Development of Computer Software for the Production Management System

by

Mr. Borworn Chuenchom

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management

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ABSTRACT

Computer technology has always changed and developed all the time. It has been used to reduce the complicated of work flow process in many works, also it was used to reduce wasting time and error. The most important problem of existing production management system is they had not enough capabilities to support all their production processes. Some companies bought high price systems but could support them only for inventory managements that means only receives and withdraws goods. The problem is how can they know when they should reorder RM from suppliers. Also some companies really had good production management system but their big problem was they could not manage the warehouse layout or planning on which product should be kept where. When the truck that picked up the goods reach the front of the warehouse, it was very difficult to find out where is the right place to keep the goods also they could not know the locations available or unavailable. Production Management 2004 was launched to solve these problems. It is there are most industrial factories in small and medium size. Everyone knows in the world there are many types of industries such as animal food, metallic, ceramic, petrochemical, or agricultural. Therefore each of them has different kinds of RM and production process but the core steps of production is still based in the same way. These issues the system and added the extra features as Bill Of Materials or BOM, ABC Analysis, or Forecasting. Otherwise it has user interfaces in graphic mode for easy users review. Therefore any entrepreneur can use this system to increase the management performance.

ACKNOWLEDGEMENTS

The master project could not be finished and completed only by the writer. This project is made to develop the traditional production management. The principle of production management is complicated and composed many principles in the way of theory and practice. Those cover the issue of forecasting, inventory management, Material Requirement Planning, facility location planning, layout planning, statistical control, and quality control. The project was separated into two parts as the production development concept and computer aid production. The writer had found information from the textbooks, journals, magazines, and websites. Some information the writer got from friends, instructors, industrial factories, and enterprise companies. The two companies that could not be overlooked are E-Center and BTN Solutions because the manager had assisted and advised the writer in the necessary information that relates to production management development. They approved the writer to review the existing production management system that was purchased in the industry and computer software market. Those could make me understand the problem in the production management, what are the exact issues to improve, and how people uses the computer system to assist in accuracy, reliability, reduce error and etc.

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I. INTRODUCTION

1.1 Background of the Project

At the present time the world has changed in the trend of culture, economy, technology, and etc. Industry is has changed also in manufacturing, quality improvement, inventory control, and etc. The entrepreneurs intend to improve those processes to achieve the highest performance and it means more profit will to achieved. Many entrepreneurs have purchased new and high technology machines, or improved the facility location because they ensure those factors as the exact factor for high performance achievement. Of course, they could not look over it but they might forget another one that is the most important factor. That is they must answer the question how they should manage all resources on hand for the best utilization.

The readers know most of the time if you are talking about industry, it must be concerned with Production Management. It is about the transformation of production inputs into "outputs". Here the outputs are not only the physical products that the customer can touch, catch, or taste but they include service, as customer satisfaction. The production management used produce the products to meet the needs of customer but it could not produce the products without improvement and predict customer's demand. Because the requirement, need, and demand of the customers have always changed within reason such as economy, war, season, and etc.

Marketers in a business must ensure a business sells products that meet customer needs and wants. The role of production is to ensure the business actually makes the required products in accordance with the plan. The role of production therefore concerns areas such as: performance, aesthetics, quality, reliability, quantity, production, costs, and delivery dates.

Basically the master project is created for industries but however to make everything clear and understand better, the writer will mention one industry that the writer has worked in a permanent job one year ago until present time. That is the Jewelry Industry the company the writer has been working for is Pan Continental Ltd. This company is located on Mahesak, Silom Road, Bangkok. Here is the factory that has produced jewelry such as pendant, necklace, ring, earrings, and bracelet then shipped the goods to retail around the world. Its branch office was located at New York USA that has a showroom and customer service office. In fact this company has the production system but it cannot serve all their needs. When the writer walked in to the office the first day, they instructed the writer to analyze and adjust the system to support all their requirements but it is really difficult because all are concerned the paper work.

To produce the products, factory of some kind is needed. This will comprise the bulk of the fixed assets of the business. In determining which factory to use, management must consider areas such as: future demand (volume, timing), design and layout of factory equipment and offices, productivity and reliability of equipment, need for (and costs of) maintenance, health and safety (particularly the operation of equipment), and environmental issues (e.g. creation of waste products).

There are many different ways of producing a product. Management must choose the best process, or series of processes. They will consider: available capacity, available skills, type of production, layout of plant and equipment, safety, production costs, and maintenance requirements.

As markets have become much more competitive, quality has become widely regarded as a key ingredient for success in business. In this revision note, we introduce what is meant by quality by focusing on the key terms you will come up against.

Producing products of the required quality does not happen by accident. There has to be a production process that is properly managed. Ensuring satisfactory quality is a vital part of the production process. To meet the highest production, quality cannot come from only your management of one or two production factors but it must happen when you manage all its factor as inventory control, quality management, forecasting, facility location planning, layout planning, material requirement planning, and statistical analysis. The reason is all production factors have been involved since receiving the customer order, bring the raw materials to produce the finished goods, until distributing the goods to the customer.

1.2 Objectives of the Project

If you are talking about industry it must be concerned with production management and it composes of inventory control (such as Economic Order Quantity, ABC classification, and etc), forecasting (such as forecasting method, forecasting process, and etc), facility location and layout planning (such as design product or process layout), material requirement planning (such as MRP process and Bill of Material-BOM), and statistical analysis. These are main factors for production management. A major feature of this development is the increased emphasis on computer technology and the effect of IT technology on production management. It is composed to develop the computer system that can assist people who need to manage their industry to do as well and better. I intend to create it to cover all main factors of production management and assist all kinds of processes for factory in the industries.

1.3 Deliverables

To recommend Production Management System 2004 or PMS 2004 for the industrial factories its deliverables of the project are:

(1) Documents regarding the analysis and design of the system.

(2) Documents of system requirement and all research and investigation information.

(3) The sample screens of the system and examples of system operation.

(4) The sample reports.

(5) Computerized filling and record system.

1.4 Project Plan

The project is planned as shown in Figure 1.1. The plan is separated into 9 steps as follows:

(1) Data collection and analysis, which investigates the involved data as the current system operations and problems for the current system.

(2) Define objectives and scopes, which define the objectives of the project and what the users will achieve from the developed system and also what the capabilities of the project are.

(3) Analyze the current system, from which the researcher had learned how the production processes flow, how many functions are involved, and what functions should be added more for improving the performance and accuracy.

(4) Identify the current problems, which specify the current problems that must be solved.

(5) Develop data model, which design and implement the new production management system in the form of DFD and ER diagram to show how data was taken to use.

(6) Develop process model, which design and implement the process model of the new production management system to show how many processes will be defined in the system and how many factors each process involves.

(7) Cost and benefit analysis, which estimate the cost and benefit that the users will achieve from the developed system.

(8) System Design, which design the system about input data, output data, screen display, report, control function, hardware requirements and software requirements.

(9) Implementation and evaluation, which review the completed design of the new production management system and bring it to be advised from the literate or expert people in the field of software development of production, or the entrepreneurs.

1.5 Scope

The scope of the project is to analyze the existing production management systems, improve them to higher performance.

(1) The master project is only the concept that is generated from the theory of computer and information technology, and the theory of production and operation management to develop the traditional production management system.

(2) Expand the limit of computer system to concern and assist with the issues of production management as inventory control, forecasting, facility location and layout planning, material requirement planning, and statistical analysis.

(3) The project involves the production work flow as received and withdraw the raw material or finished goods, layout planning and design, Bill of Material-BOM, goods transferring between one location to another, production cost estimation, quality analysis and control and etc.

(4) The system has been proposed for small and medium size of industrial factory.

H. THE EXISTING SYSTEM

2.1 Background of the Organization

Pan Continental Ltd is the company that is located at Bangkok, Thailand. It has business about jewelry manufacturing and export to countries around the world. They have produced jewelry products as pendant, ring, earrings, bracelet, necklace, and bangle in a variety of styles examples in Figure 2.1.

Figure 2.1. Products of Pan Continental Ltd.

Pan Continental Ltd has a branch at New York, USA as the show room and administration office. The name of the branch is Art of Diamonds Ltd. The company is a small to medium sized company. Total staff of both Pan Continental Ltd and Art of Diamond Ltd is 15 persons and work in different departments at Financial, Production, Information Technology (IT), and Customer Service as follows Figure 2.2.

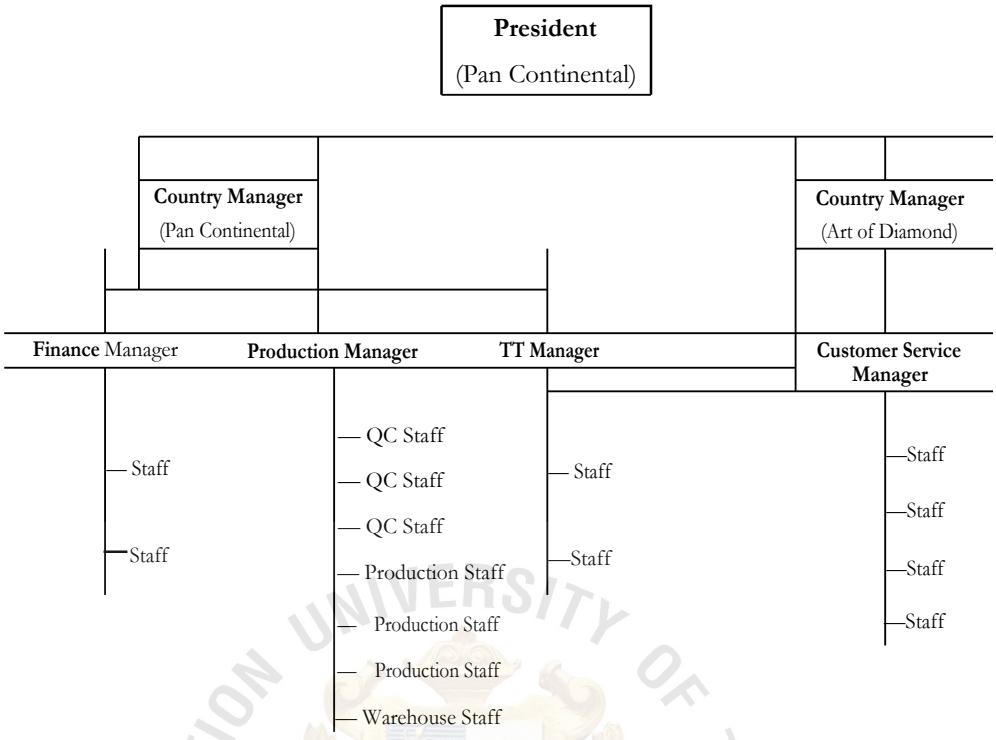


Figure 2.2. Organization Chart of Pan Continental Ltd.

Business activities of Pan Continental Ltd are as follows:

(1) Receive purchase orders over fax from Art of Diamond and verify them to ensure which orders can be produced or cannot. Because sometime they received purchase orders but the raw materials might not be available to produce; then they would send customer notification to inform the branch to let the customers know.

(2) The administration staffs will entry the verified orders to the computer and save into database.

(3) After verifying purchase order step completely, they will send the outstanding purchase orders to factory to produce the goods following the customers' orders.

(4) When the factory receive the outstanding purchase orders, they will send the raw material request forms to inventory department for withdraw RM-Raw Materials to produce the goods.

(5) After the factory received all RMs they need, they will start production. The production priority would be arranged by due date on each purchase order. The reason they have not produced the principle of FIFO — First Come First Serve is because due date on the purchase order shows which customers can wait or cannot. Example A orders the goods before B but A does not want to receive urgently and due date is in the next three months. B sends order after A as one month. It shows the company may be able to produce B's order first and then still have time to produce A's order next.

(6) When the goods are produced completely, the finished goods will be sent to inventory again to stock and wait to ship.

(7) When the finished goods reach inventory, inventory staff will stick the label that has customer name, due date, product ID, dimension, and weight on it and then send it to keep in the stock. The finished goods will still be kept there until the shipment date then ship it to the customer.

(8) The finished goods will be sent to customer with Invoice.

2.2 Existing Business Functions

The current production system includes Order processing System, Account Information System, Inventory Processing System and Production Information System. The entrepreneur may think the system is still implemented well but if he looks through the system, he found the work flow of the system involving human and paper work in many processes. Otherwise each step of work process must use paper and take a long time to complete.

Nowadays, the entrepreneur engages in activities, such as hiring employees, training employees, purchasing IT equipments, managing inventory, and collecting cash flow for selling products to customers. These are grouped as one and is called transaction.

The company consists of four major transactions, which each manager will be in charge and has the following responsibilities:

(1) Customer Service Department. Its responsibilities are:

(a) To take care of customers, get their orders provide all product knowledge, information, and capabilities to customers.

(b) To set price and promotion of the company's product.

(c) To design marketing strategy and marketing plan.

(d) To achieve the company's mission and objective.

(e) To get invoices from Finance Department and send them to the customers.

(f) To collect payment from the customers to Finance Department and deliver official receipts back to the customers.

(2) Production Department. Its responsibilities are:

(a) To get customer's order from Customer Service Department.

(b) To order products and deliver purchase orders to suppliers.

(c) To check product quantity in warehouse with warehouse staff

(d) To manage receive and withdraw raw materials to produce finished goods.

(e) To control and evaluate production workflow and volume.

(f) To check quality of products and always improve.

(3) Finance Department. Its responsibilities are:

(a) To prepare and issue tax invoice, official finance report, invoice and purchase order.

(b) To record all financial and accounting transactions.

(c) To prepare financial statement reports to management level.

(d) To collect payment of sales and prepare payment to creditors.

(e) To deposit checks and cash receivables to bank.

(f) To service and support all functions of the company about finance.

(4) Information Technology Department. Its responsibilities are:

(a) To improve and maintain the resources in computer system; both hardware and software.

(b) To back up all data that flows in the system.

(c) To research and develop the new system to assist the management level.

(d) To service and support all functions of the company about IT resources.

2.3 Current Problems and Areas of Improvement

From the writer's work experience of approximately one year at Pan Continental Ltd, the company has been facing the big problem about transfer data between branches, resource utilization wastefully, and time waste in production flow process.

As per the writer's description about the business activities of Pan Continental Ltd, the process workflow looks good and should be perfect but what are their problems? The problems of the existing system are as follow:

(1) No Sales Statistical Analysis Function: They produce to order but they could not produce to stock because they have not recorded the sale statistic in each period of the year. They have not used the forecasting method to estimate which period these stones can be sold a lot. Therefore, sometime when they receive the purchase orders that require too much but they have stock. The effect is the customer lead-time may be over due and make customers upset because they must waste time to find the supplier who have the goods in quality the customer wants and wait until receipt from the supplier. Otherwise, they could not estimate which goods are the hot

sale products and which one is worth. Example; the products three years ago have total sale volume of only 10 pieces why do they still need to promote it over the advertise medias?

(2) No Raw Materials Reorder Alert Function: Normally it is really necessary that warehouse staff must walk around warehouse and check stock twice a week because the current system could not alert them when any raw material statuses come to reorder point.

(3) No Stock Arrangement and Location Index Function: The production department arranged the location for each good and record in the documents. Most of the time, the warehouse staff used his memory to find goods in warehouse. If he could not remember, he might find it from the folders that is difficult and complicated.

(4) Capacity Limitation of DBMS: The important fact is the existing system uses Microsoft Access as DBMS. The limitation of Microsoft Access is it limits numbers of record per one table approximately to not over 200,000 to 250,000 records. But the company's sale volume in each year has around 130,000 to 150,000 so they need to clear the database every one and a half years and the old data must be kept in the backup medias.

(5) Data Transfer Method Inefficiency: The existing system when IT staffs want to export data to transfer to the others, they will enter to design view of Microsoft Access and copy data from the tables then save it into CDs and send to the branch. After destination received, they must enter to design view of Microsoft Access and import it. This way is inefficiency because between deliver CD from source to destination accident may

happen such as CD may be scratched. Otherwise the design view of Microsoft Access is area for change design screen, data source setting, form background color, and etc. These are sensitive and when IT staffs enter there for import or export data; it may have effect on them.

2.4 The Existing System

The existing system that the company has used for production management composes functions following the button on Figure 2.3 and data flow diagrams are presented on Figure 2.4 and Figure 2.5.

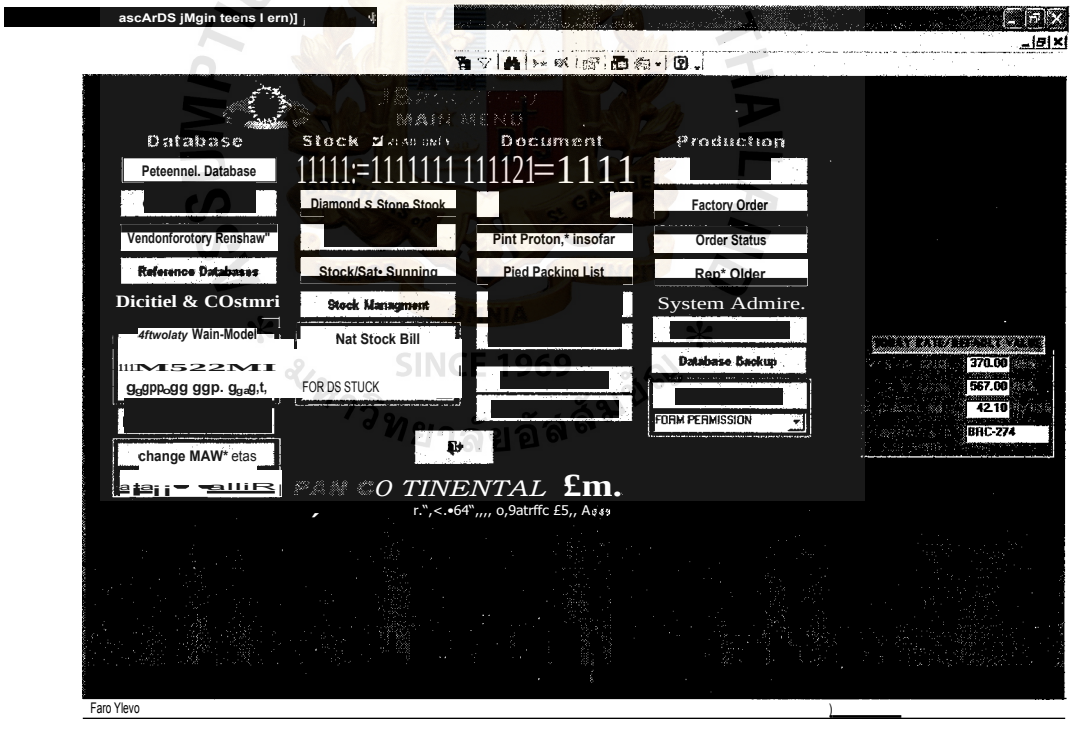


Figure 2.3. Main Screen of the Existing System.

