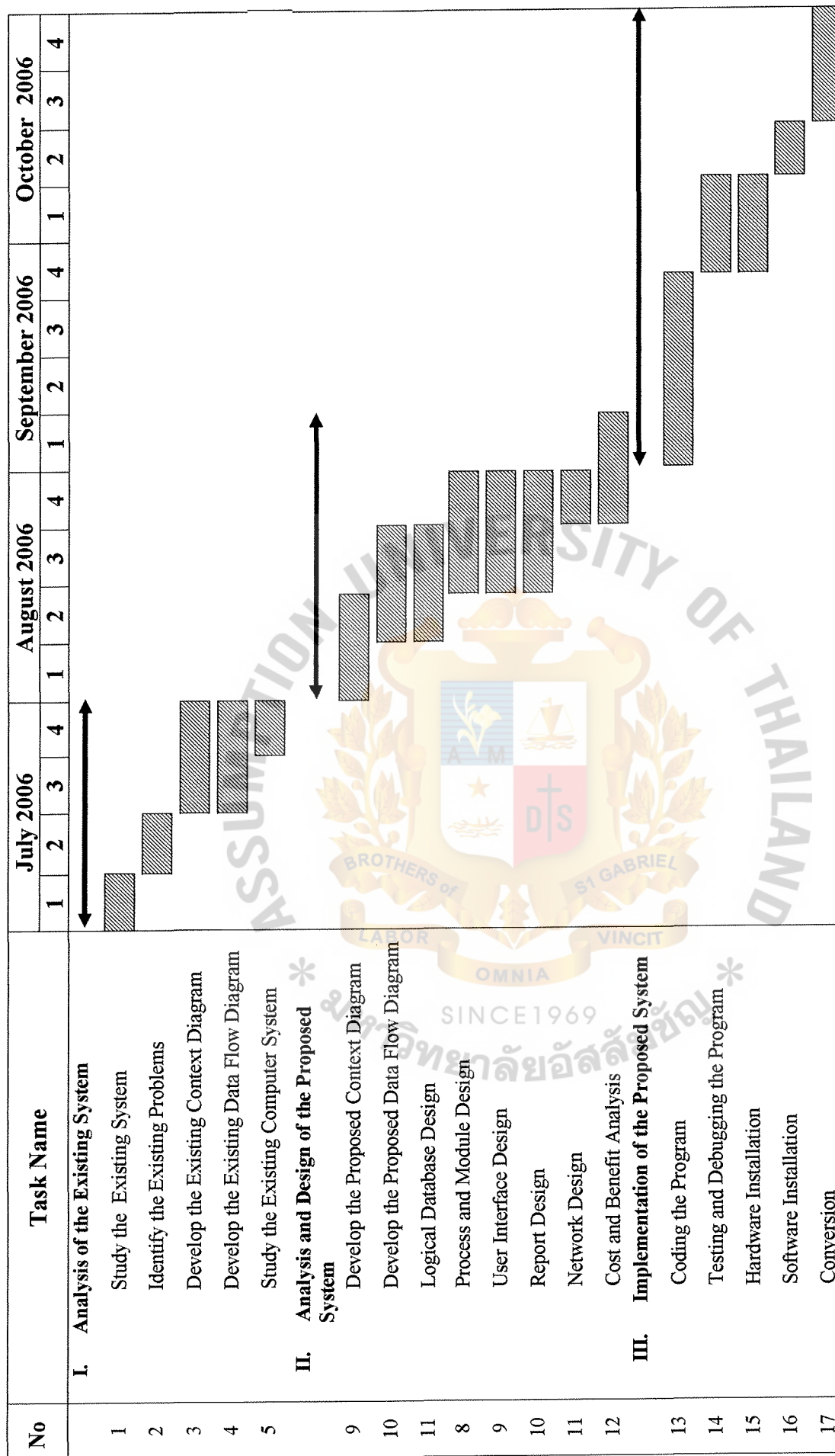


Figure 1.1 Project Plan for Inventory Information System



## II. THE EXISTING SYSTEM

### 2.1 Background of the Existing System

“ *T S N Manufacture Company Limited*” is the company which manufactures *Fastener Screw* such as machine screws, bolts, nuts, and so on, and then sells to the customers and the retailers. Currently, the company has collected the information and prepared the documents by manual, which lead to many problems especially Inventory Information System. The products ( Fastener Screws) in stock often do not meet the customer orders. The customers’ order delivery sometimes causes delays. The officers have to file a lot of documents which are difficult to trace. Also, it is very difficult to manually check the daily number of product items.

The company has decided to develop Inventory Information System as it is a major operation of the company which should have more effective control. Moreover, the growing number of customers and retailers are expected to increase slightly the demand for products in Thailand. The company needs in stock to meet all the expectations and requirements of the manager for better decision-making and better service for the customers. The computerized system serves to be a competitive advantage strategy to assist the stock keeper in performing services by automatically checking the stock and informing about the unsold items. This computerized system will retrieve the product information form a database accurately and faster than manual system. This would help the company not to stock more products than the future demands.

The company has 70 employees and five departments, which are Production Department, Marketing Department, Finance& Accounting Department, Human Resource Department and Inventory Department (as shown in Figure 2.1).

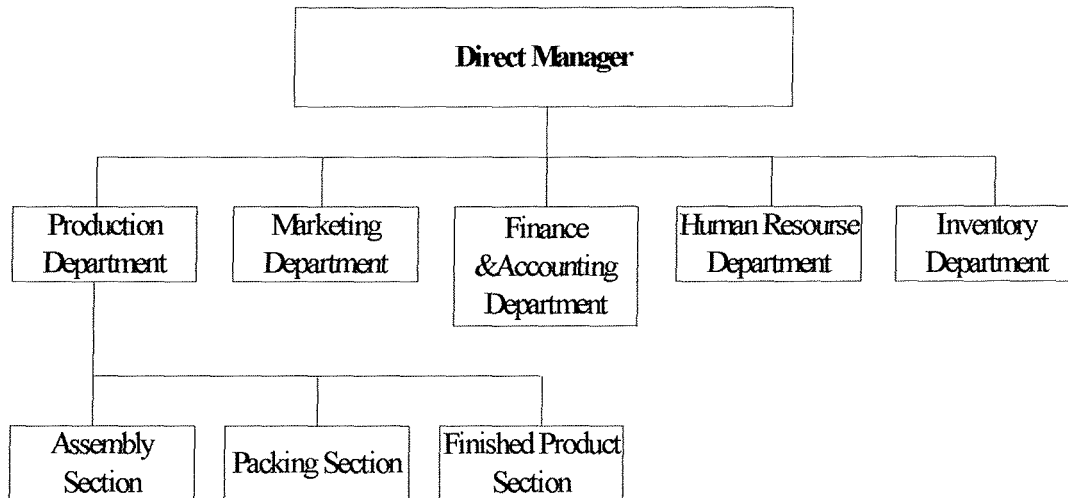


Figure 2.1 Organization Chart

## 2.2 Business Functions and Operations

Currently, the inventory information system of the company is operated manually which is the paper-based system. Each department will record their own information about the products in the papers.

The inventory system controls the number of products, which are purchased and sold to the customers in the manual way. The officers will deduct the products that have been sold to the customers everyday from the stock cards, when products are sold out. When the products in the inventory reach the reorder point, the workers will report the total amount of the products left to the officers in order to reproduce the products. The Existing system of Inventory System are illustrated in Figure 2.2

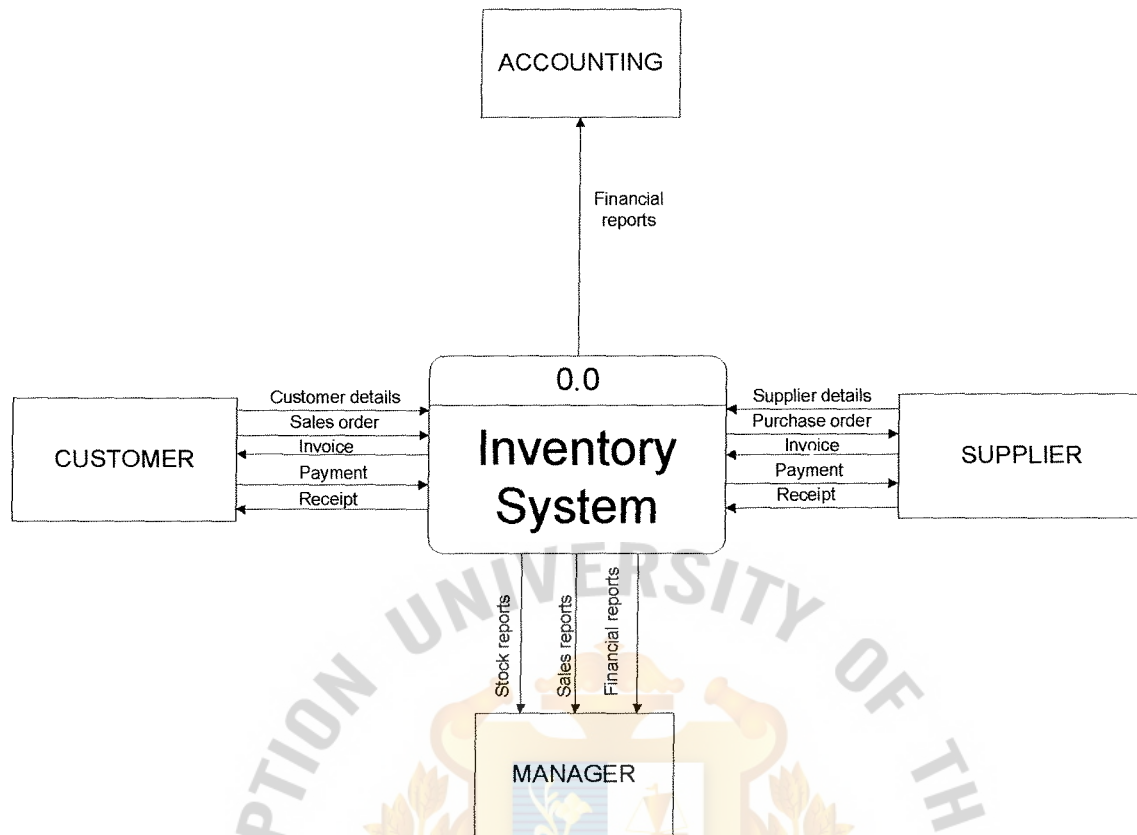


Figure 2.2 Context Diagram of Existing System

### 2.3 Current Problems and Areas for Improvement

Presently, the current system maintains some problems and cannot perform smoothly, such as incorrectness of the information, inefficient and inconvenient information in the stock cards of various products, the failure of inventory procedures, and time-consuming to find the information. These are as follows :

- **Inaccurate and duplication of the information**

Since the inventory system is controlled in the manual way, the information may be duplicated with other departments. Because the company uses the paper-based system of keeping the information in each department, the inaccuracy of information may be transferred between departments. Thus, it causes high error in information. This is also the

major problem for updating the data in the inventory system. Moreover, the officers may face the problem of checking the incorrect remaining products in the warehouse.

- **Inefficient and inconvenience of inventory control**

In the area of information system, it is identified that main problem issues, which are namely, the failure of information in various products such as the products is out of inventory and incorrect stock cards. In addition, the various products are difficult to maintain and access. This is also one of the weaknesses in the operation of the company. Moreover, the existing system is time-consuming to produce the daily or monthly inventory reports, which has to report to the manager.

- **Difficulties in retrieving information**

Due to the large amount of the documents, it is difficult to find the records of the products in the inventory system. Moreover, it is time-consuming to find the total amount of the products left in the inventory.



### **III. THE PROPOSED SYSTEM**

#### **3.1 System Specification**

After analyzing the existing system and interviewing the users for Fastener Screws Inventory system. All requirements the proposed system specification should provide the involved users to retrieve the data of inventory system from the same database which is more reliable and consistent when users process the procedures without error occurred. Users can check the accurate update of date the stock volumes of products on hand, products in order, and total available products in the inventory system.

#### **3.2 System Design**

The system design is used for evaluation of alternative solution and specification of the proposed system. The concept is restrictive definition of the process of design by drawing blueprints of the computer-based system to present the context and the dataflow diagrams of the proposed system. The context and dataflow diagrams are shown in the Appendix B.

The proposed system is stored in files of the databases. The system uses relational database technology to offer the advantage of storing data flexible formats. The type of files used in the system is a master files and transaction files. Normalization is attempted in the design of the master files and other related files. Database design and entity relationship diagrams are shown in Appendix E.

(1) Entity-Relation Diagram

3180 e-1

Entity-relationship diagram is used to display detailed, logical representation of the entities, associations, and data elements for the company. There are 5 entities in the new proposed system namely Customer, Order, Item, Product and Product-In. The relationships between the entities ( Figure 2.1 ) are following:

- Each customer has one or many orders. On the other hand, each order must be taken by exactly one customer.
- Each order must have one or many items, but each item must be had by exactly one order.
- Each item belongs to exactly one product, but each product can be taken by one or many items.
- Each product must have one or many product-in. Each product-in belongs to exactly one product.