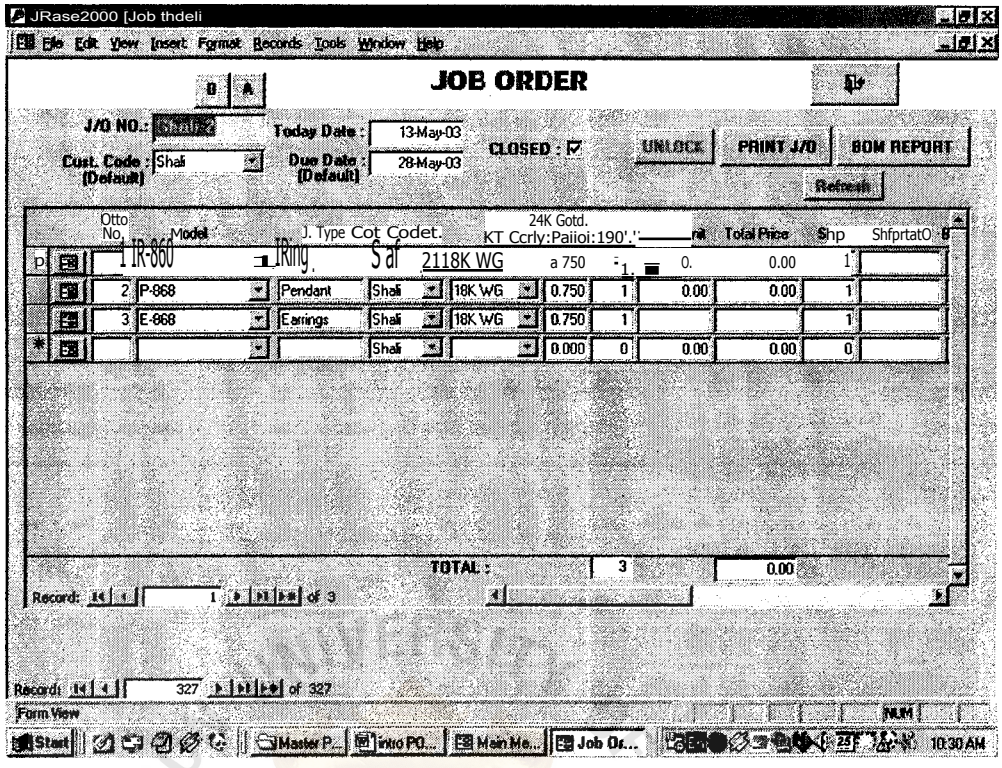


Figure 2.4. Customer Order Screen of the Existing System.

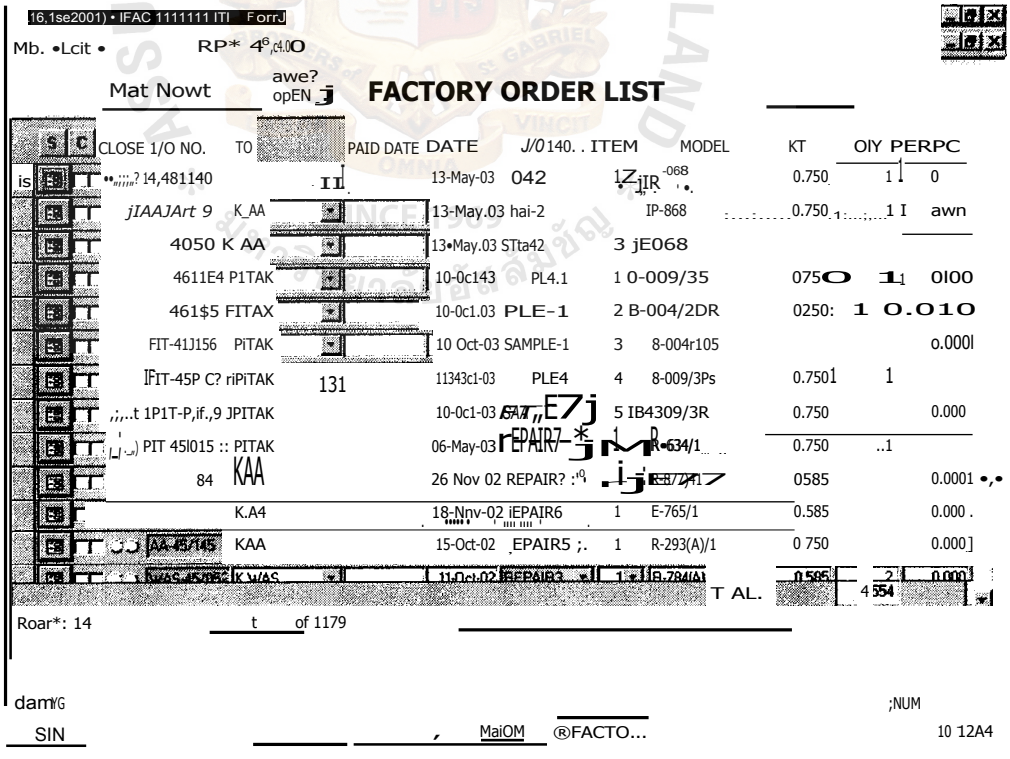


Figure 2.5. Factory Order Screen of the Existing System.

(1) Personal Database: When you click this button it will enter personal record screen. The user can add, delete, and update any employee information record.

(2) Customer Database: When you click this button it will enter personal record screen. The user can add, delete, and update any customer information record.

(3) Vendor Factory Database: When you click this button it will enter personal record screen. The user can add, delete, and update any supplier information record.

(4) Reference Database: When you click this button it will enter personal record screen. In this part is only record basic information of the involved database.

(5) Jewelry Main Model: When you click this button it will enter personal record screen. The user can add, delete, and update any main model information record such as R-761, BRC-557, or E-776.

(6) Jewelry Sub-Model: When you click this button it will enter personal record screen. The user can add, delete, and update any sub model information record that is sub model from main model such as R-761DEm (ring is made from diamond and emerald), BRC-557R (bracelet is made from ruby), or E-776S (earrings is made from sapphire).

(7) Sub-Model Super Search: When you click this button it will enter the screen that is used for search any information from sub model ID.

(8) Finished Jewelry Costing: When you click this button it will enter the screen that shows the cost list for each product.

(9) Change Material Cost: When you click this button it will enter the screen that shows the price list of each material in production.

(10) Metal Stock: When you click this button it will enter the screen that shows the inventory status of metal for the mounting. Here metal for jewelry production as white gold, yellow gold and silver.

(11) Diamond and Stone Stock: When you click this button it will enter the screen that shows the inventory status of diamond and stones. Here the stone types for jewelry production include precious (Ruby, Sapphire, Emerald, etc) and semiprecious (Citrine, Aquamarine, Tsavorite).

(12) Jewelry Cost: When you click this button it will enter the screen that shows the cost list for each product in each step of production.

(13) Stock and Sale Summary: When you click this button it will enter the screen that shows the comparison between order volume and raw material stock for ensures production capability.

(14) Stock Management: When you click this button it will enter the screen that shows only the inventory status and stock summary report.

(15) Print Stock Bill: When you click this button it will enter the screen that shows print preview of stock summary report and let the user prints from here.

(16) Print Label/Catalog: When you click this button it will enter the screen that shows print preview of product specification label for stick on the product before deliver to the customers.

(17) Print Quotation: When you click this button it will enter the screen that shows print preview of quotation.

(18) Print Proforma Invoice: When you click this button it will enter the screen that shows print preview of invoice.

(19) Print Packing List: When you click this button it will enter the screen that shows print preview of packing slip for stick on the product package before deliver to the customers.

(20) Print Receipt/Certificate: When you click this button it will enter the screen that shows print preview of receipt or certificate for guarantee the products.

(21) Invoice Payment Status: When you click this button it will enter the screen that shows the list of the issued invoices and how are they going on.

(22) Invoice to NY: When you click this button it will enter the screen that shows the list of invoices to Art of Diamond. The cost in the invoices to Art of Diamond is only the production cost and when Art of Diamond received them, there will plus profit with the cost for inform to the customers.

(23) Job Order and Invoice: When you click this button it will enter the screen shows which job orders were produced complete and is it made invoice.

(24) Job Order: When Pan Continental receives purchase orders from Art of Diamond, the data entry will click this button and enter data over here.

(25) Factory Order: After the data entry entered the item orders in the Job Order screen, he must click at Factory Order button to make factory order document. It is used to inform the factory to produce the products.

(26) Order Status: When you click this button it will enter the screen that shows the list of the outstanding customer orders and shows their status in production processes.

(27) Repair Order: When you click this button it will enter the screen that shows the list of the returned products from Art of Diamond. They are sent because the production quality problem or the customers' disaster.

(28) Source and Data Backup: This part is used for backup and restore data from the customer's select table.

(29) Database Backup: This part is used for backup and restore database.

(30) Security Setup: This part is used for set the users' authorization.

TM THE PROPOSED SYSTEM

In fact, the concept of PMS 2004 can be used to create the software program for a variety of industrial factories such as material, jewelry, animal food, medicine, etc. But if the writer described it fully, the readers may not clearly understand so the writer mentions the jewelry industry. The jewelry industry is the business that the writer has worked since early 2003 until now. The writer feels familiar and can achieve much more information easily and correct. The proposed system has been involved since the customers place orders until the entrepreneurs ship products to the customers.

The proposed system is the concept of software development to create software to assist the entrepreneurs to manage the production workflow. It can be divided into six modules as Order Processing system, Employee information System, Production Information System, Account Information System, and Inventory Processing System. Each of them has different worked functions as follows:

(1) Order Processing system

This module is created to process about all customer orders since customers send orders to the company. After staff receives purchase orders, they will check to customer information, inventory status, resource available, etc.

(2) Account Information System

This module is created to process about all financial tasks as deliver invoices to customers, receive customers' payment, receive suppliers' invoice, make payment to suppliers, record all financial data, etc.

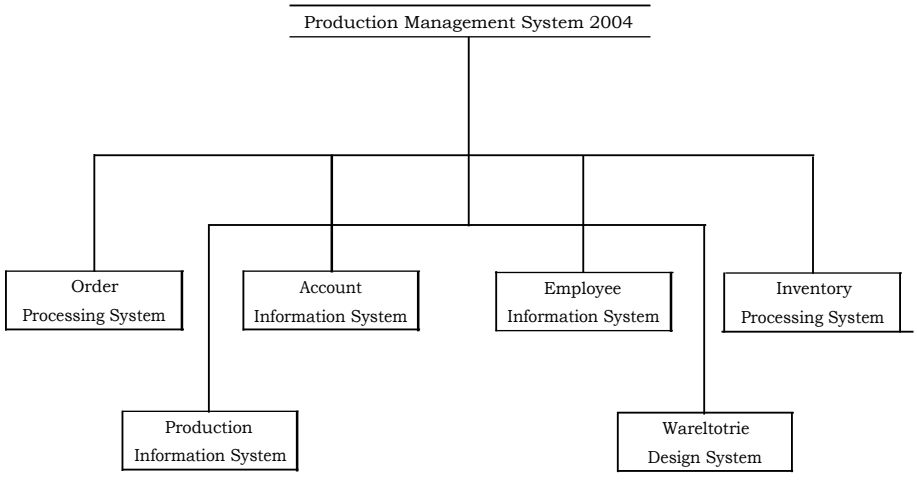


Figure 3.1. Functional Decomposition Diagram of PMS 2004.

(3) Employee Information System

This module is created to assist the part of production at factory to estimate production capability in each period of time and for capability requirement planning.

(4) Production Information System

This module is created to process all production tasks since RM requirement planning, send withdraw form to request RMs from warehouse, record production data in each period of time, etc.

(5) Inventory Management System

This module is created to process all inventory tasks as monitor RM and finished goods in stock, deliver outstanding inventory status to each department, record RM and finished goods receive data, record RM and finished goods withdraw, etc.

(6) Warehouse Design System

This module is created to record each good stock location; deliver outstanding available and unavailable area in stock area, etc.

POM 2004 composes with many functions inside and those related with production operations since receiving orders, RM withdrawe to produce, produce the finished goods, quality control, packing, keep the finished goods in stock, ship the finished goods to customers, and check stock status. The writer can explain step by step about modules inside PMS 2004 as details below:

(1) Main - This part involves users' authorization checking and username/password setting. When the user click it on the menu bar, the list will appear slides down and have the choices:

(a) User Login. When the software is opened it will not show anything as every button cannot be clicked. First, the user must click Main on menu bar then click at User Login. After that it will shows small windows to let user fill his username and password. If they are correct, the user will get permission to read, write, or both to data upon the defined rule. The system administrator will define the permissions.

(b) Authorization Setting. Only the system administrator can access this section. It will be used to add, delete, change password, define permission for any accounts. It is separated into two parts. First is the part to fill data about each account and set the permission. Second is the area to show the list of account information.

(c) Backup/Restore. Only the system administrator can access this section. It will be used for backup and restore data. They must be set

into the system to avoid the data lost and damaged problem. Data that was backup can be restored only in the same computer which is backup data.

(d) Import/Export. Only the system administrator can access this section. It will be the same Import and Export functions in MS Access. Import function is used for import data that is exported from another computer. Export function is used to export data and then transfer to another computer.

(2) General Info — This part involves the company's information as employee, supplier, customer, company, and product. When the user click it on the menu bar, it will appear on the list slides down and have the choices as:

(a) Employee Info. This section is used to fill records of the employees' information such as name, address, home phone number, email address, position, etc.

(b) Supplier Info. This section is used to fill records of the suppliers' information such as capital investment, name, address, contact person, website, etc.

(c) Customer Info. This section is used to fill records of the customers' information such as customer ID, customer name, address, and telephone number, fax number, etc.

(d) Product Info. This section is used to fill records of the product's information such as product ID, name, dimension, picture, and etc.

(e) Define Warehouse Info. This section is used to fill records of the warehouse's information such as warehouse ID, address, area measurement, and etc.

(f) Define Location. This section is used to fill records of the location's information in the warehouse because in the warehouse will be divided into many sub-areas and those are represented with Location ID.

(3) MRP — This part involves the detail of each product. It is used to specify the hierarchy of product derivation and it shows how each product is made from. When the user clicks on the menu bar, it will show MRP screen that has two parts. First is the area that let you fill the product model for filter. After you filled product model and clicked at View button, the detail of the product model will be show in graphic mode as from hierarchy on the second part. The procedure shown Bill of Material (BOM) for each product in graphic mode starts from drawing a circle in the middle of view area and put the name of main part under the circle. Information for next level comes from data user filled in the product information screen, then the program will draw circles equal to the number of main product's sub-parts and put the name of each sub-part under each circle. For next level and so on, the program will repeat until end of sub-part.

(4) Receive/Withdraw — This part involves staffs' receipt and withdraw of both raw materials and finished goods, record production data, and record the result of quality measurement.

(a) Receive Raw Material. After suppliers delivered raw materials to the company's warehouse, staffs will fill supplier's shipment information (such as Document ID, Date, SupplierID), product information (such as unit price, dimension, packaging), reason of receipt, etc.

(b) Withdraw Raw Material. When staffs come to warehouse suppliers to withdraw the raw materials for production, the warehouse staff must fill withdraw data (such as Document ID, StaffID, Date), product information (such as unit price, dimension, packaging), reason of withdraw etc.

(c) Receive Finished Goods. After factory produced the products completely, the factory staff must bring the finished goods to keep at the warehouse and then must record finished goods' information that will be kept in warehouse.

(d) Withdraw Finished Goods. When staffs come to warehouse suppliers to withdraw the raw materials for production, the warehouse staff must fill withdraw data (such as Document ID, StaffID, Date), product information (such as unit price, dimension, packaging), etc.

(e) Production Operation. After suppliers delivered raw materials to the company's warehouse, staffs will fill supplier's shipment information (such as Document ID, Date, SupplierID), product information (such as unit price, dimension, packaging), etc.

(f) Quality Control. When staffs come to warehouse suppliers to withdraw the raw materials for production, the warehouse staff must fill withdraw data (such as Document ID, StafffD, Date), product information (such as unit price, dimension, packaging), etc.

(5) Layout P/D — This part is prepared to let users fill detail about locations in each warehouse. It has presentation with a little graphic. The program prepared the number of floors for each warehouse yet and the users just fill the warehouselD that they want to review. After they filled, the program will show list of floors in graphic mode and represent with a circle. If the users want to review a floor, they just click on the circle of each floor, the review area will show the list and let users define locations detail in the floor.

(6) Analysis

(a) Forecasting. This part will allow staffs to forecast and define reorder point from RM withdraw statistic with the Simple Moving Average method. The reason using RM withdraw statistic is the writer wants to forecast the point of request RMs from suppliers. PMS 2004 is not linked with the system of Marketing Depaiintent so the program cannot load marketing data.

(b) ABC Analysis. This part will allow staffs to analyse, which RM was most often ordered from suppliers. The range between groups is A equals 70%, B equals 20%, and C equal 10%.

(c) Analysis of Receipt. This part prepares analysis method to analyse the rate of receives RM from suppliers.

(d) Analysis for Withdraw. This part prepares analysis method to analyze the rate of withdraws RM for production.

(e) Quantity Stock On Hand. This part prepares checking method to check quantity in stock in each period.

(7) Cost Calculation

(a) Production Dimension. After suppliers delivered raw materials to the company's warehouse, staffs will fill supplier's shipment information (such as Document ID, Date, SupplierED), product information (such as unit price, dimension, packaging), etc. This cost calculation method will calculate the carrying cost from the dimension of each piece of product multiplied by period of storage time.

(b) Storage Charge. After suppliers delivered raw materials to the company's warehouse, staffs will fill supplier's shipment information (such as Document ID, Date, SupplierED), product information (such as unit price, dimension, packaging), etc. The warehouse staff will set the standard size and its price first. Then compare each piece of product size with standard size multiplied by price and period of storage time.

(c) Transaction Counting. After suppliers delivered raw materials to the company's warehouse, staffs will fill supplier's shipment

information (such as Document ID, Date, SupplierlD), product information (such as unit price, dimension, packaging), etc. Also staff will punch barcode on each piece of product. the carrying cost will be calculated from the number of punched barcode multiplied by cost per punch time and then plus barcode label charge.

(8) Summary Report

(a) Customer Info Report. This report shows information about all customers who deal with company.

(b) Employee Info Report. This report shows information about all current employees who work in company at both Pan Continental and Art of Diamonds.

(c) RM Receipt Report. This report shows information about all RMs that were received by warehouse's staffs.

(d) RM Withdraw Report. This report shows information about all RMs that were withdraw by factory's staffs to production.

(e) Finished Goods Receipt Report. This report shows information about all finished goods that were withdraw from factory to warehouse.

(f) Finished Goods Withdraw Report. This report shows information about all finished goods that were withdraw from warehouse and deliver to customers.

(9) Addition — This part shows user's manual and information about PMS 2004

3.1 System Specification

The capabilities of PMS 2004 cover work processes of production operation. The work processes that are proceeded through PMS 2004 starts Art of Diamonds send the customer orders to Pan Continental over email. After staff of Pan Continental enter to the system and check how many RMs for each product and in each customer order, and what they are. The system will tell staff RMs in stock enough production following customer order or not enough. If not enough, the system will generate notice and send to Art of Diamonds over email. If enough, the staff will generate Factory Order and send factory with enclosed product detail. Factory receives Factory Order and then the system will generate RM request form and send to Warehouse. The staff will send RMs following detail in RM request form. The process of finding out RMs in Warehouse, staff enters the system in the part of layout design then searches the warehouse and location that keep RMs. After RMs were sent to Factory, staffs will produce goods following the orders and staff will record all tasks they did in the system. Then all finished goods will be sent to QC and staffs will record result into the system. When QC process is complete, the staffs will stick picking slip on the finish goods and on the picking slip will have barcode. Next finished goods will be sent to warehouse for keep, the staff will punch barcode reader to record productID of each. The finished goods will be kept until shipment date. The order status will be sent to Art of Diamonds over email that is generated from the system. The staff can forecast the production quantity in the future and analyse the rate of production from the system. As detail above, these are the system processes of PMS 2004 that can manage the most of production operation tasks.

3.2 System Design

The writer had collected staffs' requirements and recommendations to analyst and design system. As the principles of Data Flow Diagram, the writer can represent the

workflow of system into DI-41.) and divide from the overall view to sub element inside the system. Context Level of PMS 2004, can be separated into six external sources, twenty outputs from the system, and fifteen inputs to the system. Input and output data that flows inside the system as customer orders, account and finance data, line production, inventory data, and warehouse and planning data.

DED Level 0, the writer had divided the core system as Production Management System into six subparts. These are Order Processing System, Account Information System, Employee Information System, Production Information System, Inventory Processing System, and Warehouse Design System. Each of them will relate with the six functions that relate to production operation since receiving customer POs until delivering the finished goods to the customers.

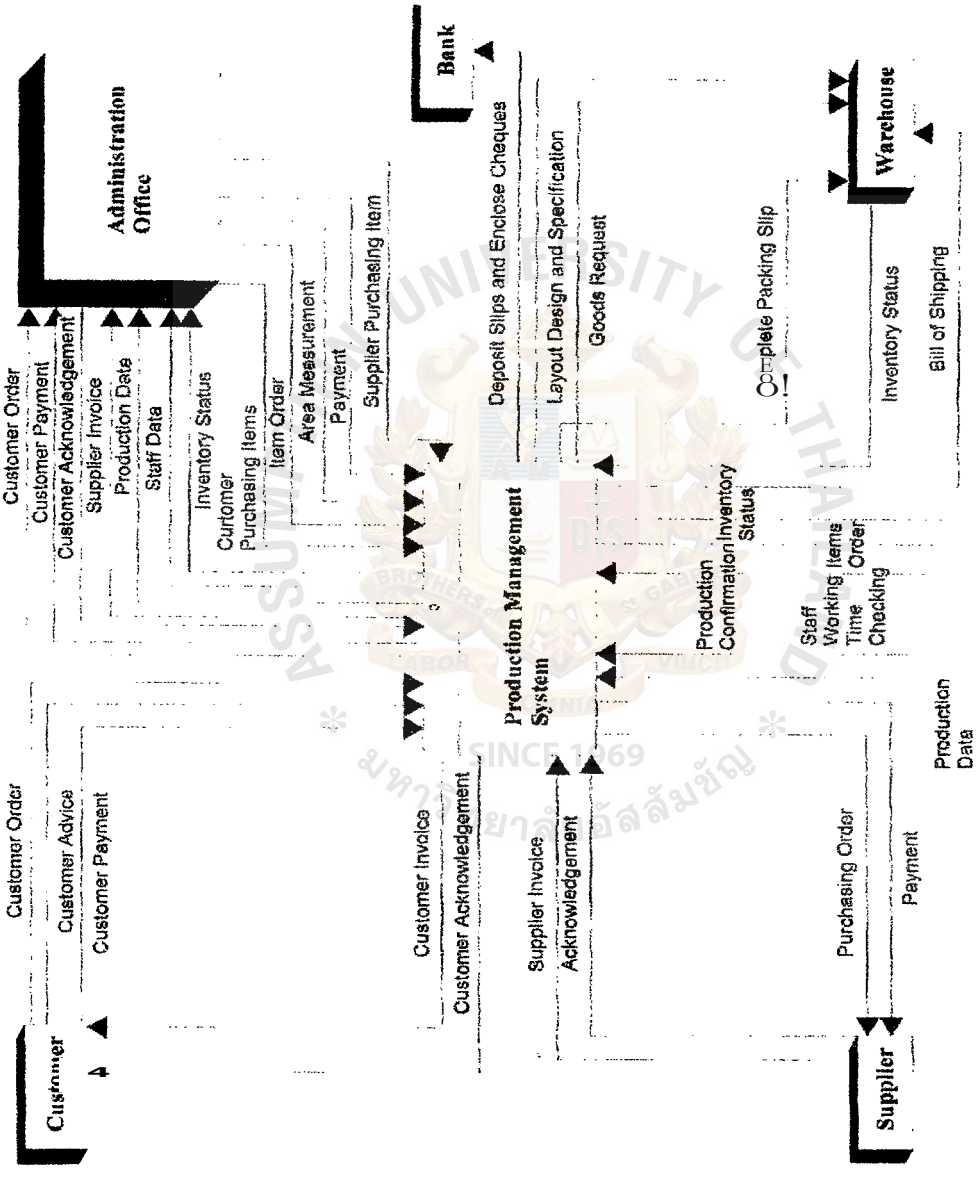


Figure 3.2. Context Level of Production Management System 2004.

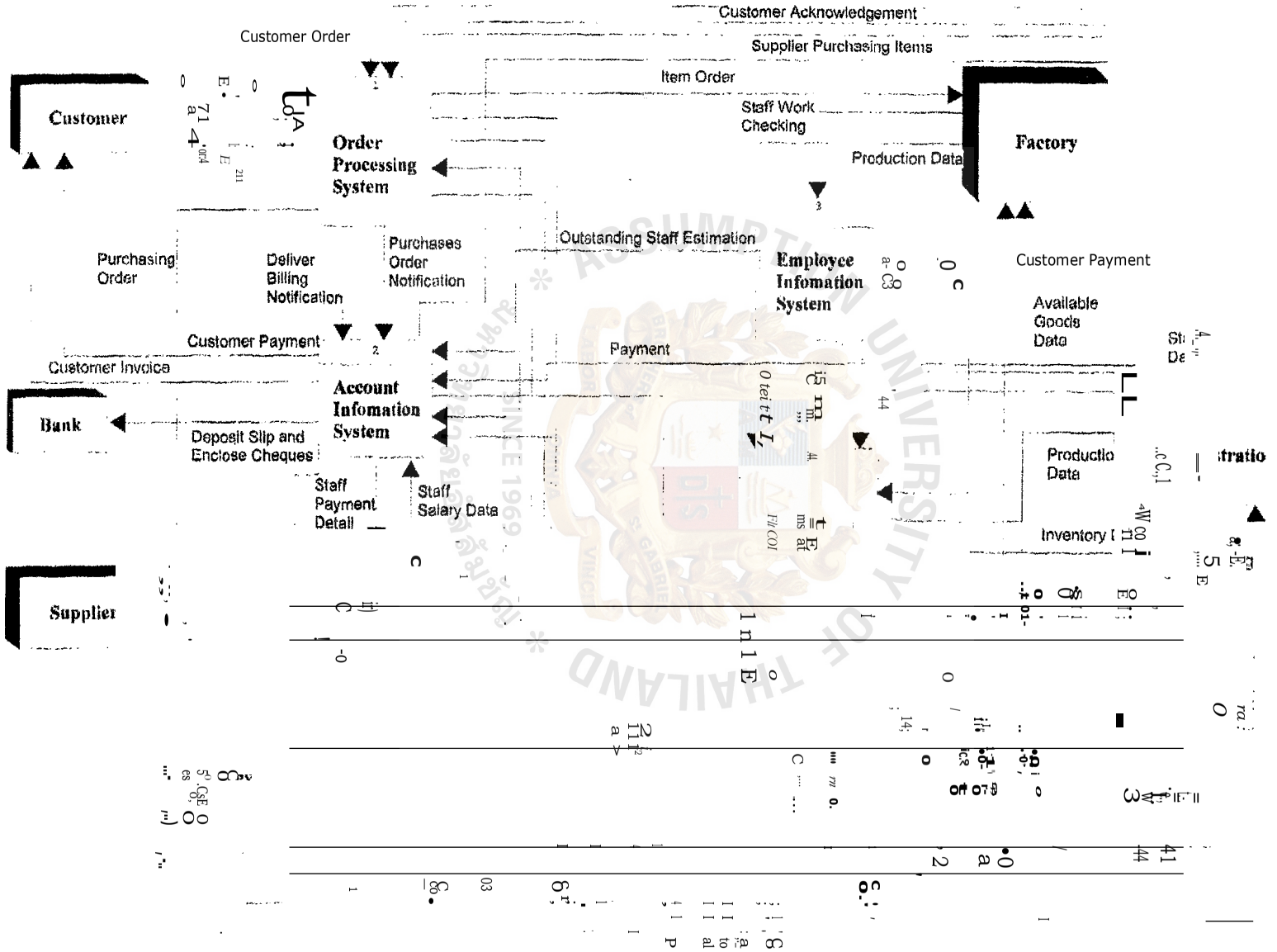
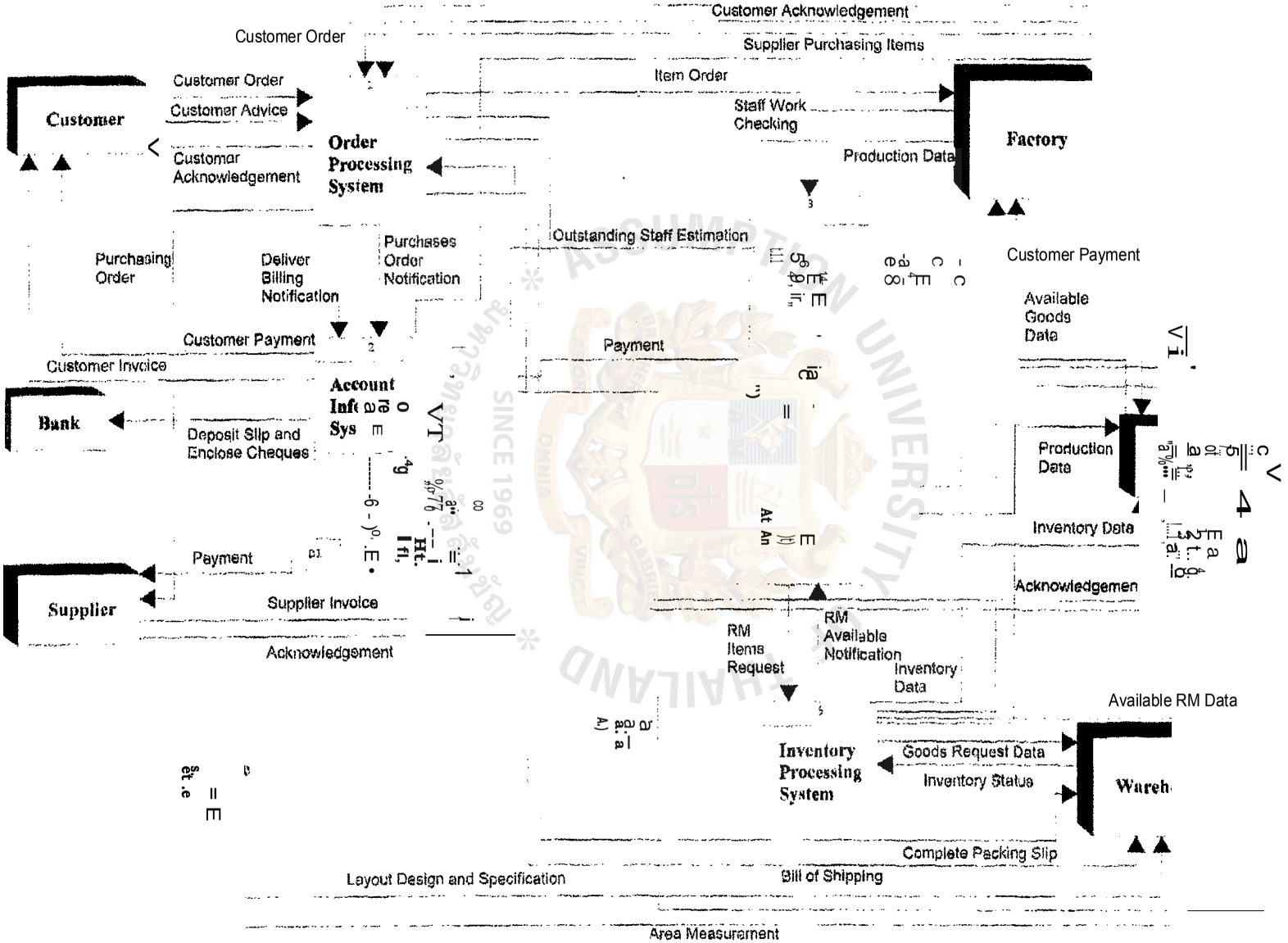


Figure 3.3. Level 0 of Production Management System 2004.



Level 1 of Order Processing System of Production Management System 2004.