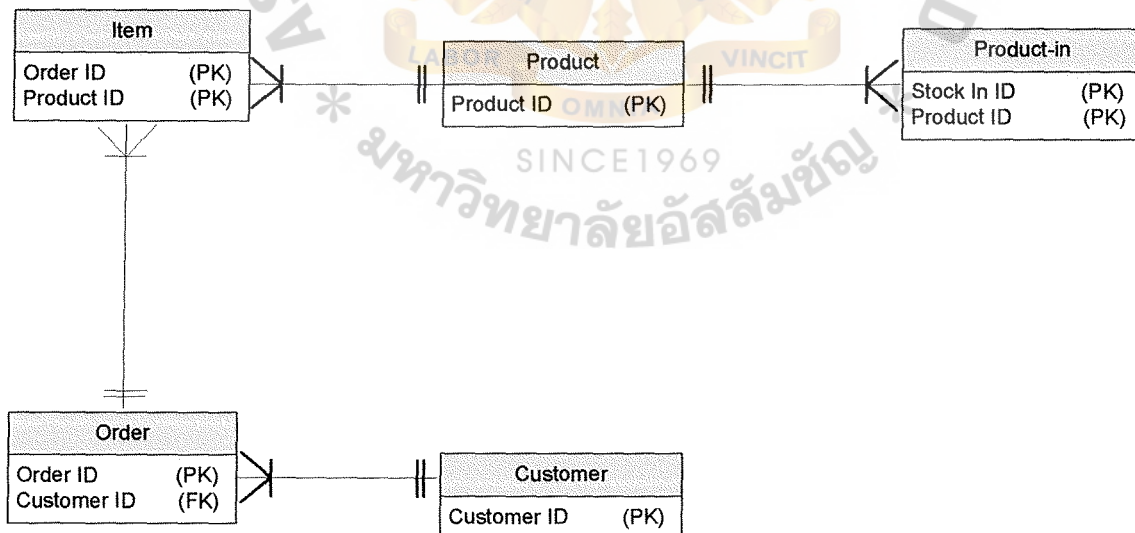


Figure 3.1 Entity-Relationship Diagram

(2) Database Design

Database Design consists of *five tables* as follows:

(1) *Customer Table* (Refer to Appendix C Table C-1)

Customer Table is stored the customer details, which is including customer ID, customer name, contact name, address, city, postcode, telephone and fax number.

(2) *Order Table* (Refer to Appendix C Table C-2)

Order Table is stored the order details which is including order ID, customer ID, order date and invoice ID.

(3) *Item Table* (Refer to Appendix C Table C-3)

Item Table is stored the details which is including order ID, product ID, quantity on order and delivery date.

(4) *Product Table* (Refer to Appendix C Table C-4)

Product Table is stored the product details which is including product ID, product type, description, each box, unit price, quantity on hand and safety stock level.

(5) *Product in Table* (Refer to Appendix C Table C-5)

Product in Table is stored the product in details which is including product in ID, product ID, received date and quantity in.

(3) Interface Design

There are *twelve Forms* as follows:

(1) *Login Form* (Refer to Appendix F Figure F-1)

The system is required the correct username and password. If the user input wrong username or password, the system will not allow the user to login into the program.

*(2) Main Menu Form* (Refer to Appendix F Figure F-2)

Main Menu Form has ten functions as follows:

- Customer Form
- Product Form
- Order Form
- Inventory Control Form
- Inventory Details Form
- Search Customer Form
- Search Product Form
- Invoice Form
- Report Form
- Change Password Form

*(3) Customer Form* (Refer to Appendix F Figure F-3)

Customer ID is generating by auto number. The user can add new customer details in this form. If the customer details have any change, the user can update the customer details in order to make the customer details up-to-date in the database. The user can delete the customer details in case of this customer has never been created any transaction in the company. The user can search each customer details by selecting search key, which is customer ID, customer name and contact name.



*(4) Product Form* (Refer to Appendix F Figure F-4)

The user can add new product details in this form. If the product details have any changed, the user can update the product details in order to make the product details up-to-date in the database. The user can delete the product details in case of this product has never been ordered from the customer. The user can search each product details by selecting search key, which is product ID, product description and product type.

*(5) Order Form* (Refer to Appendix F Figure F-5)

Order ID is generated by auto number. When the customer has ordered the product, the user will key in the sales order from the customer. If the product is not available in the stock, the system will not accept the sales order from the customer.

*(6) Inventory Control Form* (Refer to Appendix F Figure F-6)

When the Inventory Department receive the product from the Production Department, the user will key in the product – in details which is received date and amount of quantity in.

*(7) Inventory Details Form* (Refer to Appendix F Figure F-7)

This form shows the quantity on hand of each product, which is available or unavailable in the stock.

*(8) Search Customer Form* (Refer to Appendix F Figure F-8)

The user can search the customer details by customer ID, customer name, contact name, city and telephone.

*(9) Search Product Form* (Refer to Appendix F Figure F-9)

The user can search the product details by product ID, product type and product description.

(10) *Invoice Form* (Refer to Appendix F Figure F-10)

To show each sales order details of each customer and to show total amount, VAT amount and net total of each order. The user will generate the invoice in order to give to the customer.

(11) *Report Form* (Refer to Appendix F Figure F-11)

To show the customer details report, product details report, inventory report and sales report.

(12) *Change Password Form* (Refer to Appendix F Figure F-12)

The user can change the password in the form.

(4) Report Design

There are *four types* of reports as follow:

- *Customer Report* is showing the necessary details of each customer such as customer ID, customer name, address and telephone number. (Refer to Appendix G Table G-1)
- *Product Report* is showing the necessary details of each product such as product ID, product type, description and unit price. (Refer to Appendix G Table G-2)
- *Inventory Report* will represent the product remaining in the inventory. The Inventory Department will know all the quantity in and receive date of each product. It is also a benefit to the Inventory Department in order to check the number of stock available in the inventory easily. Moreover, the updated inventory will be shown in the Inventory Report to avoid the problem of lacking stock. (Refer to Appendix G Table G-3)

- *Sales Report* will show the sales profile of each customer such as amount of daily, weekly, monthly and yearly sales. It also shows the details of each order which including vat amount and net total sales. (Refer to Appendix G Table G-4)

### 3.3 Analysis of Candidate Solutions

The purpose of the decision analysis phase is to identify candidate solutions, analyze those candidate solutions, and recommend a target system that will be designed, constructed, and implemented.

To process the feasibility analysis, the candidate system matrix will be appointed for identifying candidate system solutions and analyze the solutions for mentioned feasibility. Below is the candidate system matrix which is used to compare the candidate.

- Candidate number one is an alternative of the software application package.
- Candidate number two is an alternative of the new application development which is developed by Microsoft Visual Basic.Net
- Candidate number three is an alternative of the new application development which is developed by Microsoft Office Access.

For analysis the potential of the mentioned 3 candidates can be done by using the feasibility analysis, below.

Table 3.1 Feasibility Analysis Matrix

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
Operational Feasibility	30 %			
Functionality		Fully supports user requirements and current business process would have to be modified to take advantages of software functionally	Same as Candidate 1	Same as Candidate 1
Political		Training the program is significant needs for less knowledge users because the function is so complicated	Same as Candidate 1	Users can accept the implement system that it 's relevant user's requirements
		Score : 85	Score : 65	Score : 100
Technical Feasibility	30%			
Technical		The ready to use software package just launch to the market. So it might have risk and unstable standard of software	Visual Basic.Net enables the user interfaces, and enables the guideline in database management.	Same as Candidate 2
Expertise		Require to appoint the expert to modify application integration with organization's computer system	Same as Candidate 1	No complexity to use MS Office Access.
		Score: 76	Score: 80	Score: 95

Table 3.1 Feasibility Analysis Matrix (Continued)

Economic Feasibility cost for development	30%	The ready to use software is more expensive in case of licensing.	MS Visual Basic..Net is not the basic software for every PC, but the cost of software license is not too costly.	Regards MS Access is one of software in MS Office which are primary software of every PC, so the cost might not too high when compare with software application package.
		Score: 90	Score: 80	Score: 95
Schedule Feasibility	10%	2 Months	4-5 Months	3-4 Months
		Score: 90	Score: 80	Score: 85
Ranking	100%	Sore : 85	Score: 76	Score: 94

### 3.4 Hardware and Software Requirement

To prepare the compatible hardware and software with the proposed system for effective performance. The specification required for the proposed system as below :

#### (1) Hardware Requirements

- a) 1 Set of database server
- b) 6 sets of personal computer (clients)
- c) 2 sets of printers
- d) 1 set of UPS
- e) Network accessories



The detail specification of each type of hardware is defined as follows :

a) Database Server

Table 3.2 Hardware for Database Server

Hardware	Specification
CPU	Pentium Xeon 3.2GHz
Front side bus(FSB)	800 MHz FSB
Internal L2 cache memory size	2 MB
Display Card	ASUS A9250 SE ATI Radeon 9200 , 128 M AGP . DDR
Monitor	MAG 570 FS 15" 0.28 MM. 1280x1024 Digital Sound Card
Memory (Ram)	512 MB/12GB PC2-3200R DDR2 SDRAM 400MHz
Interface type supported	Integrated Dual Channel Wide Ultra 320 SCSI
Hard disk size (GB)	300 GB
Floppy Drive	3.5" 1.44 MB
Optical device speed	52X Max
The Others Options	(Mouse) pointing device, 1 serial, 2 parallels, External 1 SCSI. , 3 USB
UPS	Syndrome Extreme 1000 VA Input : 220 + 20% Out(VAC):220+ 8%
Switch	3com Base Switch 2024:T5-3C16471, Ports: 24 Ports 10/100 Base-T , Module : NO Full/half-duplex : Yes MDI/MDIX: Yes, Buffer Memory : NA, MAC Address

b) Personal Computer (clients)

Table 3.3 Hardware for Clients

Hardware	Specification
CPU	AMD Sempron 2600
Main Board	PC CHIP/GIGABYTE
RAM	256/DDR
Display card	Integrated 64 MB
Hard disk	80 GB/7200
CD-ROM	52X Samsung
Floppy Disk	3.5" 1.44 MB
Monitor	MAG 570 FS 15" 0.28 MM. 1280x1024 Digital Sound Card
Sound card	On board
Lan Card	D-Link DWL-520 PCI , 108 Mbps
Printer	HP LaserJet 1020 (600 x 600 dpi 20 ppm 8 MB)

The cost effectiveness is the most critical issues potentially in the past whilst the hardware's cost was too expensive to buy in the market. Hence, The required hardware as above is the minimum specification of the computer configurations in order to be more efficient and effective in performing the proposed system.

(2) Software Requirements

The software requirements for the server and client machines are identified as follows :

Table 3.4 Software Requirements

SOFTWARE	SPECIFICATION
Operating System	Microsoft Windows XP
Application	1. Microsoft Office XP 2. Norton Anti-Virus 3. Crystal Reports

All the computers should have one of the useful computer software that is Microsoft Windows XP. “Microsoft Windows XP has been proved as the best operating systems among others Microsoft operating system as such Microsoft Windows 95, 98, Me, 2000, XP. In addition, Microsoft Windows XP is also the most reliable and stable system.

Microsoft Office Access is the program which is developed by Microsoft Company. It is easy to learn and suitable for the basic programmer. It provide various component tools easy to use. Furthermore, MS Office Access is the standard application editor which has been consequently developed to be more efficient and effective tool in creating the program.

The system can be affected by the Virus program. Thus it is recommended to have the Norton Anti-Virus software to protect the system.

Crystal Reports program is easy to use. This program is provided for creating the reports.

### **(3) Network Requirements**

The company applies the local are network (LAN) to connect the one server and six clients under Two- Tiered client/server architecture. This architecture places the information system's stored data on a database server and the business logic and user interfaces on the clients.

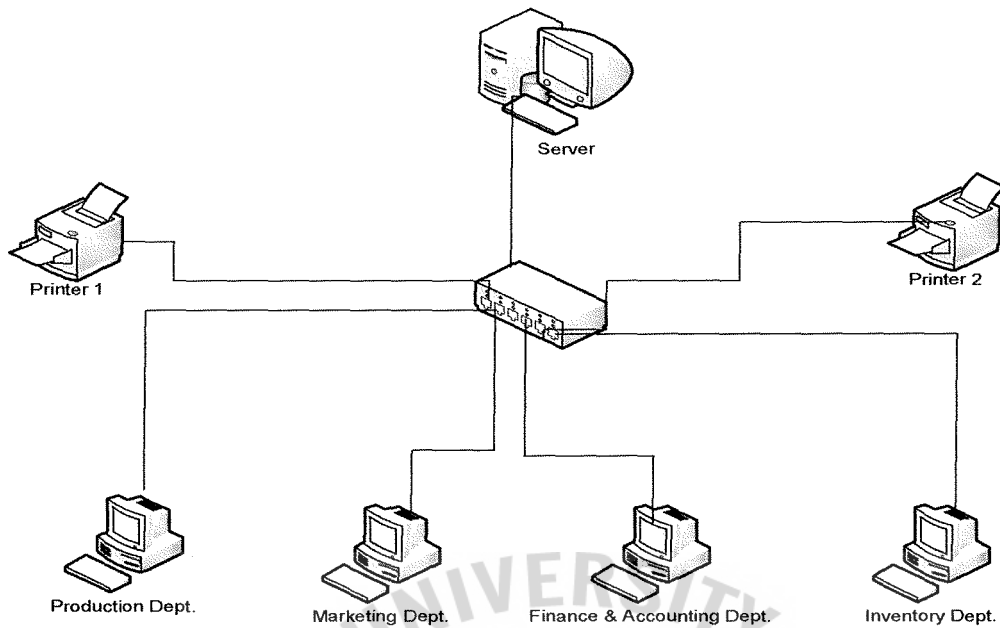


Figure 3.2 : Network Diagram of Inventory Information System

### 3.5 Security and Control

There are four types of processing controls: source-document controls, input transmission controls, output controls, and computer program controls. The new proposed system is designed to have all of these controls within the system. The details of each control are as mentioned below :

#### 1) Source-Document Controls

The source-document control procedures are designed to verify that all data have been entered into processing and that the source-documents can recover the content of data transmission that have some errors.

Each source-document e.g. the Order report, Inventory report and Sale report at source has its own format and color, which users can easily identify. So the risk of misunderstanding or mix-ups is low in this case.

Each form provides space at the bottom of the form for the authorization signature of the manager. The staff has to observe the approval

signature before inputting any information into the system . This will prevent unauthorized documents into the system. Moreover, the form also provides space for the staff to sign after processing that form. This signature is the evidence to guarantee that the form is already processed correctly and it can protect duplicate processing.

Each source-document has its own sequential number on the top right of the form. So after processing the staff have to file all forms in separate file running by the sequential number. Performing this, the staff can ensure the completeness of the documents being processed into system and can easily detect the missed documents in a timely manner. All of the forms are kept at company's storeroom for at least 5 years as required by the Revenue Department.

## **2) Input-Transmission Controls**

Input –transmission Controls are designed to verify that the computer receives data keyed to processing. The input-transmission controls designed in the proposed new system can be summarized as follows :

### **a) Flashback (echo) checks**

The staff has to enter a supplier number or Purchase Order number into the input screen and then the computer will respond by returning the supplier's name or product number in the Order number. This control is designed to help staff check the accuracy of the input information.

At the same time, using the supplier number or Purchase Order number is short can reduce the time to key in all the information by operation staff. In addition, this control can also reduce the number of human errors from the typing process.



b) File-balance control

There is the transmission of receipt information from receiving module to the inventory transmission module. The system has to check the total number of records being sent from the receiving module and compare with the number of inventory transaction module. If there is any difference, the system will prompt warning message to remind the users so that the data can be retransmitted again.

c) Journaling

This control is designed to permit the recovery of data that was transmitted erroneously. As stated in the file-balance control, there is the transmission of information between sub-systems. So every time there is the transmission of data, that file will be kept in the spool file for a certain period of time. Until it receives the signal that the data is transmitted completely without any errors, that temporary spool file will be deleted.

**3) Output Controls**

Output controls are designed to verify that all data have been sent from processing and unauthorized personnel cannot obtain any output materials. The new system controls the output from the system by printing out the register. This control is considered to be the most traditional type of output control.

The system can provide many reports and registers. The daily inventory report will be printed out and reviewed by Storeroom manager with inventory discrepancy report before making any adjustment on the system balance. In this report, it shows the total number of transactions and the summary of ending balance. The storeroom manager can also do some cross

check total number of transaction randomly with inventory report to ensure the completeness of transactions.

In order to have the restricted access to the system, the new system has the security control to block the intruders from gaining access to sensitive materials. Each staff has specific user name and password. The system requires multiple passwords to gain access to particular work area. The password has to be changed every 2 months.

The user is given three chances to enter a correct user name and password. After three incorrect tries, the computer will be locked and forbids any future attempts. Once locked, the manager of each department is the one that can unlock the computer.

#### **4) Computer Program Controls**

The computer program controls are designed to validate the accuracy of the programmed procedures. The proposed new system has various data validation procedures as follows :

##### **a) Field – Test**

The control is designed to test the accuracy of input information. For example, the field to input product number will accept only numeric data. If the staff key in alphabetic data, the program will alert the warning message to tell the user that inputs in correct data.

##### **b) Range Tests**

This is to test whether a value assigned to a variable falls within an acceptable range. The number of product quantity should not be over the available inventory stock balance. If there is an error, then the error

message telling that the quantity issued exceeds the available stock need to pop up.

c) Combination tests

This control is to combine the values of several fields to determine whether their combined value is valid. The product receiving quantity shall not exceed the order quantity plus some certain tolerance percentage in Purchase Order. The error message will be shown in case that the receiving quantity is more than order quantity.

### 3.6 Cost and Benefit Analysis for the Proposed System

The analysis of the cost of the existing system is shown in Table 3.5. The analysis of the cost of the new proposed system is shown in Table 3.6. The comparison of the cost and benefit of the new proposed system to the existing system is also prepared and presented in Table 3.9 and Table 3.10.

The cost of the new system comprised the cost of hardware, software, maintenance, system development and system implementation. The benefit from the implementation of the new system mainly comes from the decrease in staff cost and the development of controlling the inventory.

For Benefit from the Proposed System, the company will have both financial and non-financial benefits from the new proposed system. The benefits derived from the new system can be classified into cost-saving benefit, cost-avoidance benefits and improved-service-level benefits.

(1) Cost-saving benefits

The company will save some administrative and operating expenses from the use of the new system. From the analysis in Table 3.9, the company can be able to save the people cost for 3,381,686 Baht within 5 years The net

present value of the total benefits over the whole project life will be 2,502,765 Baht.

However, the company has to pay for the system development cost for the total amount 929,000.Baht during the first year of the project. It also has to pay for the operating and maintenance cost throughout the project. The net present value of the cumulative costs over the lifetime is 1,742,238 Baht.

Finally, the cost and benefit analysis of the new project gives the following outcomes:

a) Payback Period

The payback period is 2 year and 8 months as shown in Table 3.10. At the end of the 2<sup>nd</sup> year, the cumulative time adjusted of the new benefit has the positive value. Therefore, the payback period is between the 2<sup>nd</sup> and 3<sup>rd</sup> year. The following formula is computed to show the exact number of payback period.

$$\begin{aligned}\text{Payback Period} &= \text{Year 2} + (238,632 / (238,632 + 110,309)) * 12 \\ &= 2.8 \text{ Years}\end{aligned}$$

Therefore, the payback period will be 2 year and 8 months.

- b) The break-even point of cost of existing system and proposed system are shown the point in Year 1 and 6 months, it means that the proposed system takes time in providing return of investment around 1 years and 6 months. Therefore from Year 2 onwards, we will gain income from this system implementation.

c) Return on Investment (ROI)

The Return on Investment for this system is a percentage rate of the measures of the relationship between the amount of business gets back from investment. The ROI of the new proposed system is about 43.65 % ( given the discount rate of 10 % )

$$\text{ROI} = ( \text{Estimated lifetime benefits} - \text{Estimated lifetime costs} ) /$$

Estimated lifetime costs

$$\begin{aligned} \text{ROI} &= ( 2,502,765 - 1,742,238 ) / 1,742,238 \\ &= 43.65 \% \end{aligned}$$

d) Net present value of the net benefits of the project is 760,527.Baht.

(2) Cost –avoidance benefits

The company can eliminate the future administrative and operational expenses. The new proposed system can support the increase in business transactions and the expansion of the business. So the company can expand its business and perform all of the workflow using the same level of staff. However, this benefit is not included in the analysis table because it is difficult to estimate the amount of future cost avoidance.

(3) Improved-service-level benefits

During the problem identification stage, various problems occurred from the existing system. For example, errors that come from quantity recording into the system or lack of computer skills in company employees and etc. These problems cause increase in time controlling the inventory transaction through the new system and also level of employees' satisfaction.



With this new system, the company can prepare the inventory report accurately and in a proper timely manner. The Finance and Accounting Department and Manager can be able to get the inventory report more quickly compared with the existing system. The report is more accurate and consistent with other information generated from the same system. So the new system will improve the serve the level of the company, both its productivity as well as in employees.

This financial portion is derived with difficulty from the level of satisfaction because this type of benefit is intangible rather than tangible. It is hard to estimate or measure the amount of intangible benefits, so the cost and benefit analysis does not include this type of benefits in the calculation table.

Table 3.5 Existing System Cost Analysis, Baht.

Cost Items	Year				
	1	2	3	4	5
Office Equipment Cost					
Calculator 5 units @ 1,500	7,500	-	-	-	-
Total Office Equipment Cost	7,500	-	-	-	-
Operating Expenses :					
Staff Cost :					
Operation Head 3 persons @ 14,000	504,000	529,200	555,660	583,443	612,615
Clerk 4 persons @ 9,500	456,000	478,800	502,740	527,877	554,271
Operation Staff 10 persons @ 9,000	1,080,000	1,134,000	1,190,700	1,250,235	1,312,747
Storeroom Manager 1 person @ 22,000	264,000	277,200	291,060	305,613	320,894
Total Staff Cost (Increase 5% per year)	2,304,000	2,419,200	2,540,160	2,667,168	2,800,526
Office Supplies & Utility Expenses :					
Stationery	6,000	6,300	6,615	6,946	7,293
Printing materials	35,000	36,750	38,588	40,517	42,543
Miscellaneous expenses	10,000	10,500	11,025	11,576	12,155
Utility expenses	36,000	37,800	39,690	41,675	43,758
Total Office Supplies & Utility Expenses	87,000	91,350	95,918	100,714	105,749
Total Operating Expenses	2,391,000	2,510,550	2,636,078	2,767,882	2,906,275
Total Existing System Cost	2,398,500	2,510,550	2,636,078	2,767,882	2,906,275

Table 3.6 Proposed System Cost Analysis, Baht.

Cost Items	Year				
	1	2	3	4	5
<u>Office Equipment Cost :</u>					
<u>Hardware Cost :</u>					
1 set of Computer Server	250,000				
6 sets of Client Computers	180,000				
2 sets of Printers	46,000				
Other Hardware Cost	100,000				
<b>Total Hardware Cost</b>	<b>576,000</b>				
Maintenance Cost	-	20,000	21,000	22,050	23,153
<b>Total Maintenance Cost</b>	<b>-</b>	<b>20,000</b>	<b>21,000</b>	<b>22,050</b>	<b>23,153</b>
Software License Cost	100,000	50,000	50,000	50,000	50,000
<b>Total Software Cost</b>	<b>100,000</b>	<b>50,000</b>	<b>50,000</b>	<b>50,000</b>	<b>50,000</b>
System Development Cost	150,000	-	-	-	-
<b>Total System Development Cost</b>	<b>150,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<u>System Implementation Cost :</u>					
Training Cost	60,000	45,000	35,250	27,513	25,788
Set up Cost	40,000	-	-	-	-
<b>Total Implementation Cost</b>	<b>100,000</b>	<b>45,000</b>	<b>35,250</b>	<b>27,513</b>	<b>25,788</b>
<u>Other Office Equipment Cost :</u>					
Calculator 2 units @ 1500	3,000	-	-	-	-
<b>Total Other Office Equipment Cost</b>	<b>3,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Total Office Equipment Cost</b>	<b>929,000</b>	<b>115,000</b>	<b>106,250</b>	<b>99,563</b>	<b>98,941</b>
<u>Operation Expenses :</u>					
<u>Staff Cost :</u>					
Operation Head 2 persons @ 14,000	336,000	352,800	370,440	388,962	408,410
Clerk 2 persons @ 9,500	228,000	239,400	251,370	263,939	277,135
Operation Staff 8 persons @ 9,000	864,000	907,200	952,560	1,000,188	1,050,197
Storeroom Manager 1 person @ 22,000	264,000	277,200	291,060	305,613	320,894
<b>Total Staff Cost (Increase 5% per year)</b>	<b>1,692,000</b>	<b>1,776,600</b>	<b>1,865,430</b>	<b>1,958,702</b>	<b>2,056,637</b>
<u>Office Supplies &amp; Utility Expenses :</u>					
Stationery	6,000	6,300	6,615	6,946	7,293
Printing materials	12,000	12,600	13,230	13,892	14,586
Miscellaneous expenses	13,000	13,650	14,333	15,049	15,802
Utility expenses	50,000	52,500	55,125	57,881	60,775
<b>Total Office Supplies &amp; Utility Expenses</b>	<b>81,000</b>	<b>85,050</b>	<b>89,303</b>	<b>93,768</b>	<b>98,456</b>
<b>Total Operating Expenses</b>	<b>1,773,000</b>	<b>1,861,650</b>	<b>1,954,733</b>	<b>2,052,470</b>	<b>2,155,093</b>
<b>Total Proposed System Cost</b>	<b>2,702,000</b>	<b>1,976,650</b>	<b>2,060,983</b>	<b>2,152,033</b>	<b>2,254,034</b>

Table 3.7 Five Years Accumulated Existing System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	2,398,500	2,398,500
2	2,510,550	4,909,050
3	2,636,078	7,545,128
4	2,767,882	10,313,010
5	2,906,275	13,219,285
<b>Total</b>	<b>13,219,285</b>	

Table 3.8 Five Years Accumulated Proposed System Cost, Baht.

Year	Total Proposed Cost	Accumulated Cost
1	2,702,000	2,702,000
2	1,956,650	4,658,650
3	2,039,983	6,698,633
4	2,129,983	8,828,616
5	2,230,881	11,059,496
<b>Total</b>	<b>11,059,496</b>	

Table 3.9 Cost Comparison between the Existing System and Proposed System, Baht.