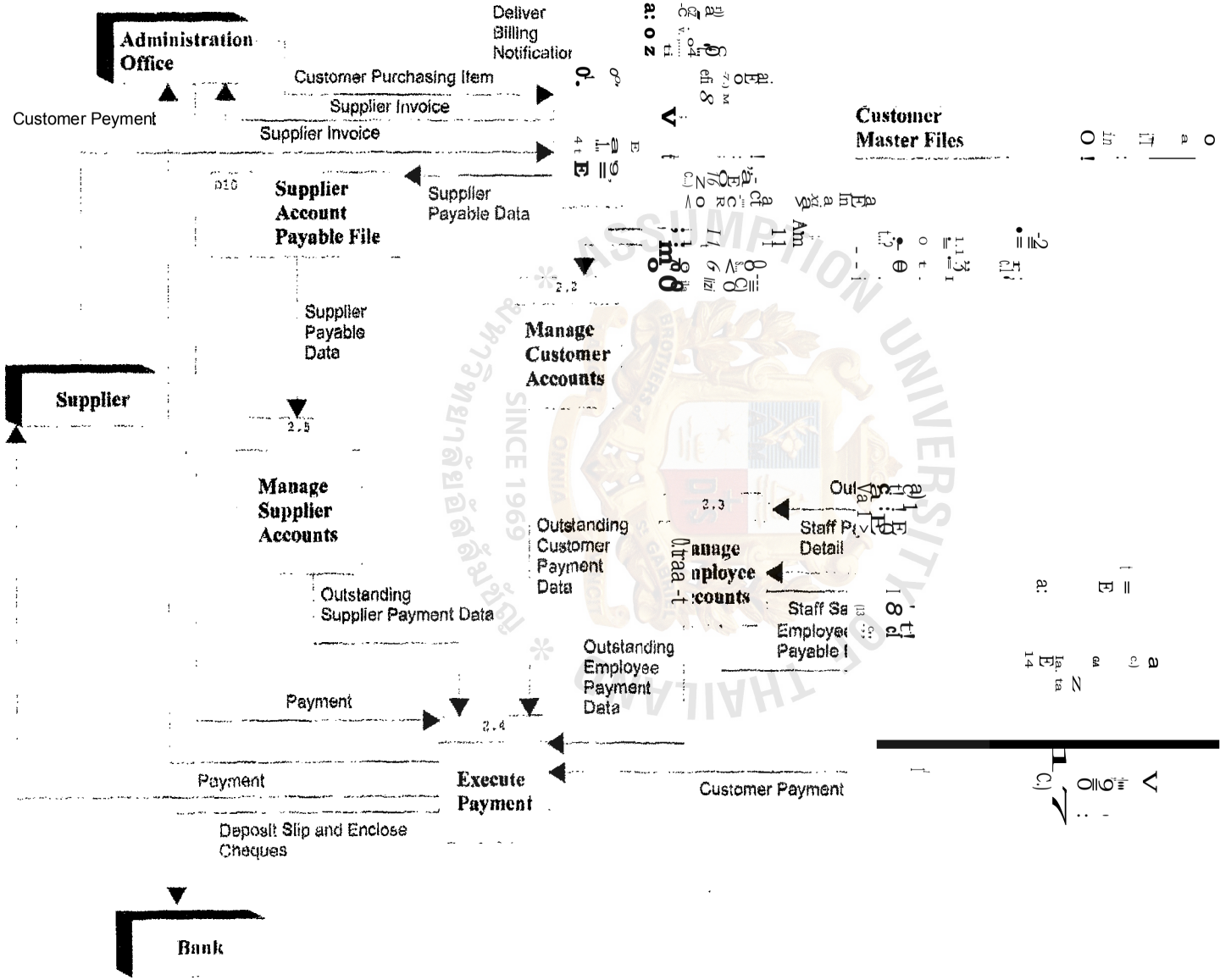


Figure 3.5. Level 1 of Account Information System of Productio

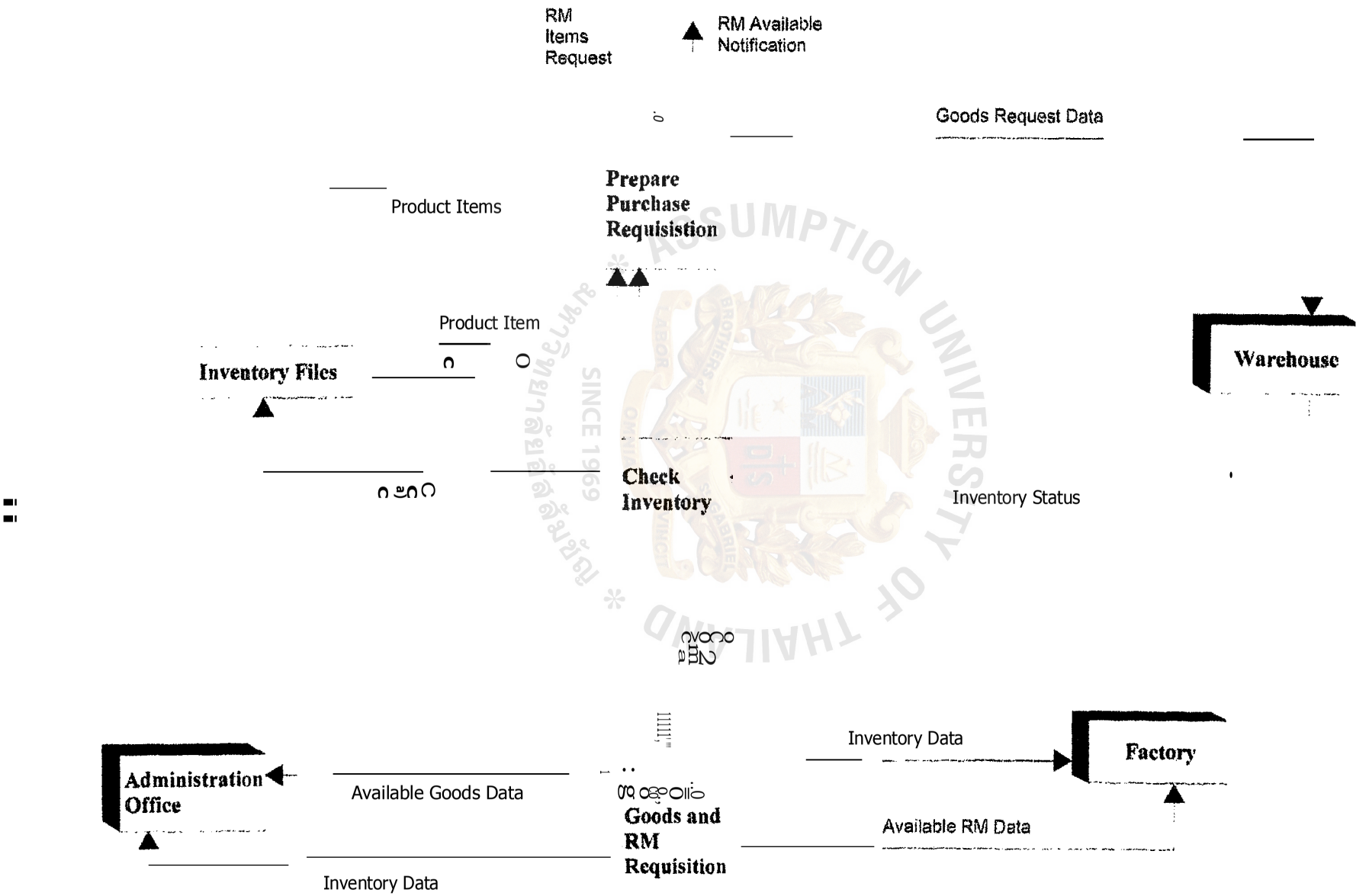


Figure 3.7. Level 1 of Inventory Processing System of Production Management System 2004.

DFD Level 1 is the step for the process division from Level 0. The writer could expanded four processes as Order Processing System, Account Information System, Production Information System, and Inventory Management System to be sub-systems because each of them has many sub-functions inside. DFD Level 1 of Order Processing System, it is exploded into four sub functions as Respond Customer Request, Validate Purchases Order, Complete Picking Ticket, and Execute Shipping Notice. DFD Level 1 of Account Information System, it is divided into five sub functions as Perform Billing, Manage Customer Accounts, Manage Employee Accounts, Execute Payment, and Manage Supplier Account. DI-41) Level 1 of Production Information System, it is divided into four sub functions as Prepare RM Receive, Estimate Production Capacity, Prepare HR Available, and Respond Production Request. DFD Level 1 of Inventory Processing System, it is divided into three sub functions as Prepare Purchase Withdraw, Check Inventory Status, and Respond Goods and RM Withdraw. The flow of processes is as follows Figure 3.2 — Figure 3.7.

3.3 Hardware and Software Requirement

3.3.1 Hardware Requirement

At Pan Continental, the equipments of existing system can be used for the proposed system and all the computers that are used to be clients in the existing system still be used in the proposed system as client. Also the server of the existing system will be used as client in the proposed system.

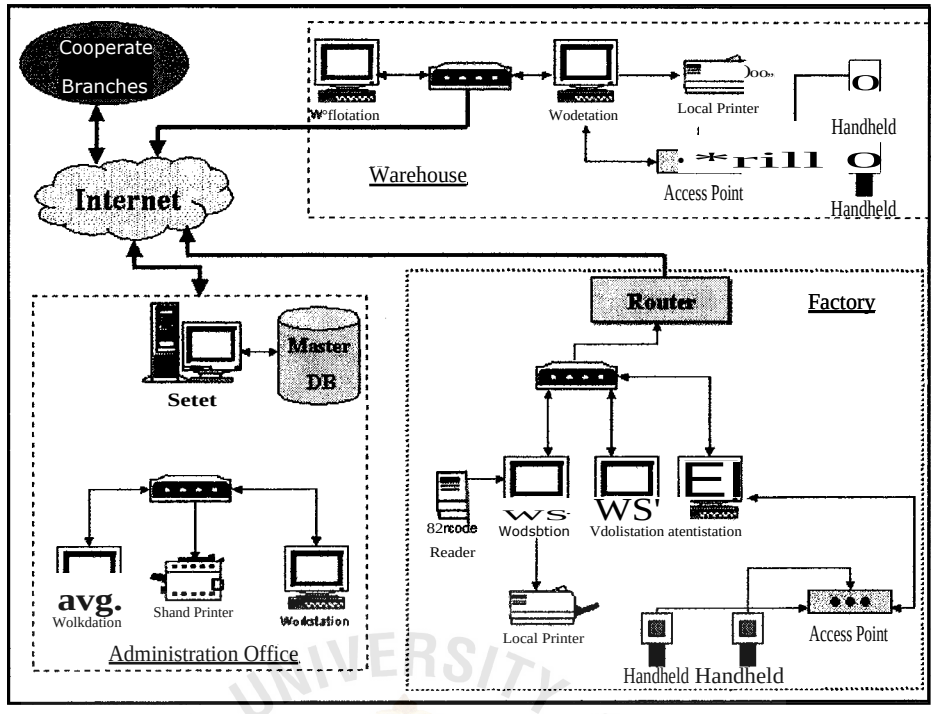


Figure 3.8. Hardware Configurations and Network System.

LAN (Local Area Network) of Pan Continental will be separated into three LANs as LAN at administration office, factory, and warehouse. Each LAN will have Switching Hub to link each machine together. In factory and warehouse will have to use barcode readers for the process of receive and withdraw the goods. The factory will have the employee time checking machine for check staffs' work time. All departments will have printers for print documents. The computers at administration office will be set modem to send and receive email to Art of Diamonds. The server is important because it is heart of the system to record every data here and control data transfer between each function. At Art of Diamonds, the computers and printers can use the existing machines because the processes there only fill customer orders and send them to Pan Continental over email. All hardware specification will show the list of cost/benefit analysis.

3.3.2 Software Requirement

The system will be created by Microsoft Visual Basic 6.0 with service pack version 5.0 and the system uses Microsoft SQL Sever 2000 as database. For the connection between Microsoft Visual Basic and Microsoft SQL Server the writer uses ADO — ActiveX Data Object.

Microsoft Visual Basic application has expanded and their roles have matured, the mechanisms for connecting Visual Basic to databases have also multiplied and evolved. It has few components that are prepared to assist the writer and programmers for computer software or system creation.

(1) Data access features allow you to create databases, front-end applications, and scalable server-side components for most popular database formats, including. Microsoft SQL Server and other enterprise-level databases.

(2) ActiveX technologies allow you to use the functionality provided by other applications, such as Microsoft Word, Microsoft Excel spreadsheet, and other Windows applications. You can even automate applications and objects created using the Professional or Enterprise editions of Visual Basic.

(3) Internet capabilities make it easy to provide access to documents and applications across the Internet or intranet from within your application, or to create Internet server applications.

(4) Your finished application is a true .exe file that uses a Visual Basic Virtual Machine that you can freely distribute.

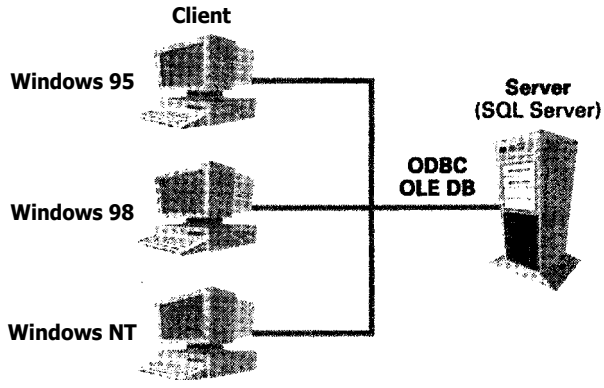


Figure 3.9. Client/Server System Architecture Uses OLE DB For PMS2004.

Microsoft SQL Server 2000 is the complete database and analysis offering for rapidly delivering scalable e-commerce, enterprise, and data warehousing solutions. It dramatically reduces the time required to bring these applications to market, while offering the scalability needed for the most demanding environments. Microsoft SQL Server 2000 provides the reliability you need to keep your business operations up and running. It can handle your workload today, and in the future as your business grows. With SQL Server 2000, you have both the flexibility to take maximum advantage of your existing hardware investment and the agility to quickly adapt to your ever-changing business environment.

ADO is the data interface to emerge from the badger works at Microsoft. This object interface to OLE DB was introduced for us with Microsoft Internet Information (HS) and has been upgraded twice since then. The ActiveX Data Control is a direct replacement for both the RDO - Remote Data Control and the DAO - Data Control. It is designed to work with ADO instead of DAO or RDO.

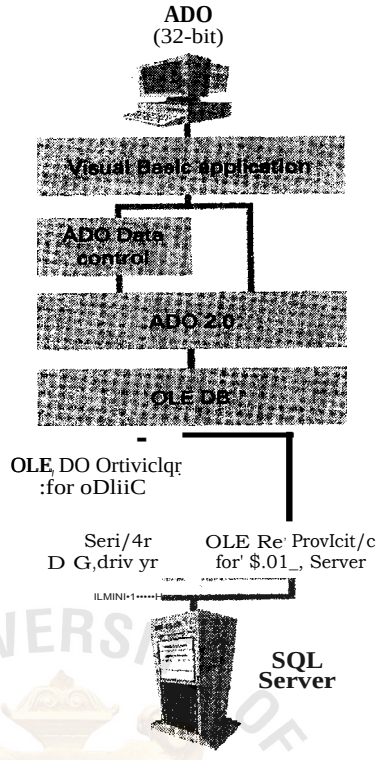


Figure 3.10. ADO Interface to Access SQL Server from Visual Basic.

ADO is designed to enable the client application or component to access and manipulate in database sever and other data stores through and OLE DB provider. Because there is an OLE DB provider for ODBC, ADO is also capable of accessing and ODBC data source, including those data sources designed fro SQL Server. The writer chooses ADO is the data interface method between clients and sever in the system some reasons.

3.4 Cost/Benefit Analysis

3.3.1 Cost Analysis

To invest in the new computer system, the cost of new system will include the cost of system development, hardware, software, operating cost, and related expensed. Therefore, the entrepreneur must estimate all related cost before he makes decision with comparison and break-even analysis.

(1) Hardware Cost

Table 3.1 The Hardware Specification, Baht.

Hardware	Specifications	Quantity	Total Amount
Case	Case ATX Model	8	12,000
Mother Board	Asustek P3V4X VIA Chipset	8	24,000
CPU	Pentium II 550 MHz	1	8,200
	Intel Celeron 433 MHz	7	5,400
Memory	Kingston SDRAM 133/128 MB	2	3,400
	Kingston SDRAM 133/64 MB	7	5,600
Harddisk	Seagate 20 GB 7200 rpm	9	29,250
Floppy Drive	1.44 MB	8	3,200
CD-RW Drive	HP CD Writer Internal	1	10,200
Mouse	Standard Mouse	8	1,200
Keyboard	Standard Keyboard	8	1,280
Display Card	S3 Savage4 RAM 32 MB AGP 2x	8	9,600
Monitor	CTX Monitor 14"	8	32,000
Sound Card	Yamaha Xwave 320	8	4,800
Ethernet Card	SMC T1255X	8	3,200
LAN Cable Wire	Amp LAN Cable 200 meters (box)	1	3,500
UPS	Leonics 550 VA	5	15,000
RJ-45 Connector	Amp RJ-45 Connector	18	324
Printer	HP Printer Model 1000	4	48,000
		Total	220,154

(2) Software Cost

Table 3.2 The Software Specification, Baht.

Hardware	Specifications	Quantity	Total Amount
Operating System	Microsoft Windows NT 5.0	1	12,000
	Microsoft Windows 98	7	28,000
Application Software	Microsoft Office 97	8	56,000
Virus Protection Software	Norton Antivirus Corporate Version	1	25,000
		Total	121,000

(3) Cost of Existing System

Table 3.3 The Existing System Cost Analysis, Baht.

Cost Items	Year				
	1	2	3	4	5
Fixed Cost					
Computers hardware and peripherals (As per described above)	220,154	-	-	-	-
Maintenance	121,000	-	-	20,000	20,000
Computers software (As per described above)					
Total Fixed Cost	341,154	-	-	20,000	20,000
Operating Cost					
Staff					
New York: 2 persons, 20,000/person	40,000	40,000	40,000	40,000	40,000
Thailand: 5 persons as 12,000/person	60,000	62,500	65,000	67,500	70,000
Total Annual Salary Cost	100,000	102,500	105,000	107,500	110,000
Office Suppliers & Miscellaneous Cost:					
Stationary Per Annual	208,100	209,500	218,000	222,000	214,000
Paper Per Annual	60,000	72,500	73,250	75,500	81,000
Miscellaneous Per Annual	20,000	22,500	23,250	24,000	24,550
Total Annual Office Suppliers & Miscellaneous Cost	288,100	304,500	314,500	321,500	319,500
Total Annual Operating Cost	100,000	102,500	105,000	107,500	110,000
Total Existing System Cost	729,254	407,000	419,500	449,000	449,500

Table 3.4 Five Years Accumulated Existing System Cost, Baht.

Year	Total Existing System Cost	Accumulated Cost
1	729,254	729,254
2	407,000	1,136,254
3	419,500	1,555,754
4	449,000	2,004,754
5	449,500	2,454,254
Total	2,454,254	-

Table 3.5 Cost of Proposed System

Cost Items	Year				
	1	2	3	4	5
Fixed Cost:					
Total Hardware Cost	78,500	-	-	-	-
Total Maintenance Cost	20,000	20,000	20,000	20,000	20,000
Total Software Cost	104,000	-	-	-	-
Total Internet Cost	3,000	3,000	3,000	3,000	3,000
Total Fixed Cost	205,500	23,000	23,000	23,000	23,000

Table 3.6 The Proposed System Cost Analysis, Baht.