Cost Items	Year				
	1	2	3	4	5
Existing System :					
Staff ( 18 Staff) increase 5 % per year	2,304,000	2,419,200	2,540,160	2,667,168	2,800,526
Office Supplies & Utility Expenses	87,000	91,350	95,918	100,714	105,749
Office Equipment Cost	7,500	-	-	-	-
Total Annual Cost	2,398,500	2,510,550	2,636,078	2,767,882	2,906,275
Cumulative Cost	2,398,500	4,909,050	7,545,128	10,313,010	13,219,285
Proposed System :					
Hardware Cost	576,000	-	-	-	-
Software License Cost	100,000	50,000	50,000	50,000	50,000
System Development Cost	150,000	-	-	-	-
System Implementation Cost	100,000	45,000	35,250	27,513	25,788
Maintenance Cost Increase 5 % per year	-	20,000	21,000	22,050	23,153
Staff ( 13 Staff ) increase 5 % per year	1,692,000	1,776,600	1,865,430	1,958,702	2,056,637
Office Supplies & Utility Expenses	81,000	85,050	89,303	93,768	98,456
Office Equipment Cost	3,000	-	-	-	-
Total Annual Cost	2,702,000	1,976,650	2,060,983	2,152,033	2,254,034
Cumulative Cost	2,702,000	4,678,650	6,739,633	8,891,666	11,145,699

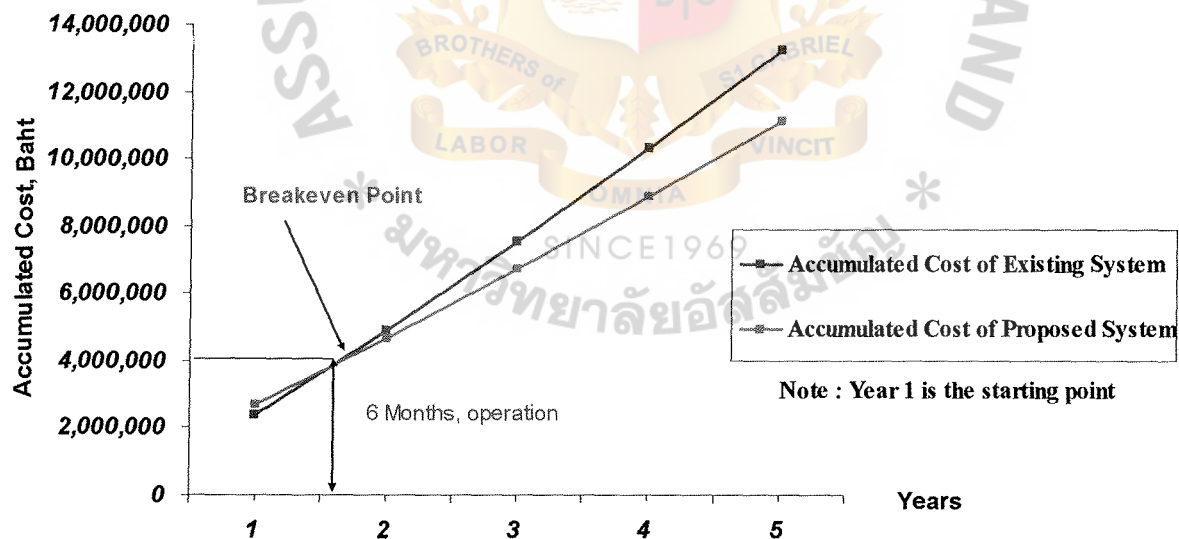


Figure 3.3 Cost Comparison between the Existing System and the Proposed System



Table 3.10 Cost and Benefit Analysis, Baht.

Cost Items	Year					
	0	1	2	3	4	5
<b>Benefits</b>						
Staff Cost Saving		612,000	642,600	674,730	708,467	743,890
Other Operating Cost Saving		10,500	6,300	6,615	6,946	7,293
Total Benefits from New System	-	622,500	648,900	681,345	715,413	751,183
Discount factors for 10%	-	0.91	0.83	0.75	0.68	0.62
Time - adjusted benefit (NPV)	-	566,475	538,587	511,009	486,481	465,733
Cumulative time-adjusted benefits over lifetime	-	500,955	1,039,542	1,550,551	2,037,031	2,502,765
<b>Costs</b>						
System Development cost	929,000					
Operation & Maintenance cost (5% increase annually)	0	-196,000	-205,800	-216,090	-226,895	-238,239
Discount factors for 10%	1.00	0.91	0.83	0.75	0.68	0.62
Time - adjusted benefit (NPV)	929,000	-178,360	-170,814	-162,068	-154,288	-147,708
Cumulative time-adjusted benefits over lifetime	929,000	1,107,360	1,278,174	1,440,242	1,594,530	1,742,238
Cumulative time-adjusted net amount	929,000	-606,405	-238,632	110,309	442,501	760,527
<b>Return on Investment</b>						<b>760,527</b>
						<b>43.65%</b>

Return on Investment: 43.65 %

Payback period: 2 Years and 8 Months

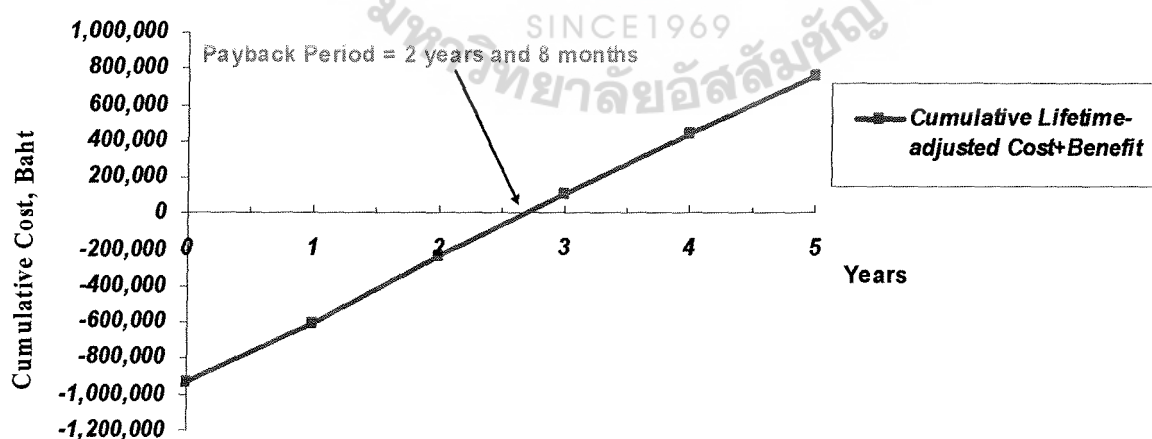


Figure 3.4 Payback Period of the Proposed System



## IV. SYSTEM IMPLEMENTATION

### 4.1 Overview of the System Implementation

In order to implement the new proposed system, the parallel operation changeover method is recommended. Parallel operation changeover method requires both the old and the new information systems to operate at the same time. If the new system does not work correctly, the company can use the old system as a backup until the new system is working appropriately.

The most advantage of parallel operation is taking minimum risk. However, there are some disadvantages. It is the most costly changeover method. Because both the old and the new systems are operating simultaneously, the company has to pay for both systems. In addition, the users must work in both old and new systems and the company may need more temporary employees to operate both systems.

### 4.2 Source Code

This project uses software, Microsoft Access 2000, as the application for the database and user interface design. The database and user interface designs are performed simultaneously. The manual and user guides are provided to the users after the system is ready to be used.

### 4.3 Test Plan

Test Plan is key to successful implementation of a new system. The testing of a newly developed system is an important implementation activity. System testing involves testing hardware devices, testing and debugging computer programs and testing information processing procedures. Programs are tested using test data that attempt to simulate all condition that may occur during processing

For example, the program will accept only character in contact name field and city field in the customer form. The program will accept only the positive number in the quantity field in order form. The quantity field cannot be negative number. After the customer ordering the product, the program will update the quantity on hand automatically in the inventory form. If the quantity on hand in the stock is lower than the safety stock level, the program will alert immediately. The program does not accept the duplicate data of the product ID in the product form. If the user fill in the product details which has already been recorded in the database, the program will alert for the user.

#### **4.4 Conversion**

System conversion consists of two activities occurring simultaneously during the conversion: Installing the system software and Making it fully operational. There are five steps in making the transition from the old manual system to the new computerized system: Making new software operational, to replace the existing system, and helping users understand and operate the new software.

##### **1) Installing the New System**

During this phase, the parallel method is recommended. It involves the concurrent operation of both the old and the new systems until the new system is evaluated to be effective. This method permits system results to be compared and corrective action to be taken if results show any deviation.

Although it is costly and may place some pressures on the company's staff by asking them to work two jobs at the same time, it has considerably more advantages for the company to use this method. The greatest advantage of the parallel method is that it preserves the audit trail. And this also gives

company's staff advantages in comparing current manual process with the new system for more practical perspective in each one. The result of the new and the old systems can be compared to verify that the new system leads to correct results.

The daily report will be printed at the end of each day for any emergency plan in case the system is down or the data is destroyed

## 2) Create the New Database

Since the existing system is performed manually, there is not any database in the computerized system. The Storeroom staff and other related functions, Purchasing Department for supplier database and Production Department for production line database, have to key in the data to many master database after the new system is installed. This step can take considerable time according to the new database in company.

## 3) User Training

User training is one of the most important steps of conversion. This stage is to provide users with experience with the new system. The Storeroom staff and the Storeroom manager are the ones who must attend this training course. The steps in arranging the training session are as follows :

- a) Identify the staff that have to attend the training for each function.
- b) Design the training materials and the topics to be presented.
- c) Selected the most appropriated method to be used in training courses.
- d) Determine the time and place to conduct the training.

- f) Evaluate the staff to assess their knowledge after trainings both theory and practice in system.
- g) Retraining for the staff that got under estimated score in the evaluating step until qualified.
- h) Provide the users with the full set of users' manual of each process.
- i) Provide some tips/ Short cut menu to users for major transactions for example Good Receipt access screen.



## V. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

The customer service is the heart of “*T S N Manufacture Company Limited*” which is to keep its customer loyalty. This report is an in-depth study of the daily operations of the company namely in the area of inventory system. The main objective of this study is to improve the operation in the company.

However, with the current management system sooner or later, it will be very difficult to match with other major manufacturer in the market. In order to gain a competitive advantage, the new proposed system which is computer-based-system must be established in the company. The new systems improve customer service and information systems by developing an updated information system with a shared database, whereby all the information are interconnected.

A detailed study and analysis of the existing system provide the more clearly vision of its operation. This proposed system is there to take out the most benefit of the rapid growth in computer network technology. Well-designed information system will provide more accurate managerial decision-making. Therefore, it will gain the profit for the organization in the long term. Table 5.1 illustrates the comparison of time between the existing system and the proposed system in the asset control process.



Table 5.1 The degree of Achievement of Proposed System

Process	Existing System	Proposed System
Create new customer or new order	20 minutes	5 minutes
Check stock on hand or stock entry	5 minutes	2 minutes
Edit the detail of products	5 minutes	1 minutes
Checking the available of products.	10 minutes	2 minute
Generate Summary report by products	25 minutes	5 minutes

## 5.2 Recommendations

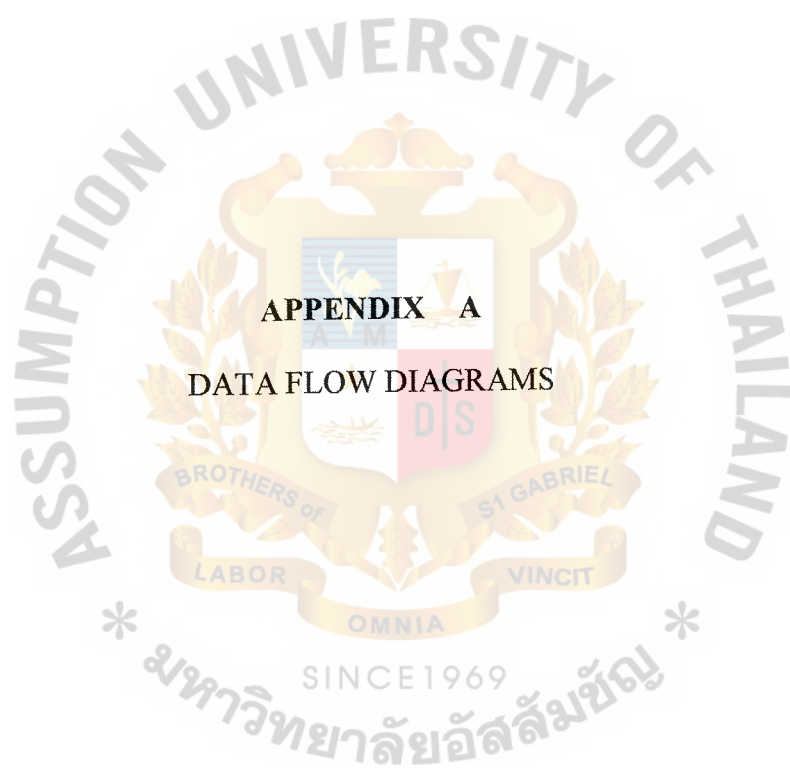
If the decision will be to improve the current information system then this new logical system is the appropriate proposal, which is to be performed to T S N Manufacture Company. The proposal to reorganize the operation should ease the main problems identified in the problem definition. The new logical system will decrease response time, but increase the efficiency. The quantity on hand in the inventory file will be updated immediately at the main area as the staff takes the sale order from the customer.

Furthermore, to decrease the processing errors is one of the tangible benefits for this system such as uncorrected of the product availability in the inventory products. The most important benefit is to increase profit. The efficiency and effective servicing of the system will help to enhance a better image and induce more profit. Moreover, this system will be the better inventory system and reduce the losses of products. Actions

and steps to implement this proposed system are clearly specifiable and should be pursued before considering adventurous and long-term developments such as the expansion of company operations.

It is important to note that this new proposed system reduce the duplications of work and effort involved in the updating and maintenance of the company records while also improving the quality, completeness, and accessibility of information.





**APPENDIX A**  
**DATA FLOW DIAGRAMS**

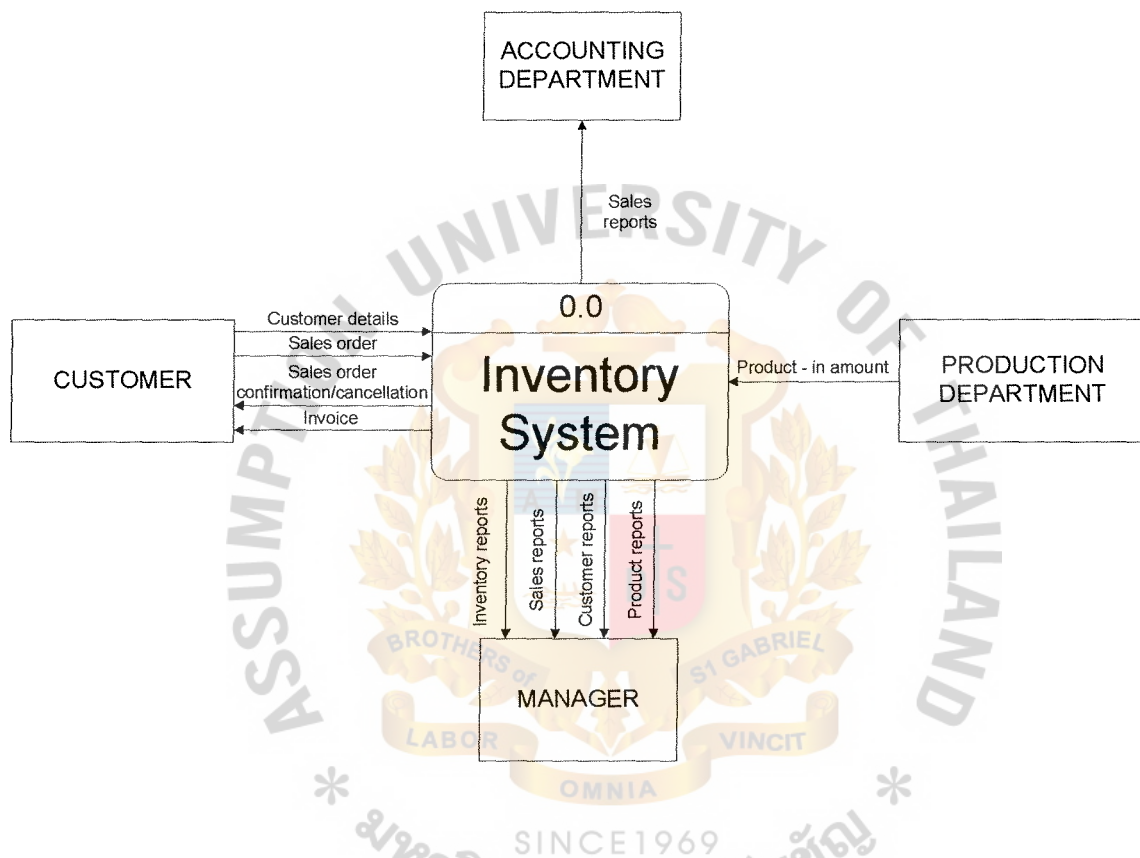


Figure A.1 Context diagram of the proposed system

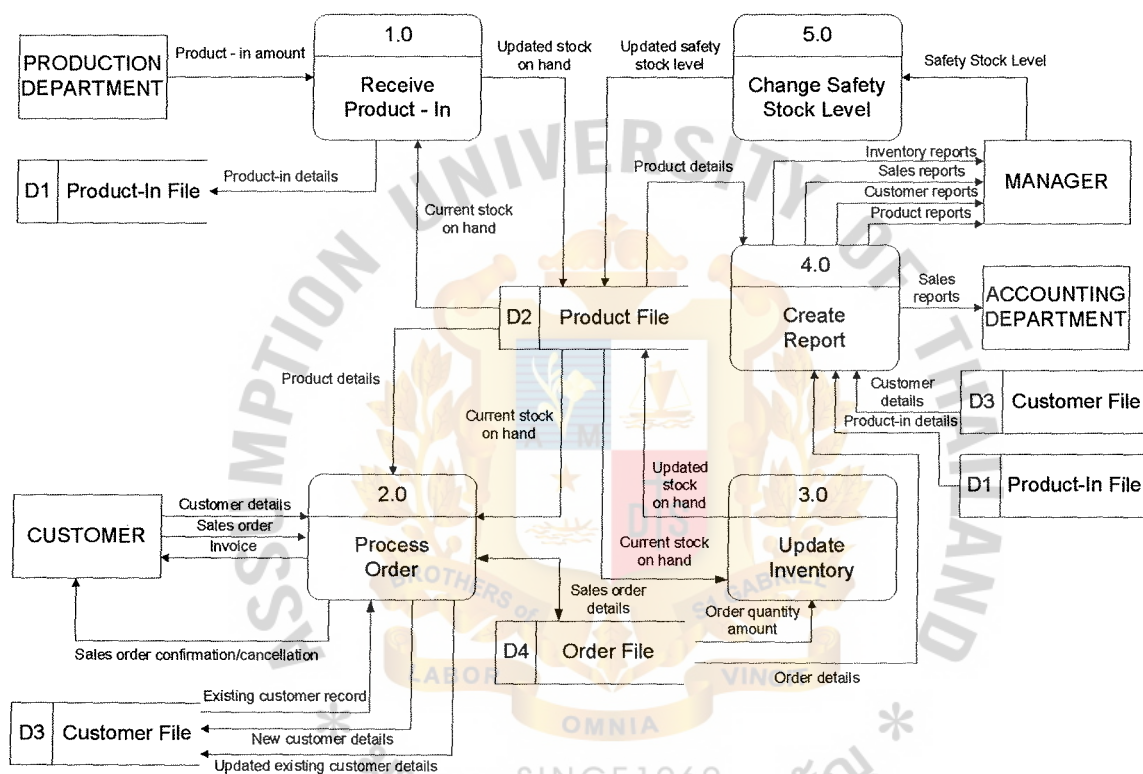


Figure A.2 Level 0 Diagram of the proposed system



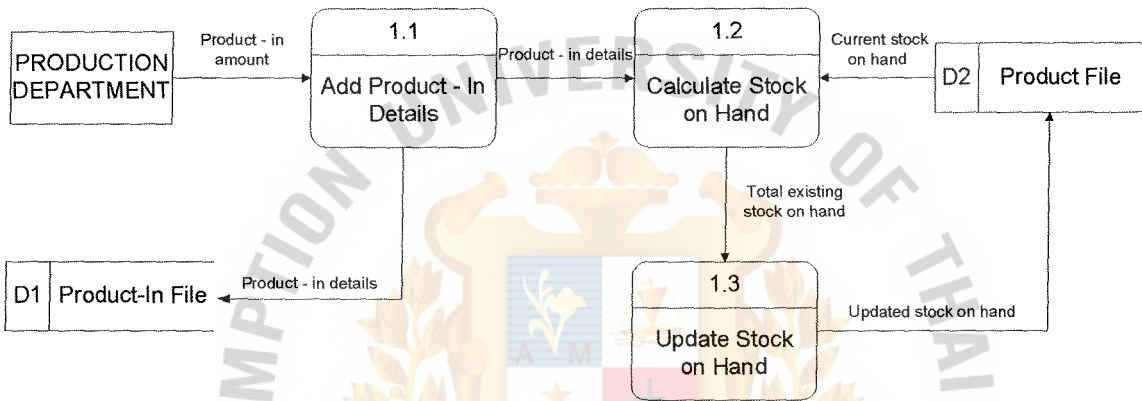


Figure A.3 Level 1 Diagram - Process 1

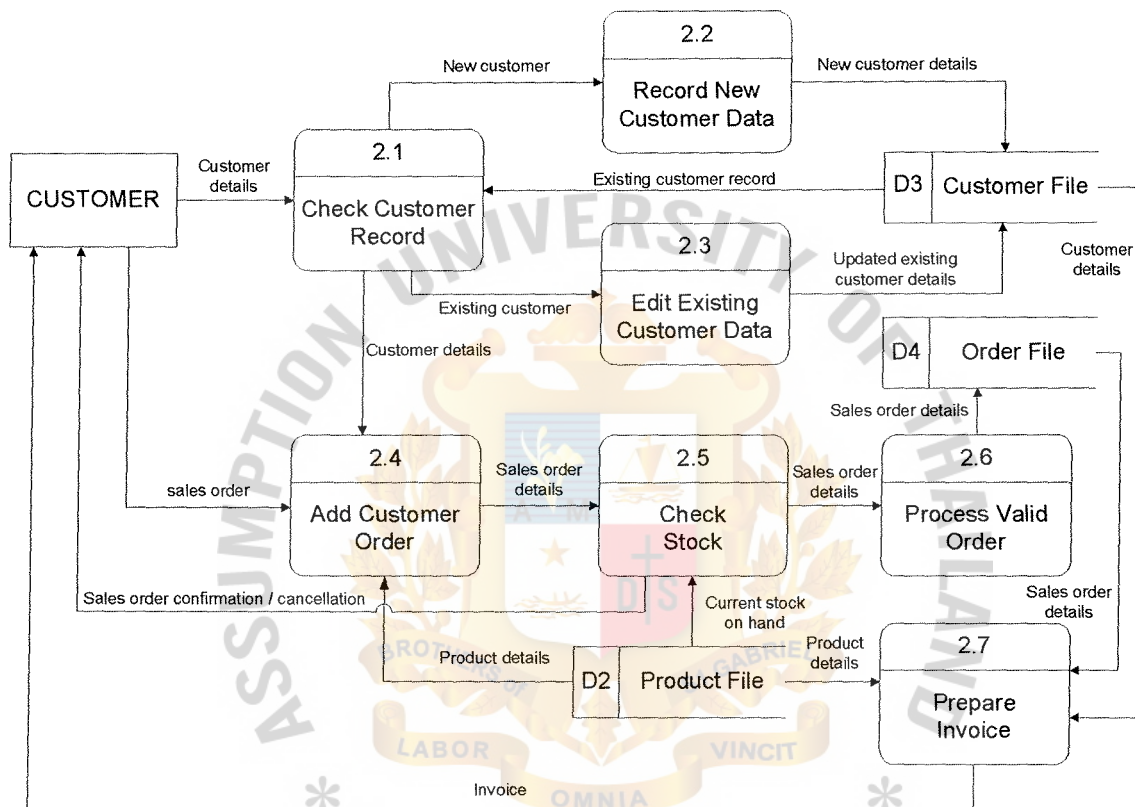


Figure A.4 Level 1 Diagram - Process 2

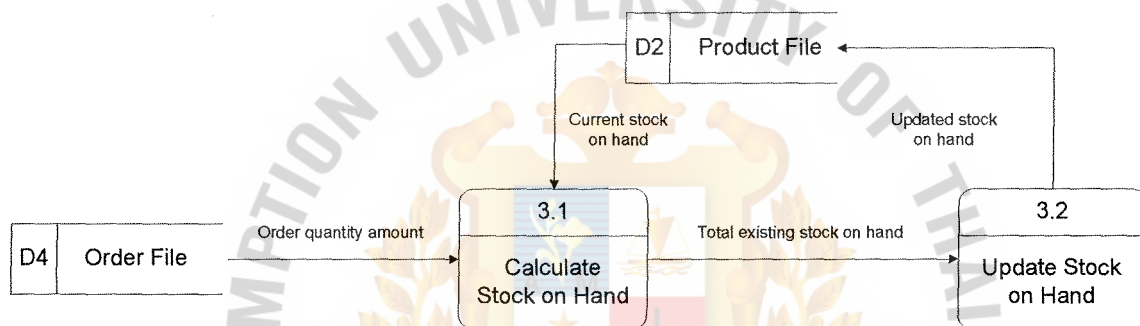


Figure A.5 Level 1 Diagram - Process 3

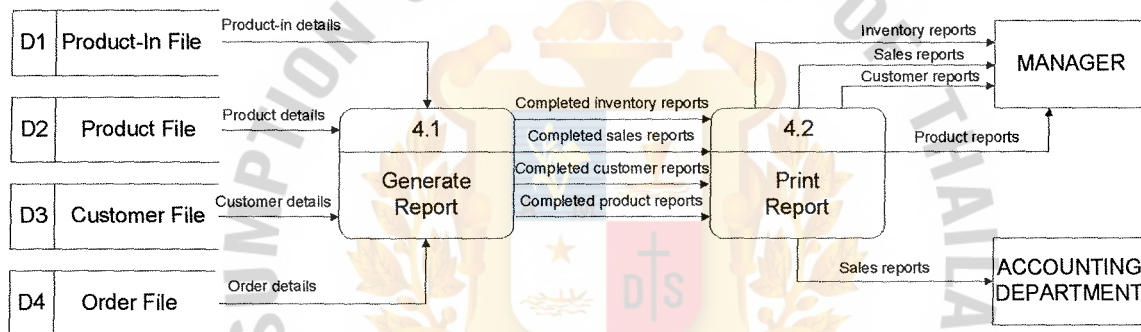


Figure A.6 Level 1 Diagram - Process 4

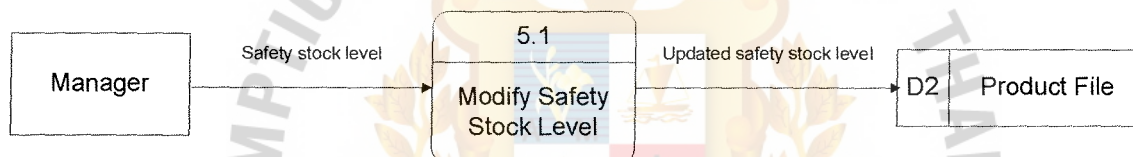


Figure A.7 Level 1 Diagram - Process 5





**APPENDIX B**  
**PROCESS SPECIFICATION**

Table B.1 Process Specification for Process 1.0

Process Name:	Receive Product - In
Data In:	(1) Product – In Amount (2) Current Stock on Hand
Data Out:	(1) Product – In Details (2) Updated Stock on Hand
Process:	(1) Add product-in details (2) Calculate stock on hand (3) Update stock on hand
Attachment:	(1) Production Department (2) Data Store D1 (3) Data Store D2