Cost Items	Year				
	1	2	3	4	5
Fixed Cost					
Computers hardware and peripherals (As per described above)	78,500	-	-	-	-
Maintenance	20,000	20,000	20,000	20,000	20,000
Internet	3,000	3,000	3,000	3,000	3,000
Computers software (As per described above)	104,000	-	-	-	-
Total Fixed Cost	205,500	23,000	23,000	23,000	23,000
Operating Cost					
Staff					
New York: 2 persons, 25,000/person	50,000	50,000	50,000	50,000	50,000
Thailand: 5 persons as 15,000/person	75,000	75,000	77,500	77,500	82,500
Total Annual Salary Cost	125,000	125,000	127,500	127,500	132,500
Office Suppliers & Miscellaneous Cost:					
Stationary Per Annual	215,000	200,000	188,000	185,000	178,000
Paper Per Annual	40,000	39,500	38,250	38,000	38,000
Miscellaneous Per Annual	20,000	20,000	20,000	20,000	20,000
Total Annual Office Suppliers & Miscellaneous Cost	275,000	259,000	246,250	243,000	236,000
Total Annual Operating Cost	125,000	125,000	127,500	127,500	132,500
Total Proposed System Cost	605,500	407,000	396,750	393,500	391,500

Table 3.7 Five Years Accumulated Proposed System Cost, Baht.

Year	Total Existing System Cost	Accumulated Cost
1	605,500	605,500
2	407,000	1,012,500
3	396,750	1,409,250
4	393,500	1,802,750
5	391,500	2,194,250
Total	2,194,250	-

Table 3.8 Comparison of the System Costs, Baht.

Year	Accumulated Existing System Cost	Accumulated Proposed System Cost
1	729,254	605,500
2	1,136,254	1,012,500
3	1,555,754	1,409,250
4	2,004,754	1,802,750
5	2,454,254	2,194,250

3.3.3 Benefit Analysis

(1) Tangible benefits

Cost reduction is the main benefit of the proposed system and the resources utilization will be more efficient. In Table 3.8 you can see the comparison of system cost between Existing System and Proposed System in 5 years that accumulated proposed system cost of Proposed System is less than Existing System and the comparison was present in graph of Figure 3.11. Although the proposed system will have more expense for hiring staffs cost more than the existing system, it has

reduced stationary and paper usage that have effect on annual cost reducing. The reason is the concept of PMS 2004 where most task processes will operate based on computer system that data will be transferred via connection cables and network communication system.

(2) Intangible benefits

(a) The manipulated information is more accurate.

(b) The format of output is more formal than that of the existing system.

(c) It is easier and quicker to search for required information.

(d) It is easier and quicker to produce the products.

(e) It is easier and quicker to review the inventory status.

(f) It is easier and quicker to arrange and search products in the warehouse.

(g) It can reduce the operational errors and waste time in production operation.

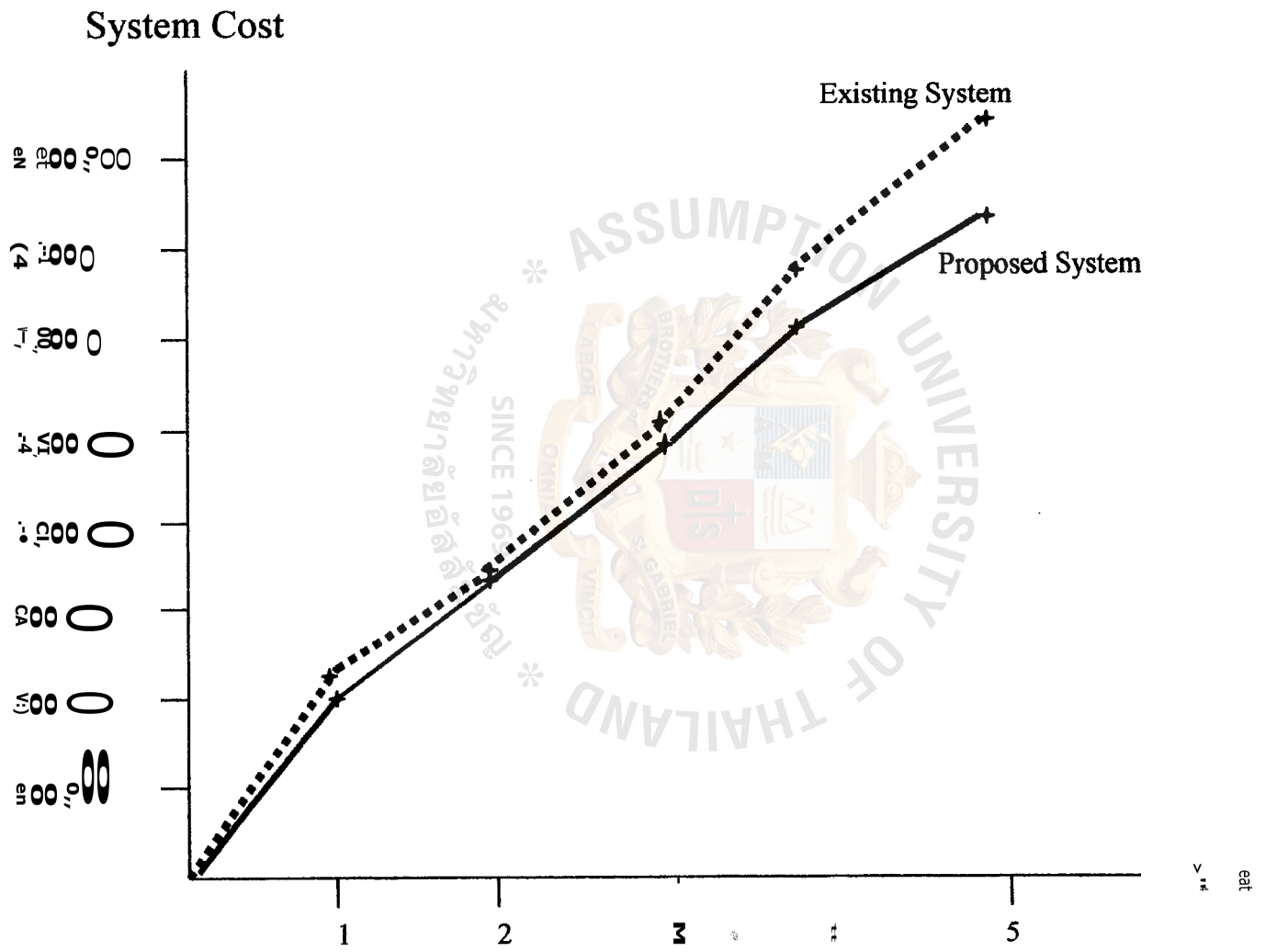


Figure 3.11. Comparison of the System Costs.

TV. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Production Management System 2004 can be a part of business strategic planning and assist the management level in the steps of decisions. The most work processes in PMS 2004 is designed and implemented on a through understanding of both business and the company in which it operates. When the business grows and engages in different activities, PMS 2004 is a tool of the business strategies to achieve the company's goals in better decision making with information, technology, systematic working.

The existing system could assist the entrepreneur in some operation processes as well but for the processes of planning and analysis, it could not. Because of this reason, PMS 2004 is developed and become the concept of production management system development. PMS 2004 is developed to solve some functions that are not in the existing system. The writer intends to develop the system better then the existing system in the function of analysis, inventory management, location planning, and location design.

The existing system has utilized resources a lot such as paper, stationary, and time. But the proposed system has operation based on data transfer between each module of system. The users can review and monitor data, work processes, and errors from the system. The proposed system uses barcode readers to help in the step of data entry, its benefits are the users do not need to fill data by themselves and avoid error of filled data. From the section of cost/benefit analysis in this master project, you can see trend of annual cost decreasing.

5.2 Recommendations

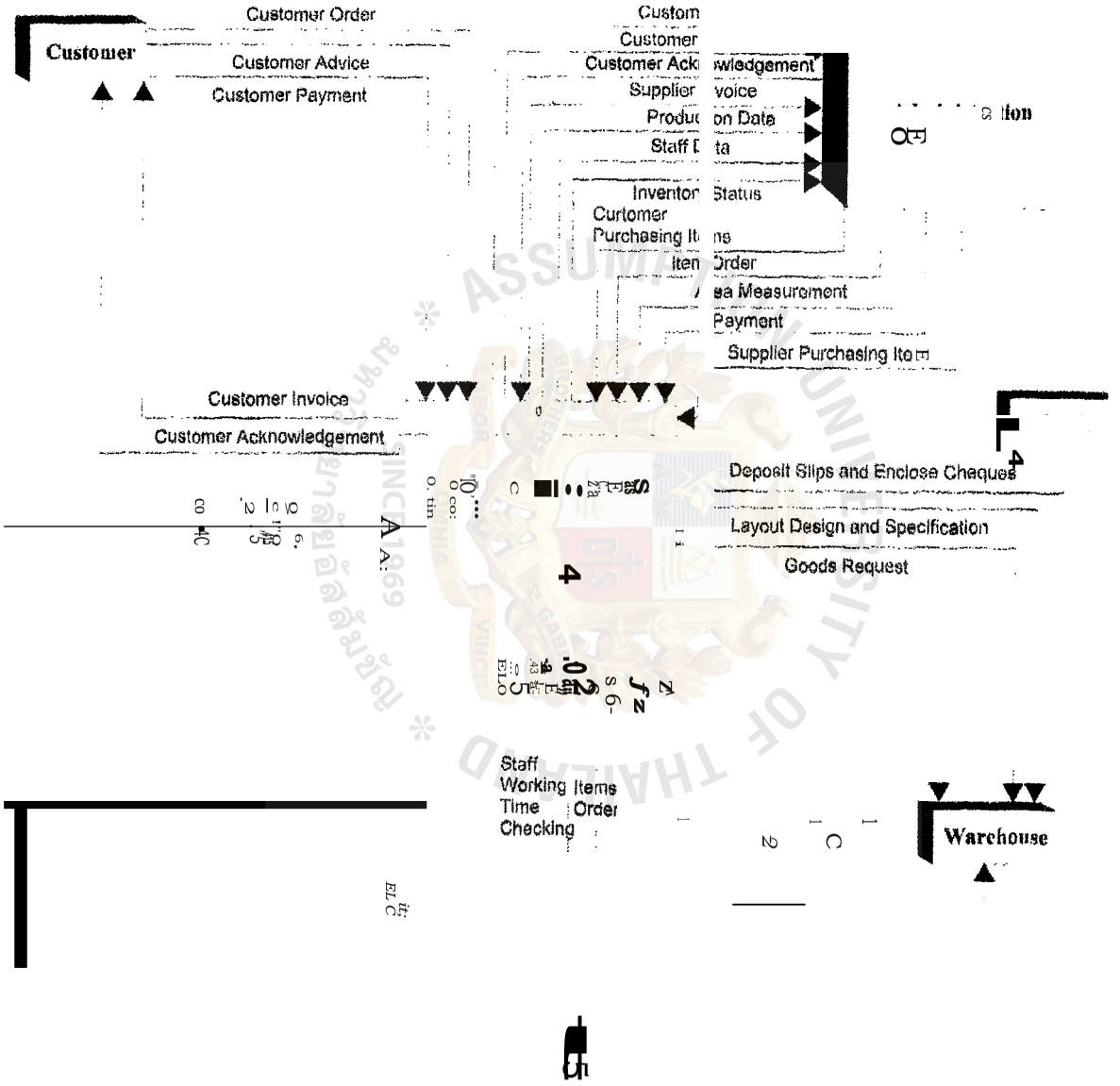
The most important problem of any new computer system that will be used in the company is users unfamiliarity and resistance. When they feel something is new and unfamiliar, they think it will increase their responsibilities. Therefore, the management level should explain to them and make them understand the objectives of the new system.

About function of forecasting, it computes results with Simple Moving Average method. This method uses a simple formula to calculate but in fact, it has others that can be used to calculate. You can adjust or change formulas depending on the complicated data source.

In ABC Analysis method, the writer divides range of data in three groups as A equals 70%, B equals 20%, and C equal 10%. The readers can change arrangement that change to A equals 75%, B equals 15%, and C equal 10%.

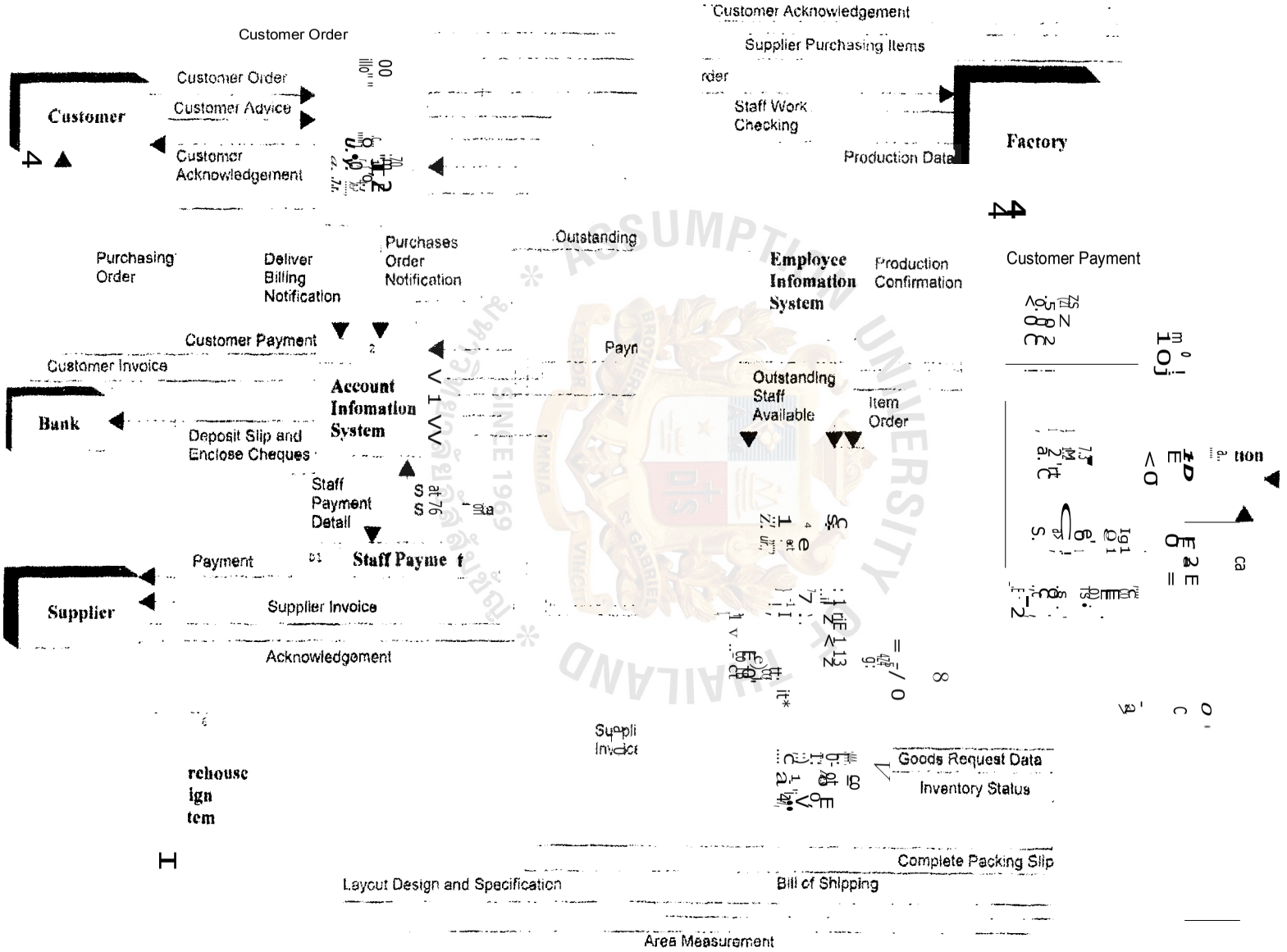
APPENDIX A

DATA FLOW DIAGRAM - DFD

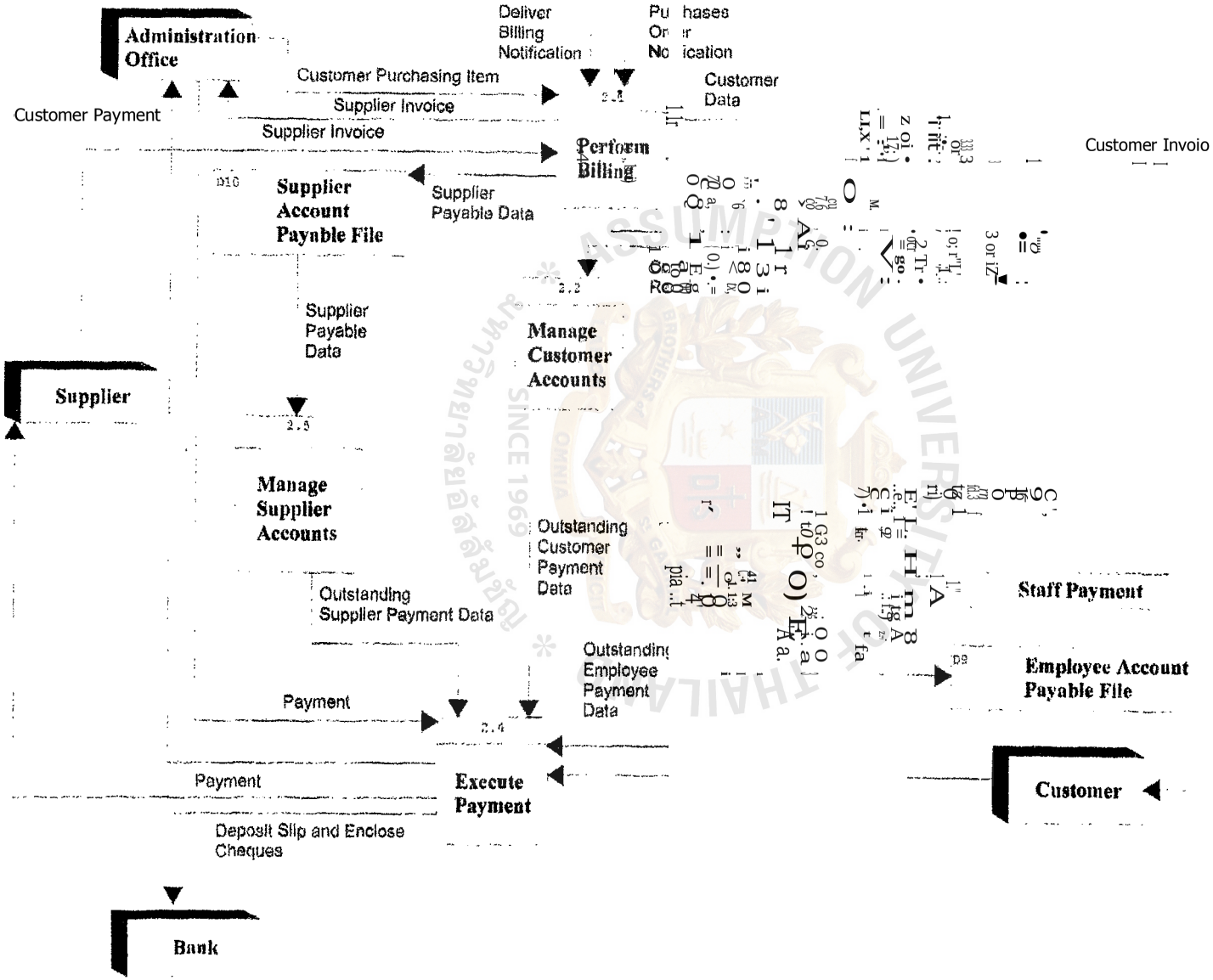


Context Level of Production Management System 2004.

Figure A.2. Level 0 of Production Management System 2004.



Level 1 of Order Processing System of Production Management System 2004.


Administration Office
Customer Payment
Customer Purchasing Item
Supplier Invoice
Supplier Invoice
Deliver Billing Notification
Customer Data
Perform Billing
Supplier Account Payable File
Supplier Payable Data
Supplier Payable Data
Manage Customer Accounts
Supplier
Manage Supplier Accounts
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Staff Payment
Employee Account Payable File
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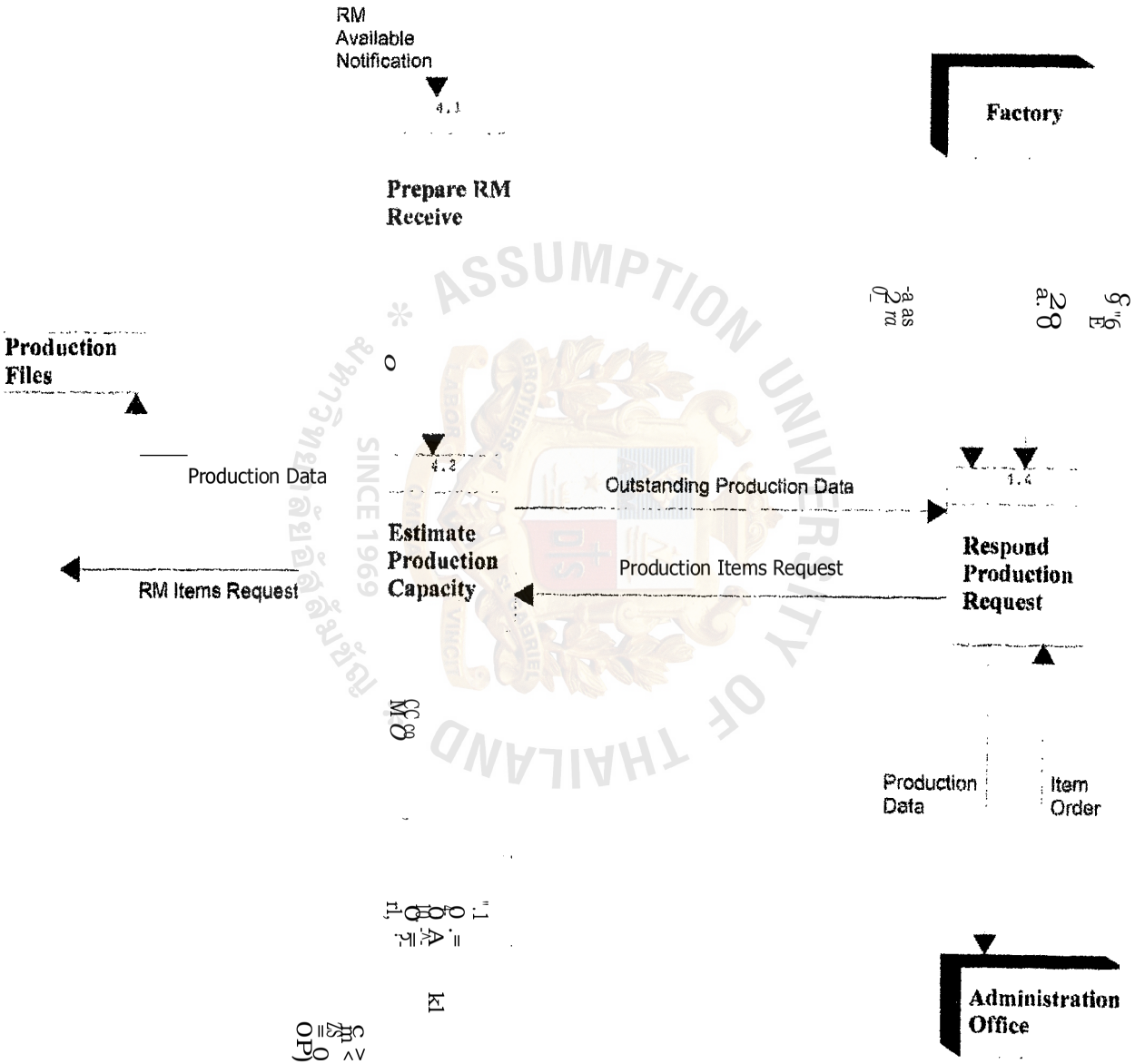
Execute Payment
Payment
Customer
Deposit Slip and Enclose Cheques
Bank



Production Management System 2004.

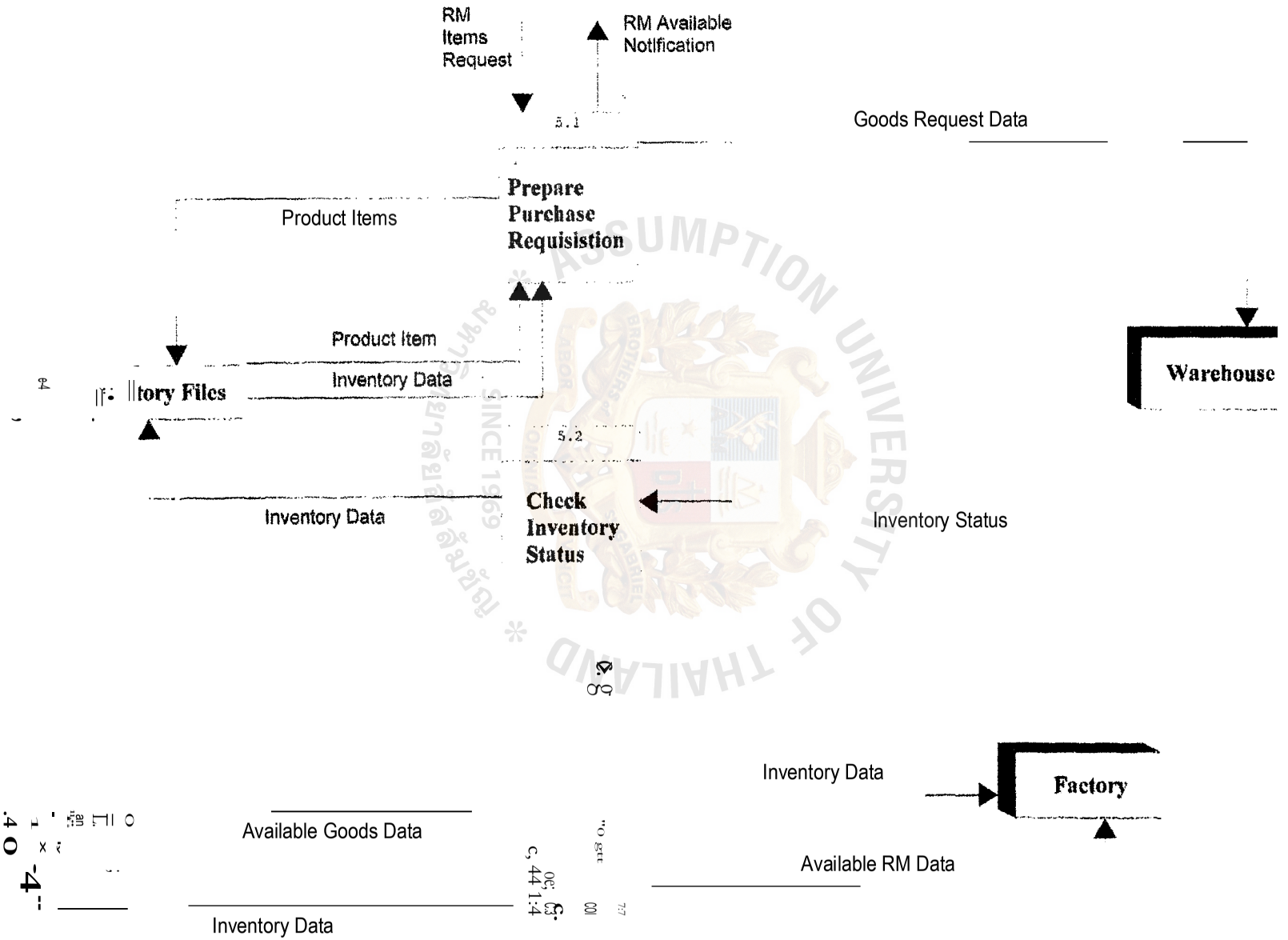


Figure A.6. Level 1 of Inventory Processing System of Production Management System 2004.

APPENDIX B

GRAPHIC USER INTERFACE DESIGN

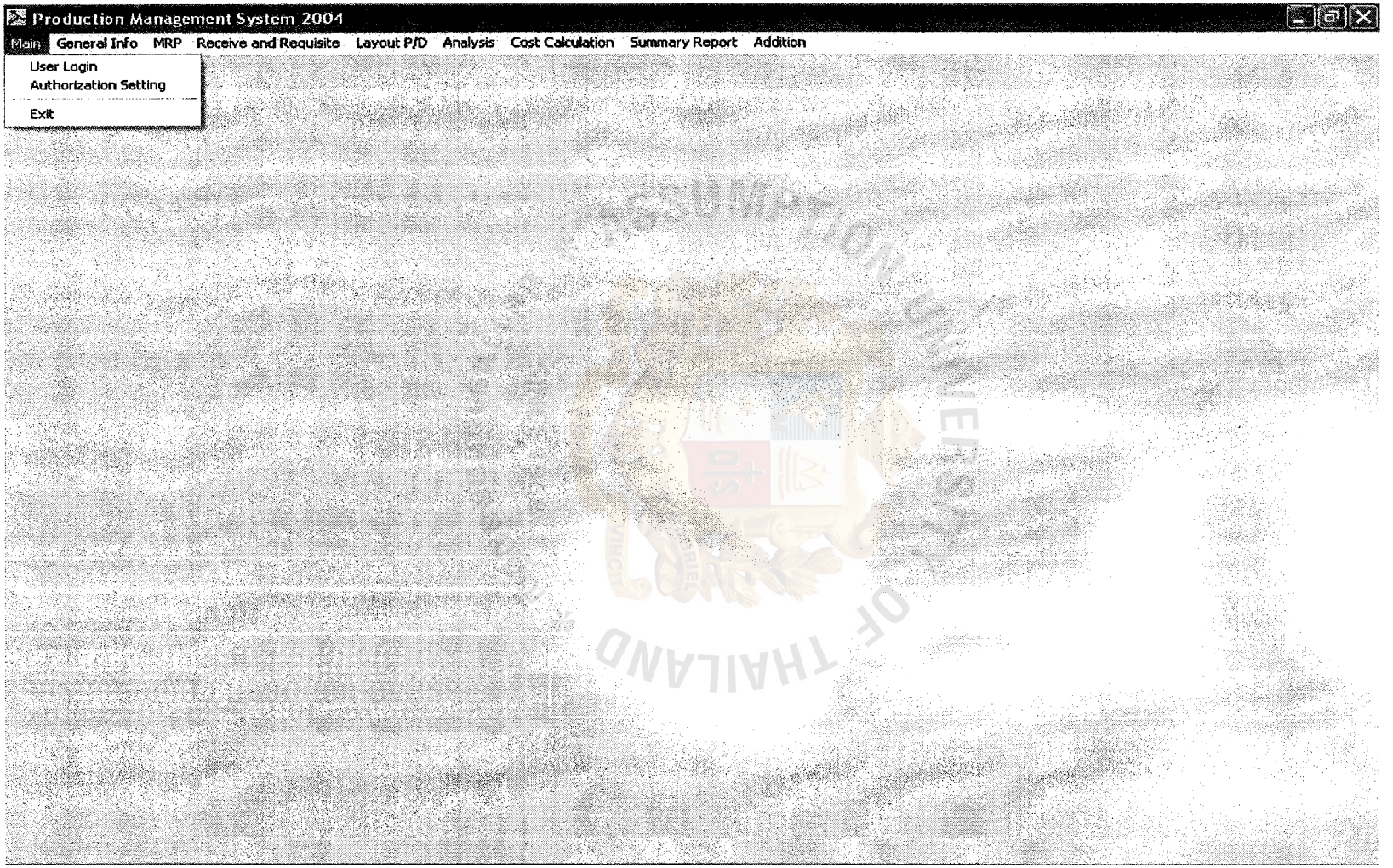
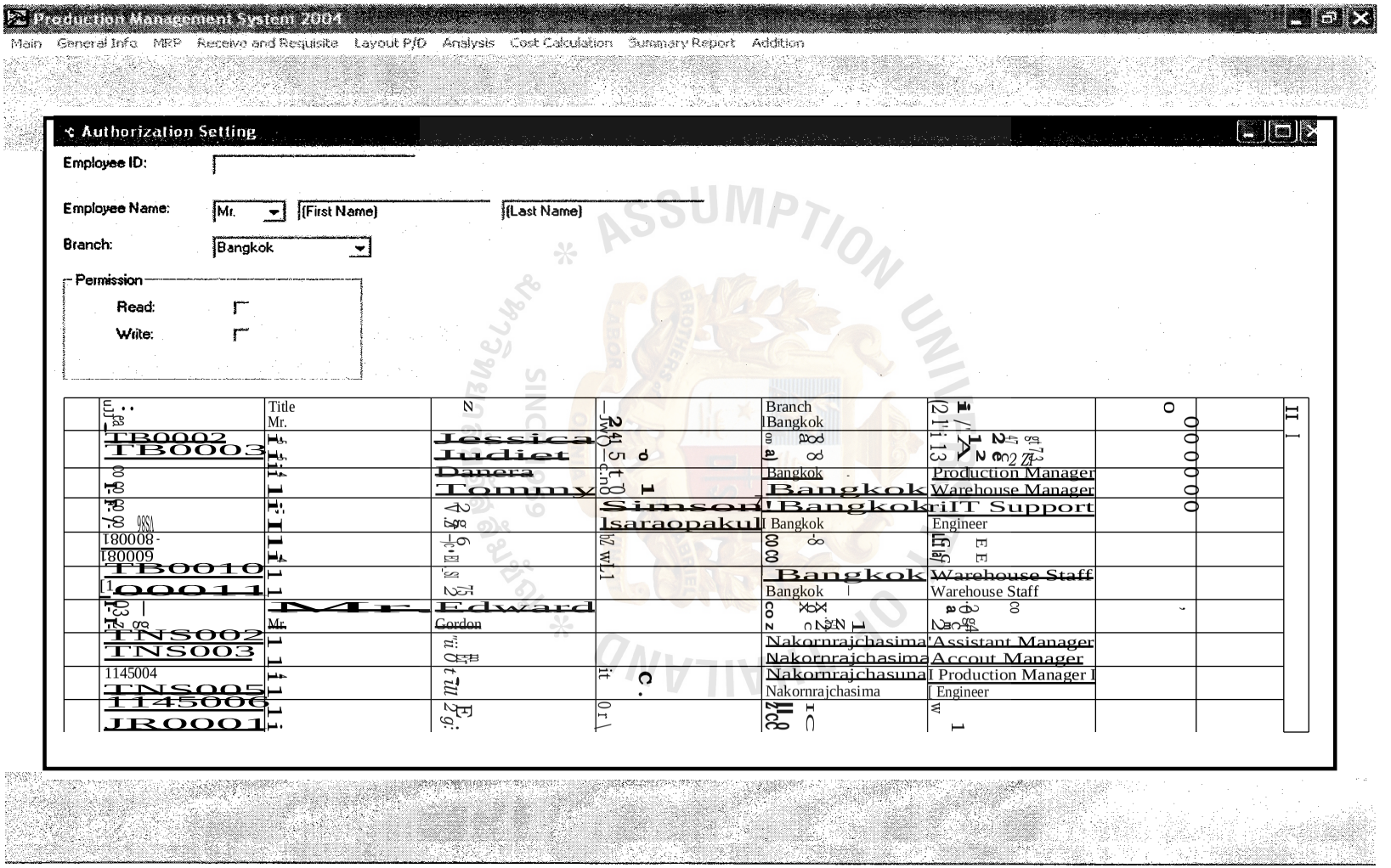
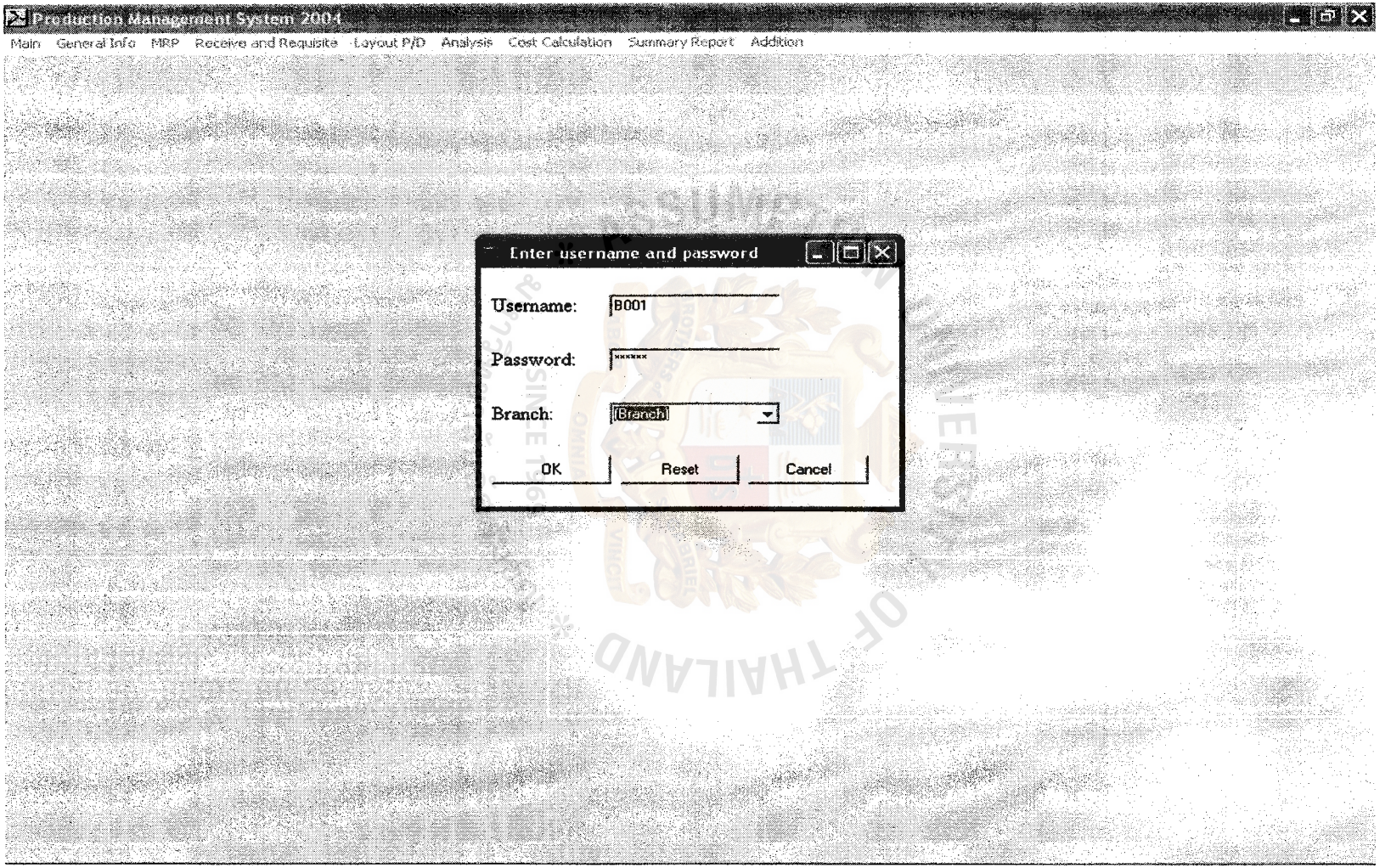