Table B.2 Process Specification for Process 1.1

Process Name:	Add Product – In Details
Data In:	(1) Product – In Amount
Data Out:	(1) Product – In Details
Process:	<p>(1) Get the product-in amount from the production department</p> <p>(2) Record down the product-in details such as the stock-in identification, the product identification, the received date and the quantity-in</p> <p>(3) Store the product-in details in the product-in file</p> <p>(4) Pass the product-in details to the process of calculating stock on hand</p>
Attachment:	<p>(1) Production Department</p> <p>(2) Data Store D1</p> <p>(3) Process 1.2</p>

Table B.3 Process Specification for Process 1.2

Process Name:	Calculate Stock on Hand
Data In:	(1) Product – In Details (2) Current Stock on Hand
Data Out:	(1) Total Existing Stock on Hand
Process:	(1) Get the product–in details (2) Retrieve the current stock on hand from the product file (3) Calculate the stock on hand (4) Pass the total existing stock on hand to the process of update stock on hand
Attachment:	(1) Process 1.1 (2) Process 1.3 (3) Data Store D2

Table B.4 Process Specification for Process 1.3

Process Name:	Update Stock on Hand
Data In:	(1) Total Existing Stock on Hand
Data Out:	(1) Updated Stock on Hand
Process:	<p>(1) Get the total existing stock on hand</p> <p>(2) Update the stock on hand so as to make the total stock on hand in the product file up-to-date</p> <p>(3) Store the updated stock on hand in the product file</p>
Attachment:	<p>(1) Process 1.2</p> <p>(2) Data Store D2</p>

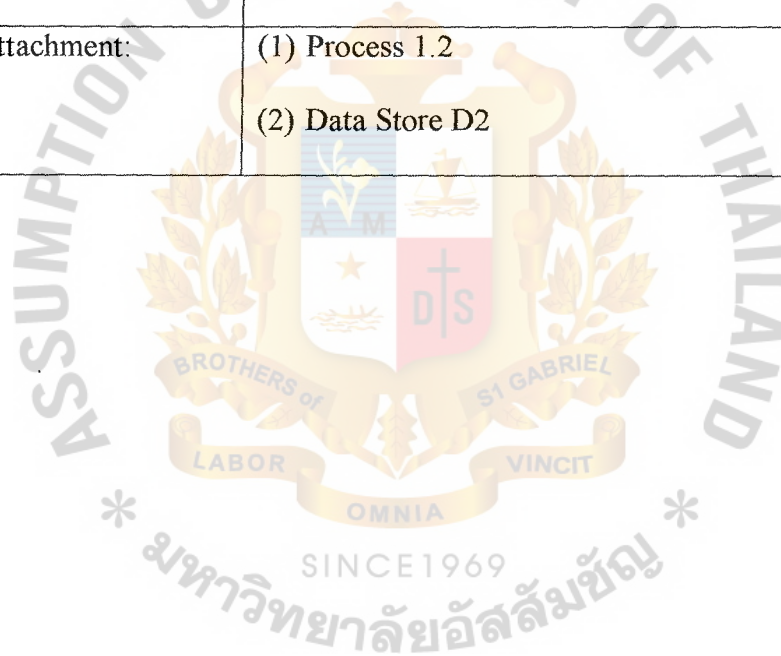




Table B.5 Process Specification for Process 2.0

Process Name:	Process Order
Data In:	<ul style="list-style-type: none"> <li>(1) Customer Details</li> <li>(2) Existing Customer Record</li> <li>(3) Sales Order</li> <li>(4) Product Details</li> <li>(5) Current Stock on Hand</li> <li>(6) Sales Order Details</li> </ul>
Data Out:	<ul style="list-style-type: none"> <li>(1) New Customer Details</li> <li>(2) Updated Existing Customer Details</li> <li>(3) Sales Order Confirmation or Cancellation</li> <li>(4) Sales Order Details</li> <li>(5) Invoice</li> </ul>
Process:	<ul style="list-style-type: none"> <li>(1) Check Customer Record</li> <li>(2) Record New Customer Data</li> <li>(3) Edit Existing Customer Data</li> <li>(4) Add Customer Order</li> <li>(5) Check Stock</li> <li>(6) Process Valid Order</li> <li>(7) Prepare Invoice</li> </ul>
Attachment:	<ul style="list-style-type: none"> <li>(1) Customer</li> <li>(2) Data Store D2</li> <li>(3) Data Store D3</li> <li>(4) Data Store D4</li> </ul>

Table B.6 Process Specification for Process 2.1

Process Name:	Check Customer Record
Data In:	(1) Customer Details (2) Existing Customer Record
Data Out:	(1) New Customer Data (2) Existing Customer Data (3) Customer Details
Process:	(1) Get the necessary customer data such as the customer identification or name (2) Retrieve the existing customer record from the customer file in order to check whether the customer data already exist in the database or not (3) Pass the customer details to the process of adding customer order when the customer details already exist and is corrected in the database
Attachment:	(1) Customer (2) Data Store D3 (3) Process 2.2 (4) Process 2.3 (5) Process 2.4

Table B.7 Process Specification for Process 2.2

Process Name:	Record New Customer Data
Data In:	(1) New Customer Data
Data Out:	(1) New Customer Details
Process:	<p>(1) Get the customer data such as name, address, and the contact details, and assign new customer identification</p> <p>(2) Record down the new customer details into the database</p> <p>(3) Store the new customer details in the customer file</p>
Attachment:	<p>(1) Process 2.1</p> <p>(2) Data Store D3</p>

Table B.8 Process Specification for Process 2.3

Process Name:	Edit Existing Customer Data
Data In:	(1) Existing Customer Data
Data Out:	(1) Updated Existing Customer Details
Process:	<p>(1) Record down the customer data that has been changed such as name, address or the contact details</p> <p>(2) Update the existing customer data</p> <p>(3) Store the updated customer details in the customer file</p>
Attachment:	<p>(1) Process 2.1</p> <p>(2) Data Store D3</p>

Table B.9 Process Specification for Process 2.4

Process Name:	Add Customer Order
Data In:	(1) Customer Details (2) Sales Order (3) Product Details
Data Out:	(1) Sales Order Details
Process:	(1) Get the customer details, for example the name, the address, the contact details (2) Retrieve the product details such as the identification, the name, and the unit price from the product file (3) Record the quantity ordered from the customer (4) Pass the sales order details which include the customer details, the product details, and the quantity to the process of checking stock
Attachment:	(1) Customer (2) Process 2.1 (3) Process 2.5 (4) Data Store D2



Table B.10 Process Specification for Process 2.5

Process Name:	Check Stock
Data In:	(1) Sales Order Details (2) Current Stock on Hand
Data Out:	(1) Sales Order Confirmation or Cancellation (2) Sales Order Details
Process:	(1) Get the sales order details (2) Retrieve the current stock on hand from the product file, and check whether the product has been ordered is available in the inventory or not (3) Create the sales order confirmation in order to confirm the product details and the delivery date, whereas the sales order cancellation is created when the product is not available in the inventory (4) Send the sales order details to the process of validate order
Attachment:	(1) Customer (2) Data Store D2 (3) Process 2.4 (4) Process 2.6

Table B.11 Process Specification for Process 2.6

Process Name:	Process Valid Invoice
Data In:	(1) Sales Order Details
Data Out:	(1) Sales Order Details
Process:	<p>(1) Get the sales order details which include the customer details, the product details, and the quantity ordered in order to validate the order and prepare the product for shipping to the customer</p> <p>(2) Store the sales order details in the order file</p>
Attachment:	<p>(1) Data Store D4</p> <p>(2) Process 2.5</p>

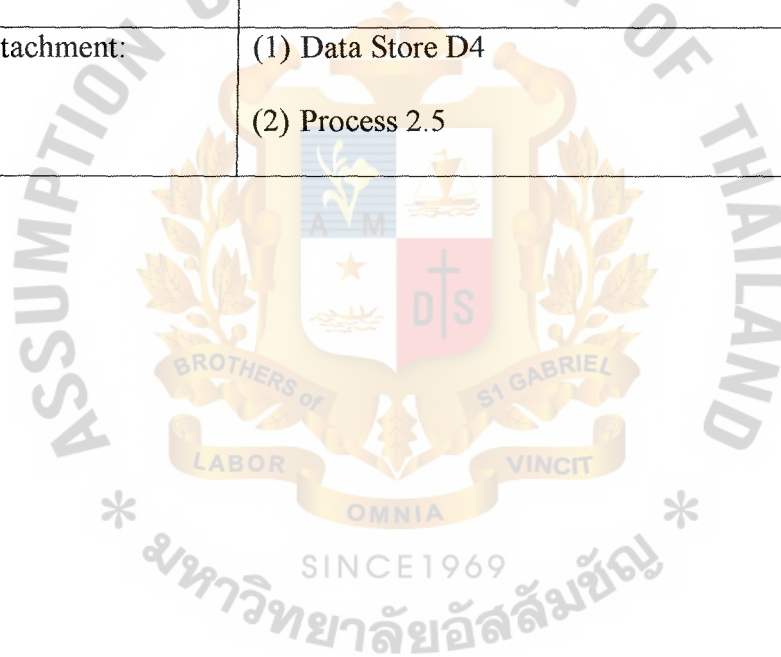


Table B.12 Process Specification for Process 2.7

Process Name:	Prepare Invoice
Data In:	<p>(1) Sales Order Details</p> <p>(2) Customer Details</p> <p>(3) Product Details</p>
Data Out:	(1) Invoice
Process:	<p>(1) Retrieve the sales order details such as the order identification, the ordered date, and the quantity ordered from the order file</p> <p>(2) Retrieve the customer details, for example, the customer identification, the name, and the address, from the customer file</p> <p>(3) Retrieve the product details such as product identification, description, unit price and the quantity for each box from the product file</p> <p>(4) Issue the invoice to the customer when the product is ready for shipping</p>
Attachment:	<p>(1) Customer</p> <p>(2) Data Store D2</p> <p>(3) Data Store D3</p> <p>(4) Data Store D4</p>

Table B.13 Process Specification for Process 3.0

Process Name:	Update Inventory
Data In:	(1) Current Stock on Hand (2) Order Quantity Amount
Data Out:	(1) Updated Stock on Hand
Process:	(1) Calculate Stock on Hand (2) Update Stock on Hand
Attachment:	(1) Order File (2) Product File



Table B.14 Process Specification for Process 3.1

Process Name:	Calculate Stock on Hand
Data In:	(1) Order Quantity Amount (2) Current Stock on Hand
Data Out:	(1) Total Existing Stock on Hand
Process:	(1) Retrieve the order quantity amount from the order file (2) Retrieve the amount of current stock on hand from the product file (3) Calculate the total existing stock on hand (4) Pass the total existing stock on hand to the process of updating stock on hand
Attachment:	(1) Data Store D2 (2) Data Store D4 (3) Process 3.2



Table B.15 Process Specification for Process 3.2

Process Name:	Update Stock on Hand
Data In:	(1) Total Existing Stock on Hand
Data Out:	(1) Updated Stock on Hand
Process:	<p>(1) Get the total existing stock on hand</p> <p>(2) Update the amount of stock on hand in the inventory file automatically so as to make the inventory up-to-date</p>
Attachment:	<p>(1) Data Store D2</p> <p>(2) Process 3.1</p>