Figure B.1. Menu Editor: Main.



Authorization Setting Screen.



User Authorization Checking Screen.

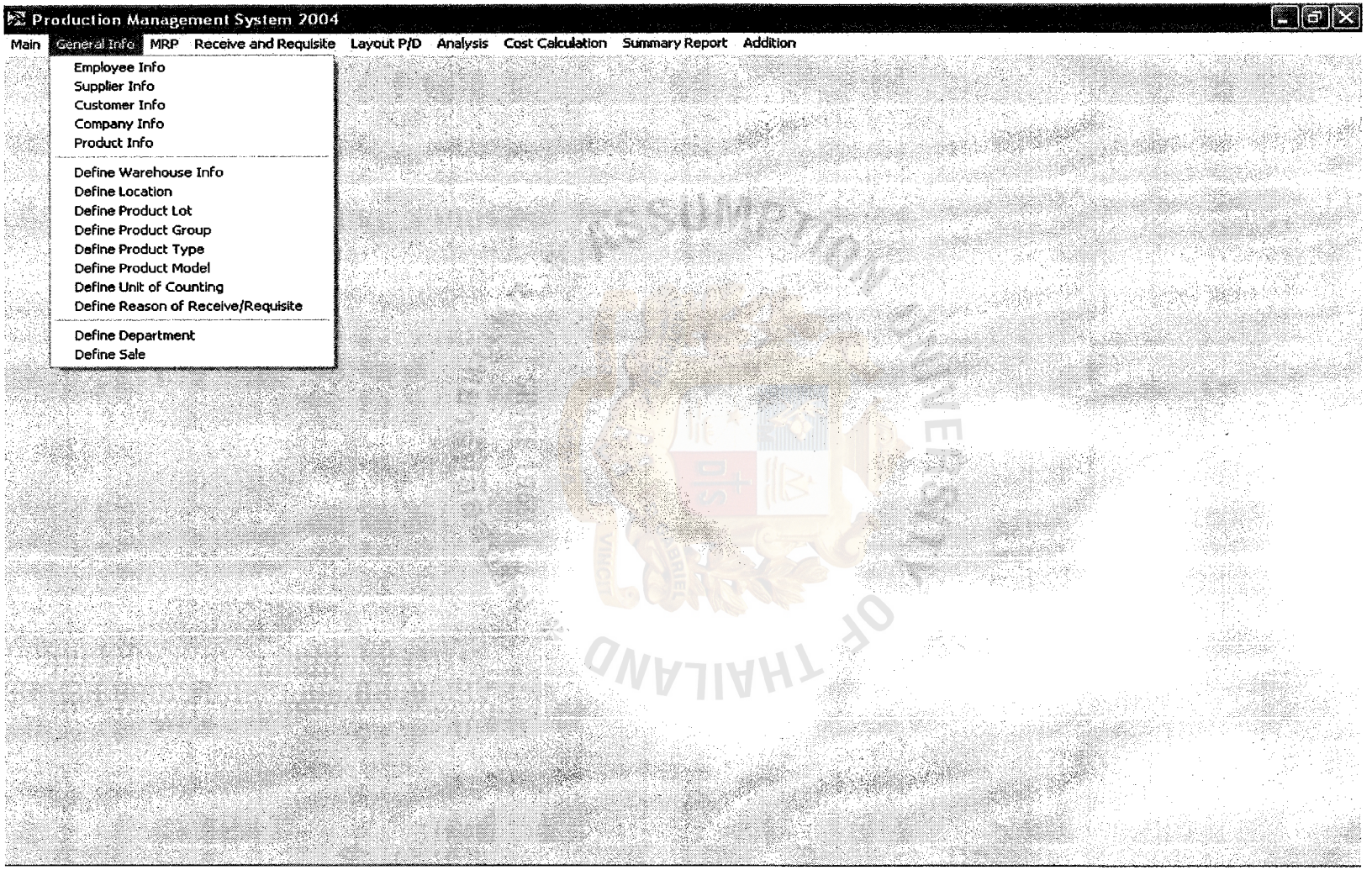


Figure B.4. Menu Editor: General Info.

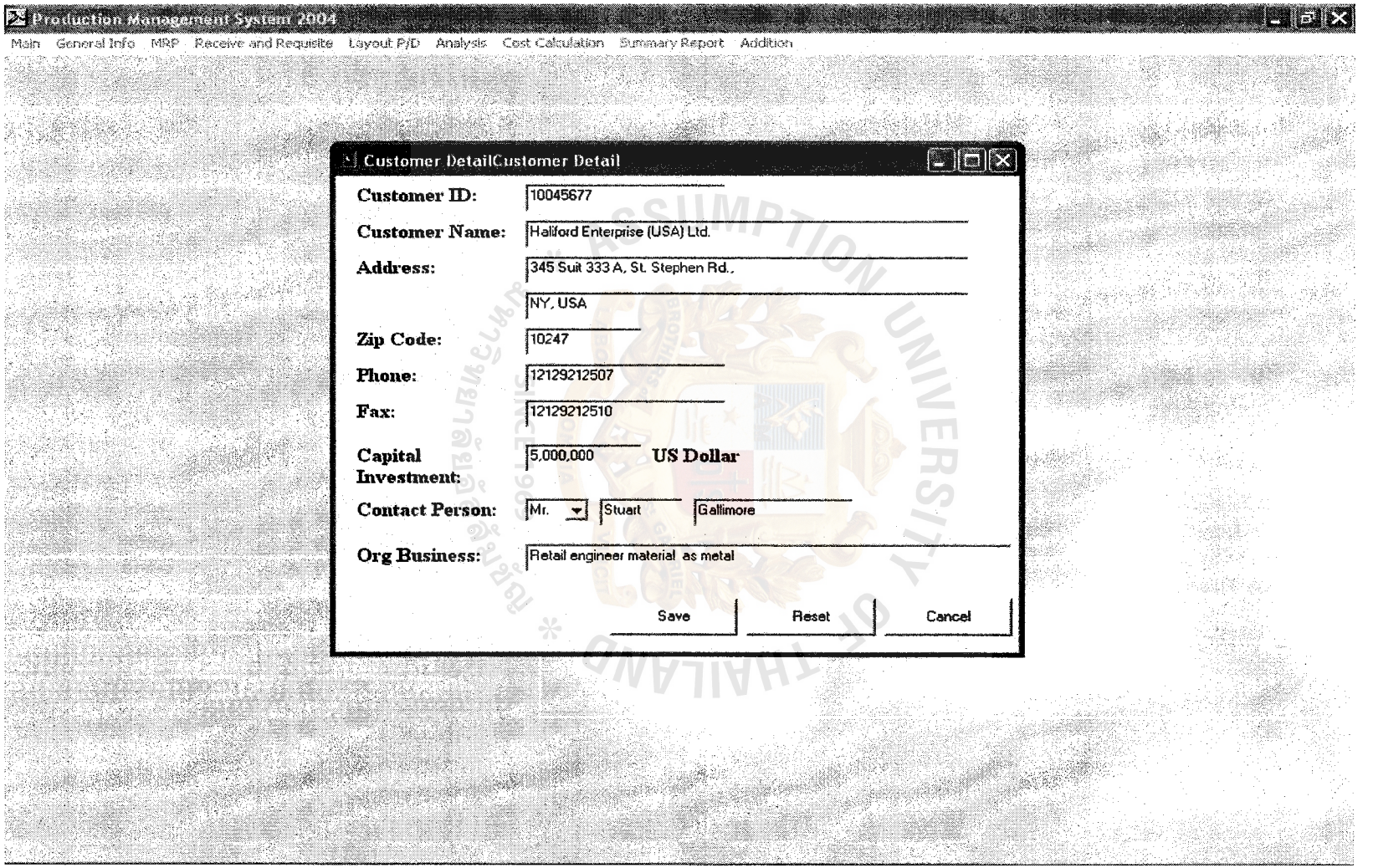
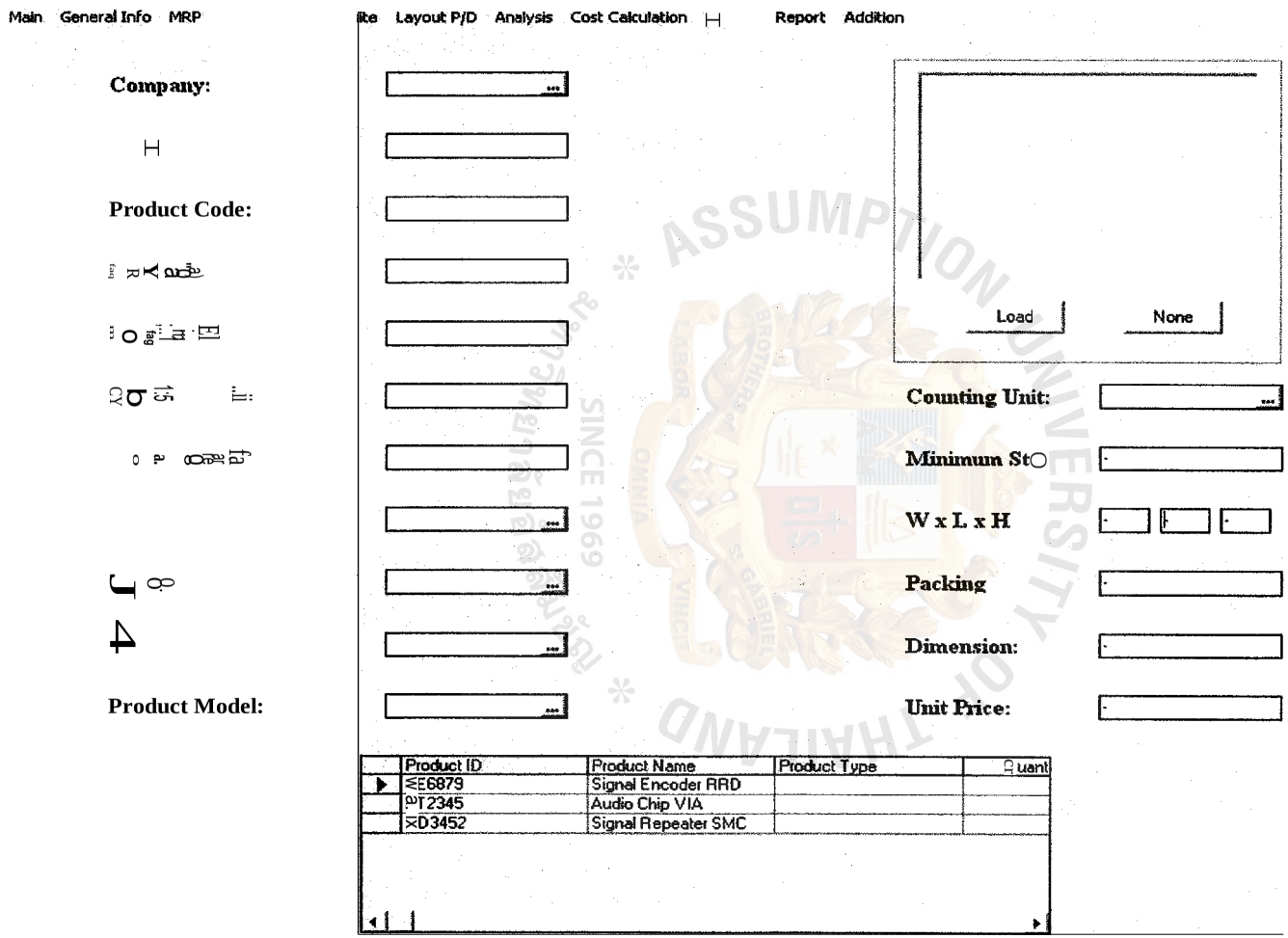


Figure B.5. Fill Customer Detail Screen.



Fill Product Detail Screen.

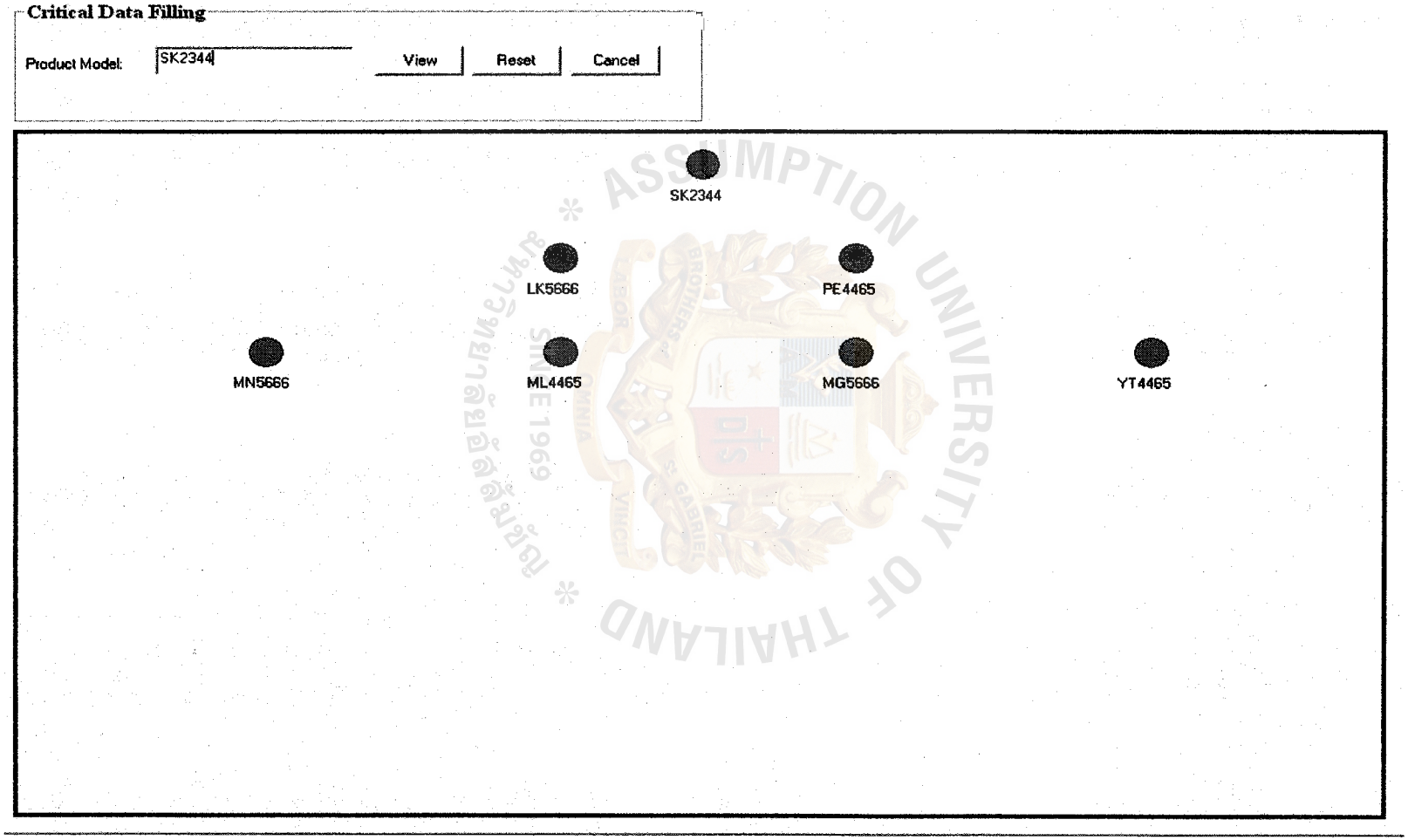


Figure B.7. Master Requirement Planning.