Table B.16 Process Specification for Process 4.0

Process Name:	Create Report
Data In:	(1) Product -In Details (2) Product Details (3) Customer Details (4) Order Details
Data Out:	(1) Inventory Reports (2) Sales Reports (3) Customer Reports (4) Product Reports
Process:	(1) Generate Report (2) Print Report
Attachment:	(1) Manager (2) Accounting Department (3) Data Store D1 (4) Data Store D2 (5) Data Store D3 (6) Data Store D4

Table B.17 Process Specification for Process 4.1

Process Name:	Generate Report
Data In:	<p>(1) Product - In Details</p> <p>(2) Product Details</p> <p>(3) Customer Details</p> <p>(4) Order Details</p>
Data Out:	<p>(1) Completed Inventory Reports</p> <p>(2) Completed Sales Reports</p> <p>(3) Completed Customer Reports</p> <p>(4) Completed Product Reports</p>
Process:	<p>(1) Get the product - in details, the product details, the customer details and the order details from the product - in file, the product file, the customer file and the order file respectively</p> <p>(2) Generate the inventory reports, the sales reports, the customer reports and the product reports</p> <p>(3) Pass the completed inventory, sales, customer and product reports to the process of printing report</p>
Attachment:	<p>(1) Data Store D1</p> <p>(2) Data Store D2</p> <p>(3) Data Store D3</p> <p>(4) Data Store D4</p> <p>(5) Process 4.2</p>

Table B.18 Process Specification for Process 4.2

Process Name:	Print Report
Data In:	<ul style="list-style-type: none"> <li>(1) Completed Inventory Reports</li> <li>(2) Completed Sales Reports</li> <li>(3) Completed Customer Reports</li> <li>(4) Completed Product Reports</li> </ul>
Data Out:	<ul style="list-style-type: none"> <li>(1) Inventory Reports</li> <li>(2) Sales Reports</li> <li>(3) Customer Reports</li> <li>(4) Product Reports</li> </ul>
Process:	<ul style="list-style-type: none"> <li>(1) Get the completed inventory, sales, customer and product reports</li> <li>(2) Print out the inventory, sales, customer, and product reports for the manager and accounting</li> </ul>
Attachment:	<ul style="list-style-type: none"> <li>(1) Manager</li> <li>(2) Accounting Department</li> <li>(3) Process 4.1</li> </ul>

Table B.19 Process Specification for Process 5.0

Process Name:	Change Safety Stock Level
Data In:	(1) Safety Stock Level
Data Out:	(1) Updated Safety Stock Level
Process:	(1) Modify Safety Stock Level
Attachment:	(1) Manager (2) Data Store D2

Table B.20 Process Specification for Process 5.1

Process Name:	Modify Safety Stock Level
Data In:	(1) Safety Stock Level
Data Out:	(1) Updated Safety Stock Level
Process:	(2) Get the safety stock level from the manager (3) Update the safety stock level
Attachment:	(1) Manager (2) Data Store D2





**APPENDIX C**  
**DATABASE DESIGN**

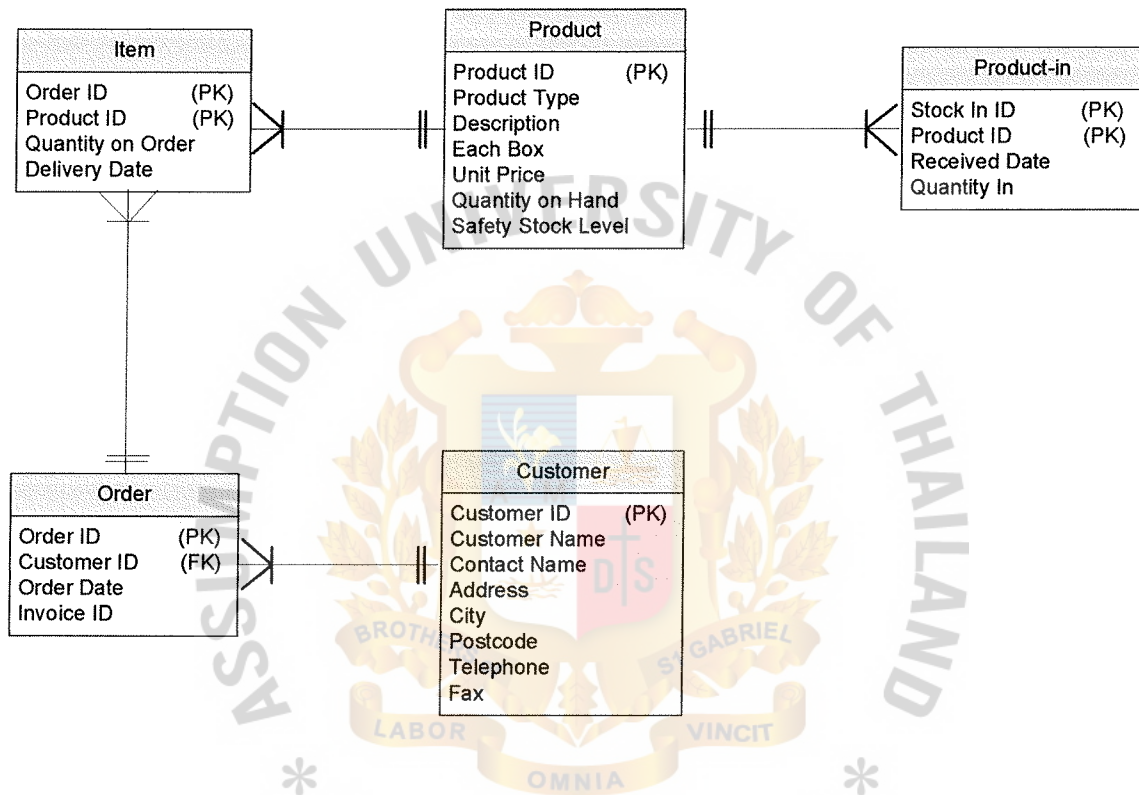


Figure C.1 Entity-Relationship Diagram

Table C.1 Customer Table

No.	Field Name	Field Type	Index	Unique	Null able	Foreign Key	Check	Key Type
1	Customer ID	Varchar (10)	Y	Y		Order		Primary Key
2	Customer Name	Varchar (50)						Attribute
3	Contact Name	Varchar (50)			Y			Attribute
4	Address	Varchar (255)						Attribute
5	City	Varchar (50)			Y			Attribute
6	Postcode	Varchar (80)			Y		(Area code, 5 digits)	Attribute
7	Telephone	Varchar (12)						Attribute
8	Fax	Integer			Y		(Area code, 11 digits)	Attribute

Table C.2 Order Table

No.	Field Name	Field Type	Index	Unique	Null able	Foreign Key	Check	Key Type
1	Order ID	Varchar (10)	Y	Y		Item		Primary Key
2	Customer ID	Varchar (10)	Y					Foreign Key
3	Order Date	Date/time					D/M/YYYY	Attribute
4	Invoice ID	Varchar (10)	Y	Y				Attribute

Table C.3 Item Table

No.	Field Name	Field Type	Index	Unique	Null able	Foreign Key	Check	Key Type
1	Order ID	Varchar	Y					Primary Key
2	Product ID	Varchar	Y					Primary Key
3	Quantity on Order	Integer						Attribute
4	Delivery Date	Date/time					D/M/YYYY	Attribute

Table C.4 Product Table

No.	Field Name	Field Type	Index	Unique	Null able	Foreign Key to	Check	Key Type
1	Product ID	Varchar	Y	Y		Item, Product-In		Primary Key
2	Product Type	Varchar						Attribute
3	Description	Varchar						Attribute
4	Each Box	Integer						Attribute
5	Unit Price	Currency						Attribute
6	Quantity on Hand	Integer						Attribute
7	Safety Stock Level	Integer						Attribute

Table C.5 Product-in Table

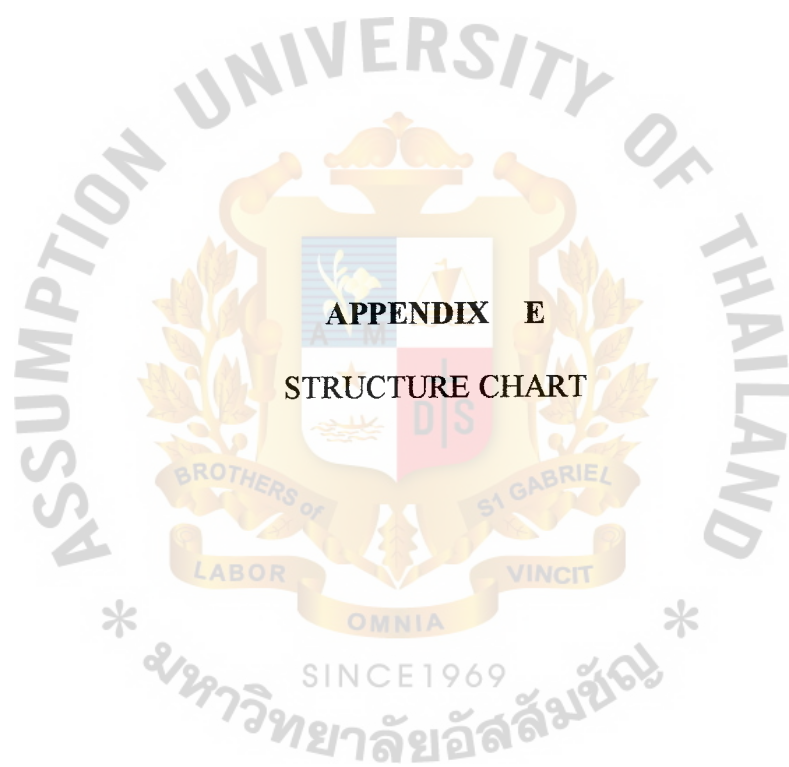
No.	Field Name	Field Type	Index	Unique	Null able	Foreign Key	Check	Key Type
1	Stock In ID	Varchar	Y	Y				Primary Key
2	Product ID	Varchar	Y					Primary Key
3	Received Date	Date/time					D/M/YYYY	Attribute
4	Quantity in	Integer						Attribute





Table D.1 Data Dictionary of Database Design

Field Name	Description
Address	Address of Customers
City	Country of Customers
Contact Name	Name of Customer who orders the products
Customer ID	Customer Number
Customer Name	Name of Customer
Delivery Date	Date for sending the products
Description	Additional message
Each Box	No.of product by boxes
Fax	Custober's Fax number
Invoice ID	Invoice Number
Order Date	Date that customer orders the products
Order ID	Order Number
Postcode	Zipcode of Customer's Address
Product ID	Product Number
Product Type	Type of Product
Quantity in	Entry quantity of product
Quantity on Hand	Quantity of Product in the inventory
Quantity on Order	Quantity of Product that customer orders
Received Date	Entry date that company receieved the new stock
Safety Stock Level	Point that identify less volume of each products
Stock In ID	Stock In Number
Telephone	Custober's Telephone number
Unit Price	Price of each box



**APPENDIX E**  
**STRUCTURE CHART**

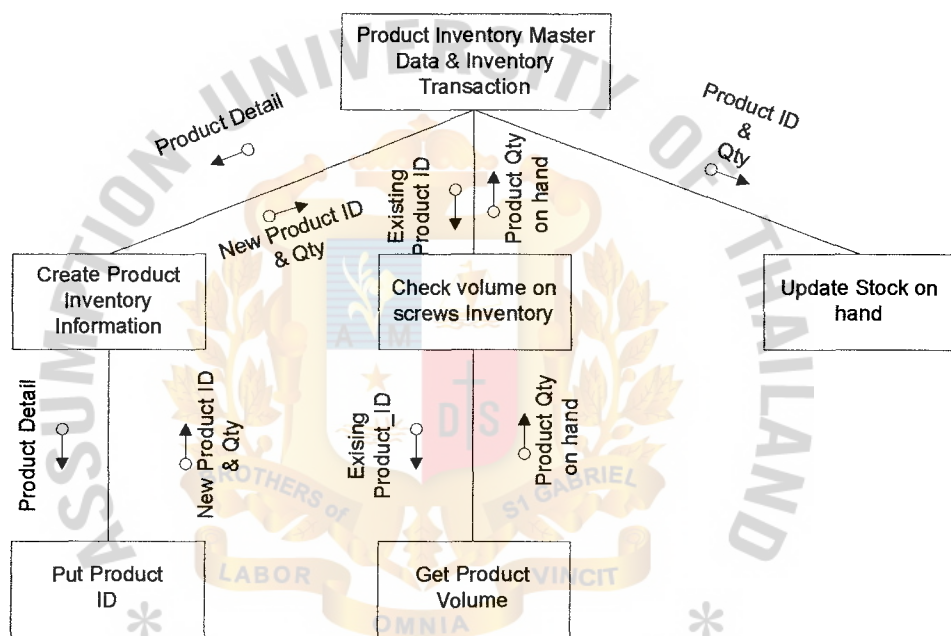


Figure E.1 Product Inventory Master

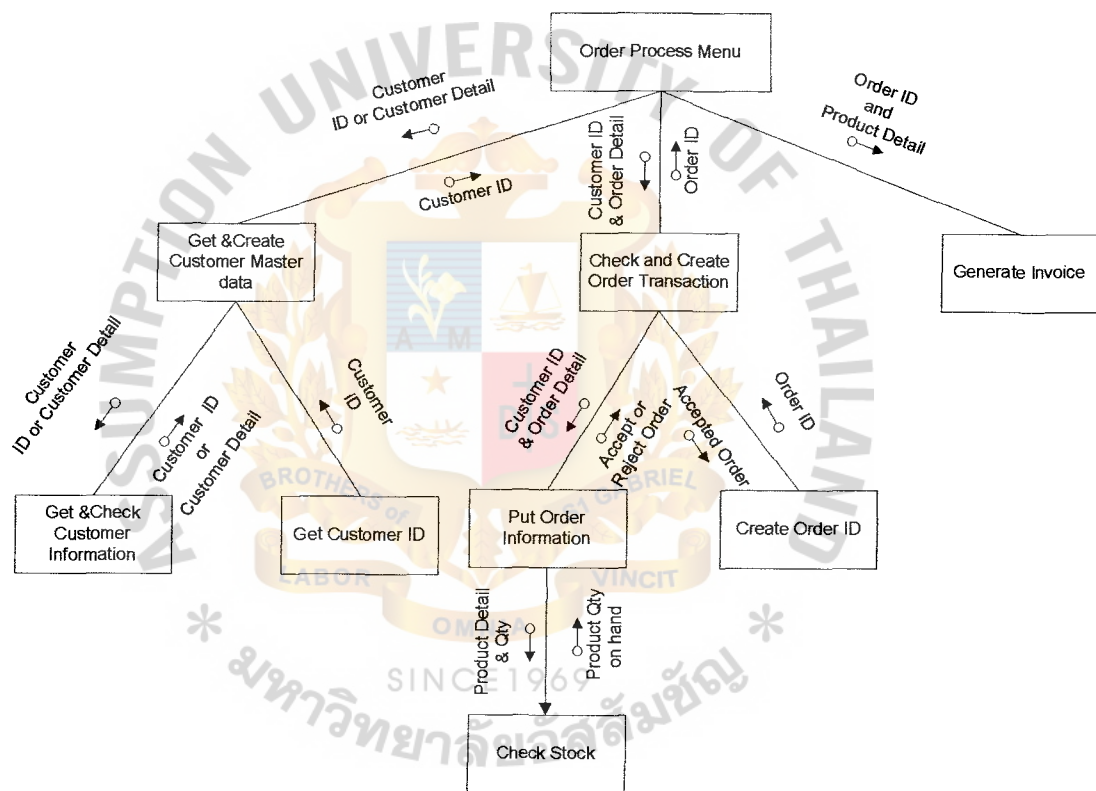


Figure E.2 Order Process





## APPENDIX F

### USER INTERFACE DESIGN

Login

User Name :: tsn

Password :: \*\*\*

OK Cancel

Figure F.1 Login Form

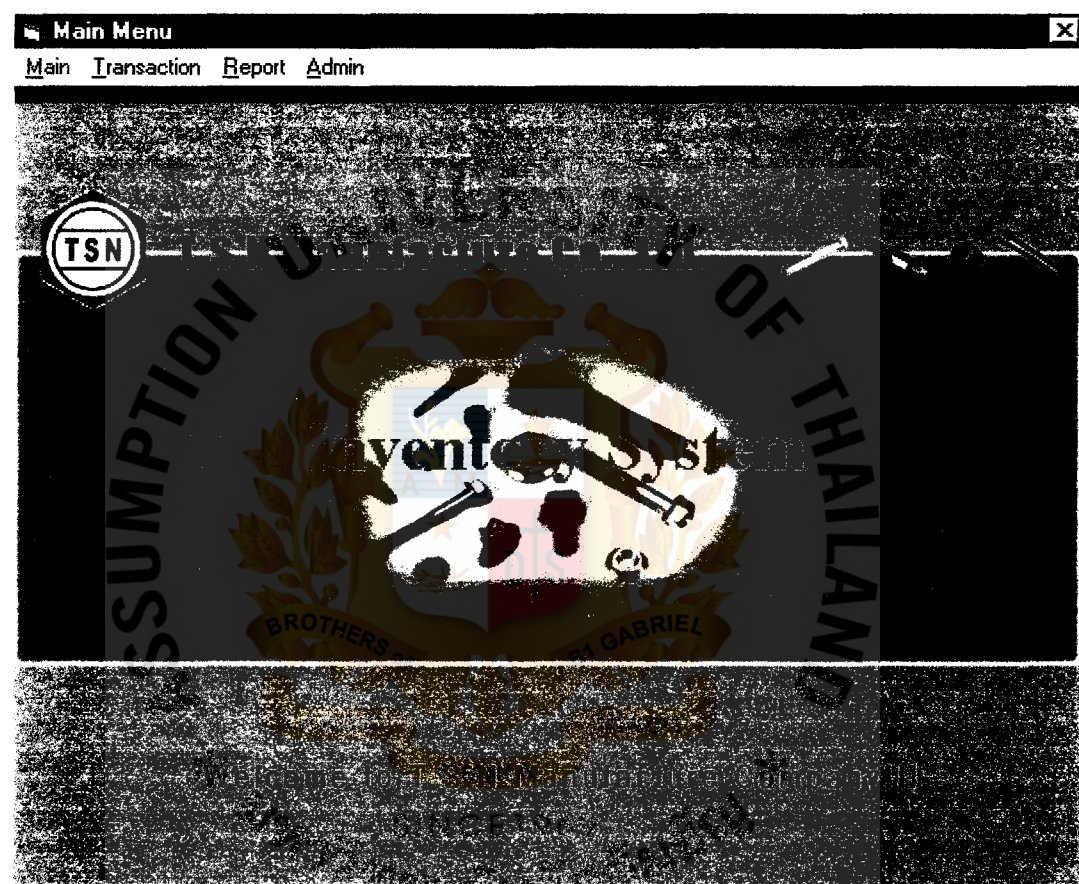


Figure F.2 Main Menu Form

Customer

TSN MANUFACTURE CO.,LTD

Customer Details

5

Customer ID :: C1

\* Customer Name :: Wax Company Limited

Contact Name :: Ekechai

\* Address :: 142 Sukhumvit Road

City :: Bangkok

Post Code :: 10260

\* Telephone :: 0-2223-3254

Fax :: 0-223-3255

k < > >|

Save Add Edit

Cancel Delete Main Menu

Search Customer

Select Search Key Search

\* Required Field

Record :1/7

Figure F.3 Customer Form







Inventory Control

**T S N MANUFACTURE CO.,LTD**

Inventory Control

Product Inventory ::

Product ID :: BH06010

Description :: BH 6 x 10

Quantity On Hand :: 225 boxes

Safety Stock Level :: 50 boxes

Add New Product

Change Stock Level

Stock Entry ::

Received Date ::

Quantity In :: boxes

Total Stock :: boxes

Add Stock

Refresh Main Menu

Figure F.6 Inventory Control Form

Inventory Details

View Inventory By :

☒ All Products
 ☐ Out of Stock

ProductID	Description	QuantityOnHand	MinimumStock
BH06010	BH 6 x 10	100	50
BH08040	BH 8 x 40	90	100
JP10020	JP 10 x 20	136	50
JP06045	JP 6 x 45	100	50
JP06030	JP 6 x 30	298	50
SP001	Rivet	750	60
BH10090	BH 10 x 90	308	50
JP06010	JP 6 x 10	39	100
JP08075	JP 8 x 75	375	100

Refresh

Print

Main Menu

Figure F.7 Inventory Details Form

Search Customer

T S N MANUFACTURE CO.,LTD

Search Customer

Search Customer

Search By

CustomerName

Charoen Company Limited

OK

Main Menu

Customer Information

	CustomerID	CustomerName	ContactName	Address
▶	C1	Charoen Company Limited	Somchai	93/5 Moo 8 Sukhu

Record : 1/1

Figure F.8 Search Customer Form

Search Product

T S N MANUFACTURE CO.,LTD

Search Product

Search Product

Search By

ProductID

BH06010

OK

Main Menu

Product Details						
	ProductID	ProductType	Description	EachBox	Price	Quant
▶	BH06010	Hexagon Head Bolts	BH 6 x 10	1000	.45	225

Record : 1/1

LABOR OMNIA VINCIT

Figure F.9 Search Product Form

Invoice

TSN MANUFACTURE CO.,LTD

Invoice

Invoice Option ::

☒ view by CUSTOMER
☐ view by ORDER

Invoice ID::

Inv45/15

By Customer ::

Customer ID ::

C7

Customer Name ::

Toyota Motor Company Limited

Contact Name ::

Chatee

Address ::

78 /7 Rama III Road, Satupadit

Order ID ::

Ord11
Ord15

Order Date ::

10/15/2006

ProductID	Description	UnitPrice	EachBox	Quantity	Total
SP001	Rivet	1.8	150	53	14310
JP06030	JP 6 x 30	.45	500	10	2250

Total Amount ::

16560

Vat Rate ::

7

Vat Amount ::

1159.2

Net Total ::

17719.2

Print
Main Menu

Figure F.10 Invoice Form

Report

**T S N MANUFACTURE CO.,LTD**

Report

By ::

☐ Customer ☐ Inventory

☐ Product ☒ Sales

Sales ::

Date Start ::  Date End ::

☐ Customer ID

☐ Product ID

☒ All

[Main Menu](#)

Figure F.11 Report Form



Change Password

Old Password :: \*\*\*\*

New Password :: \*\*\*\*\*

Confirm Password :: \*\*\*\*\*

OK Cancel

Figure F.12 Change Password Form



**APPENDIX G**  
**REPORT DESIGN**

## T S N Manufacture Company Limited

141/74 Moo 6 Bangkhuntien-Beach Road, Samaedam, Bangkhuntien, Bangkok 10150

### Customer Report

Customer ID	Customer Name	Contact Name	Address	Telephone
C1	Iwax Company Limited	Somchai	45/2 Sukhumvit Road Bangkok	0-2381-8988
C2	Central Trading Associated	Tipvilai	78 Bangkapi Bangkok	0-2658-9891
C3	Phoo Company Limited	Veeraya	41 Klongton Bangkok	0-3210-8972
C4	Charoen Industry	Preecha	74 Soi Suksawat 28, Bangkok	0-2427-4869
C5	Toyota Company Limited	Chatee	47 Petkasem Road Bangkok	0-2898-4743-8
C6	System Corp Company Limited	Anan	24 Bangruk Bangkok	0-2125-7474
C7	Hitachi Company Limited	Ekavit	21/7 Sai-Mai Road Prajinburee	0-3712-5467

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Date 10/6/2006

Figure G.1 Customer Report

**T S N Manufacture Company Limited**

141/74 Moo 6 Bangkhuntien-Beach Road, Samaedam, Bangkhuntien, Bangkok 10150

**Product Report**

Product Type	Product ID	Description	Each Box	Unit Price
Hexagon Head Bolts	BH06030	BH 6 x 30	600	0.54
	BH08045	BH 8 x 45	250	0.65
	BH10090	BH 10 x 90	100	1.29
Others	SP001	Rivet	150	1.80
	SP002	Rivet Red	200	1.82
Pan Head Machine Screws	JP08020	JP 8 x 20	800	0.64
	JP08035	JP 8 x 35	500	0.86
	JP10065	JP10 x 65	250	1.20
	JP10075	JP 10 x 75	250	1.28
	JP10080	JP 10 x 80	200	1.50
	JP10090	JP 10 x 90	100	1.84

Page 1 of 1

Date 10/6/2006

Figure G.2 Product Report

## T S N Manufacture Company Limited

141/74 Moo 6 Bangkhuntien-Beach Road, Samaedam, Bangkhuntien, Bangkok 10150

### Inventory Report

Received Date	Product ID	Quantity on Hand	Safety Stock Level	Stock in ID	Quantity in
1/6/2006	BH06030	450	100	1	500
5/6/2006	BH08045	120	50	2	400
	BH10090	757	90	3	100
	SP001	145	80	4	350
	JP08020	410	200	5	200
15/6/2006	JP08035	70	100	6	500
	JP10065	90	400	7	400
	JP10075	42	500	8	700
	JP10080	95	100	9	500
	JP10090	25	200	10	450

Page 1 of 1  
Date 10/7/2006

Figure G.3 Inventory Report

# T S N Manufacture Company Limited

141/74 Moo 6 Bangkhuntien-Beach Road, Samaedam, Bangkhuntien, Bangkok 10150

## Sales Report

Date	Cust ID	Order ID	Product ID	Each Box	Unit Price	Quantity	Total	Vat 7 %	Net Total
10/5/2006	C1	Ord 1	BH06010	1,000	0.51	30	15,300	1,071	16,371
					Total	30	15,300	1,071	16,371
							<b>Grand Total</b>		16,371
Date	Cust ID	Order ID	Product ID	Each Box	Unit Price	Quantity	Total	Vat 7 %	Net Total
10/5/2006	C2	Ord 2	BH08040	50	0.75	20	7,500	525	8,025
					Total	20	7,500	525	8,025
							<b>Grand Total</b>		8,025
Date	Cust ID	Order ID	Product ID	Each Box	Unit Price	Quantity	Total	Vat 7 %	Net Total
10/5/2006	C3	Ord 3	JB06045	600	0.68	90	36,720	2,570.40	39,290.40
			SP001	150	1.80	10	2,700	189	2,889
					Total	100	39,420	2,759.40	42,179.40
							<b>Grand Total</b>		42,179.40

Page 1 of 1  
Date 10/7/2006

Figure G.4 Sales Report



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