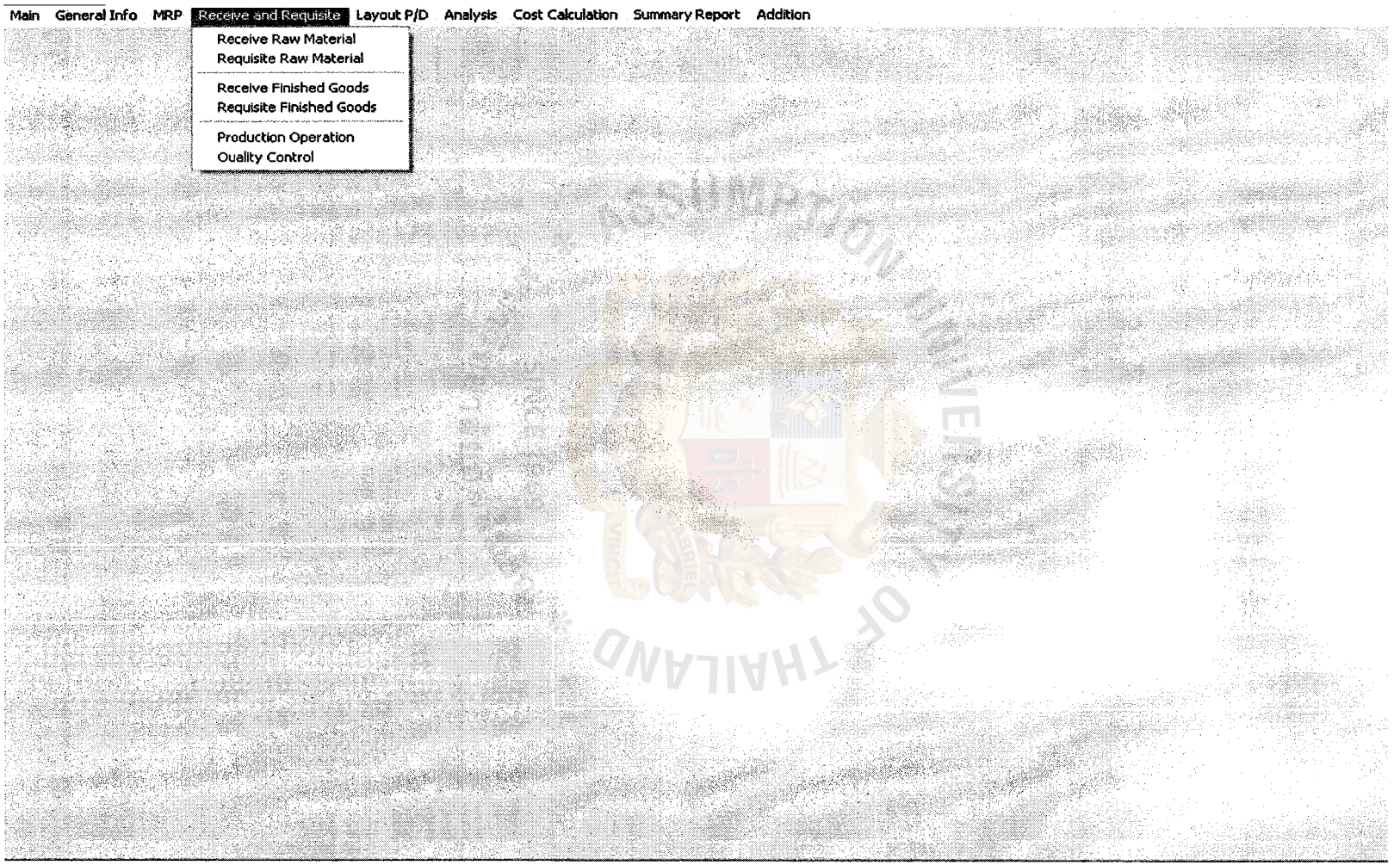


Figure B.8. Menu Editor: Receive and Withdraw.

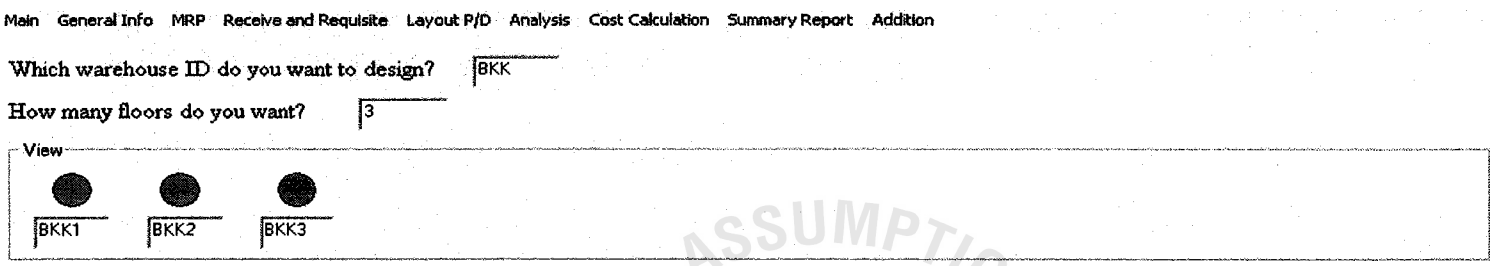


Figure B.9. Layout Planning and Design.

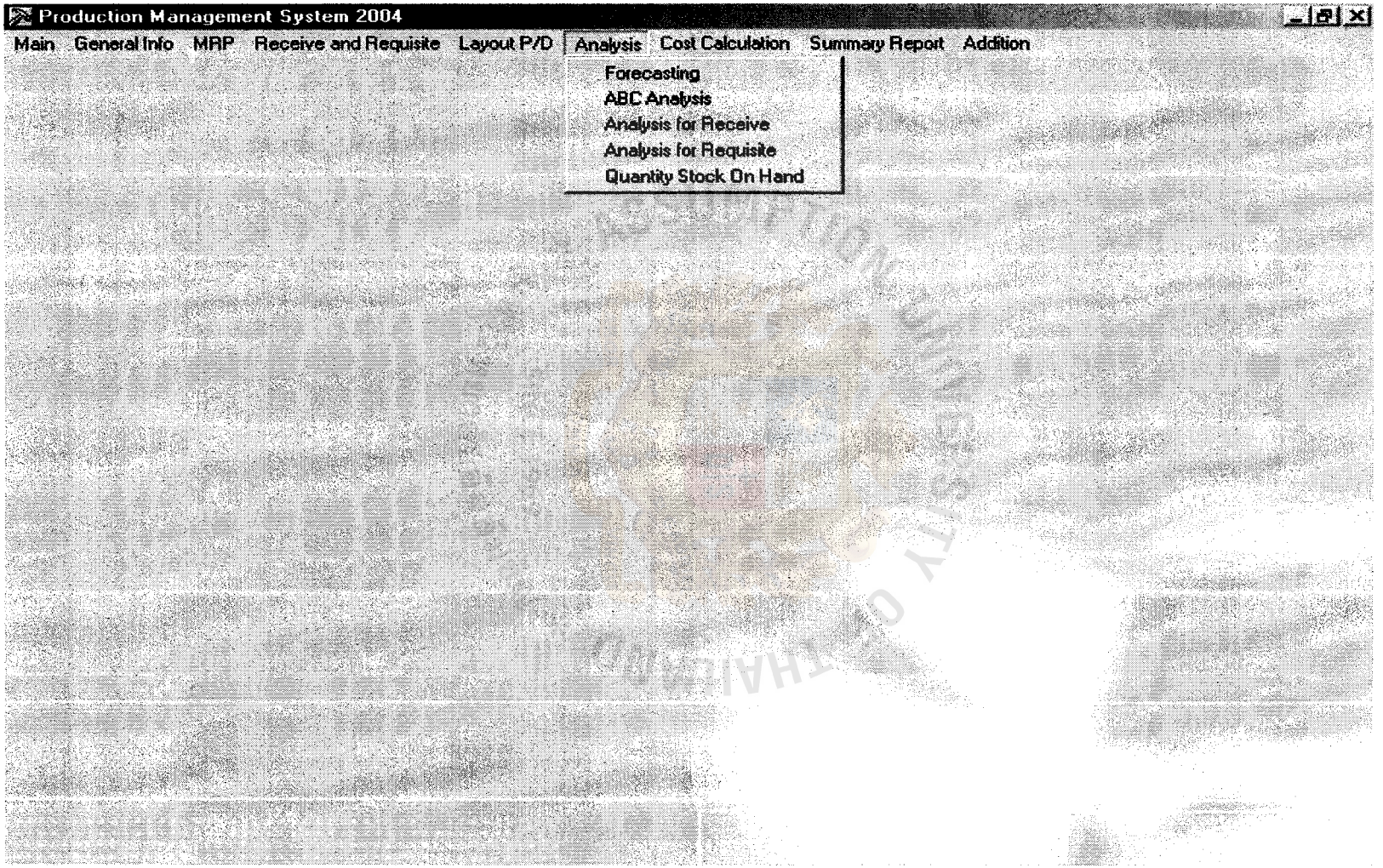


Figure B.10. Menu Editor: Analysis.

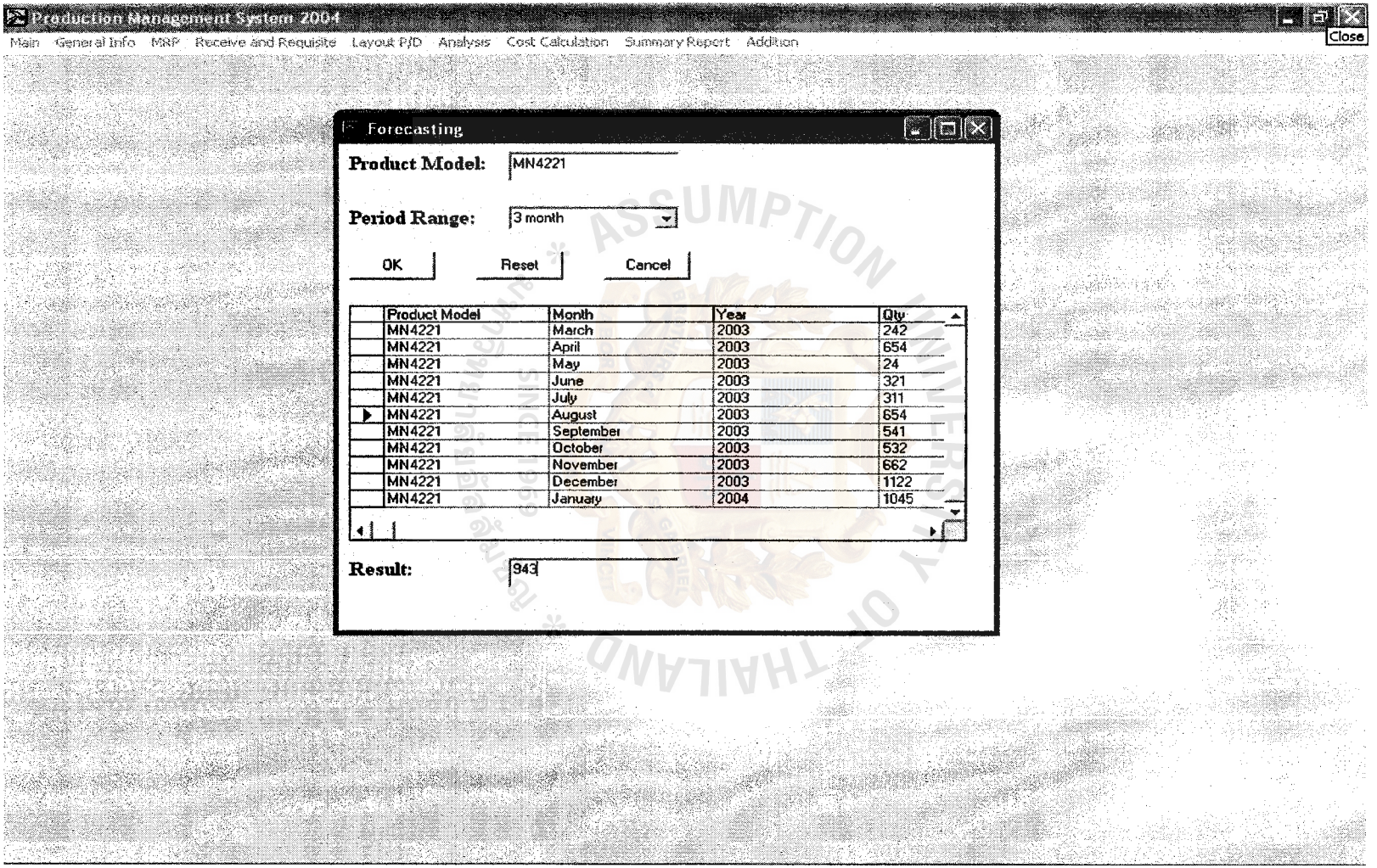
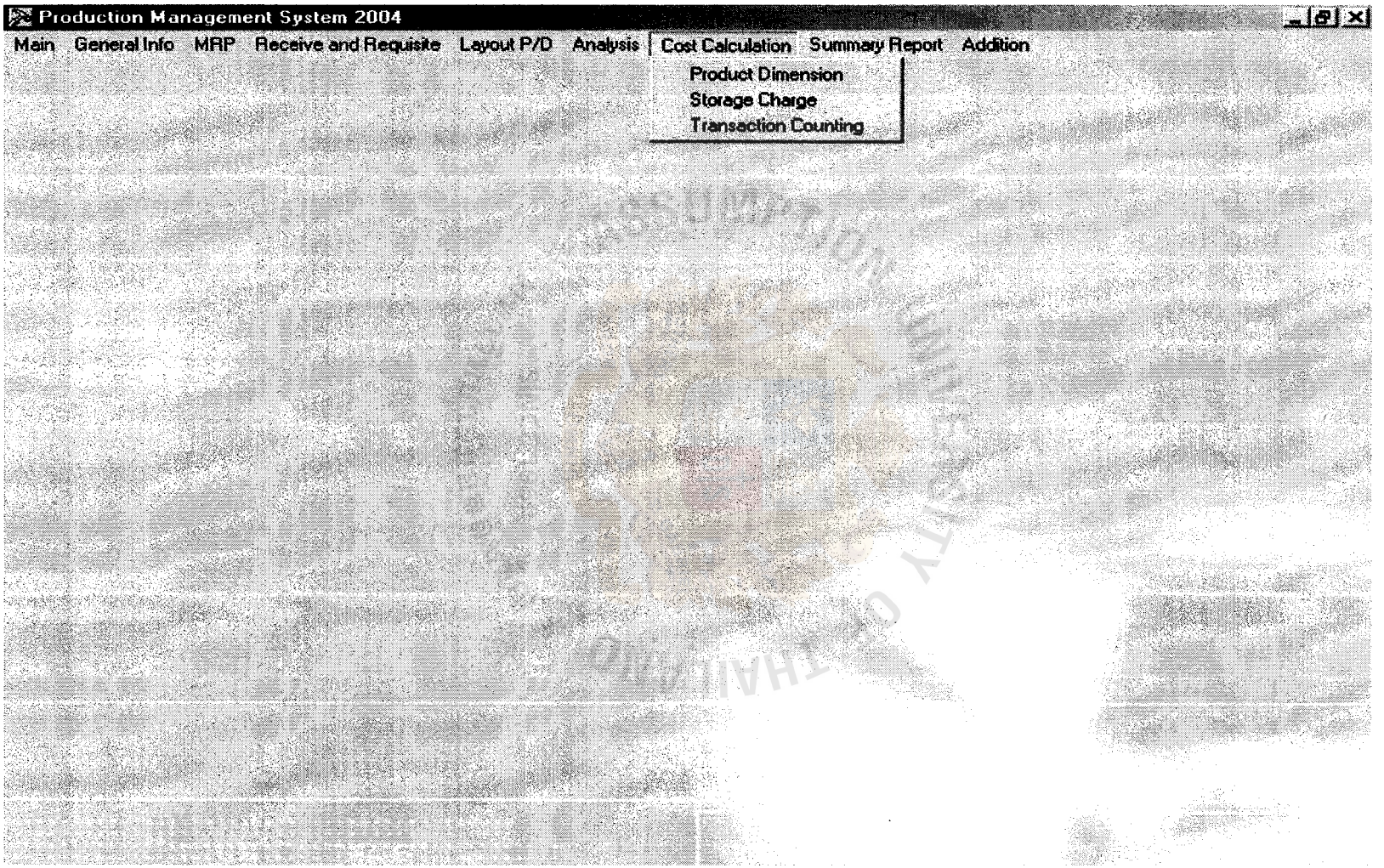


Figure B.11. Forecasting.



Menu Editor: Cost Calculation.

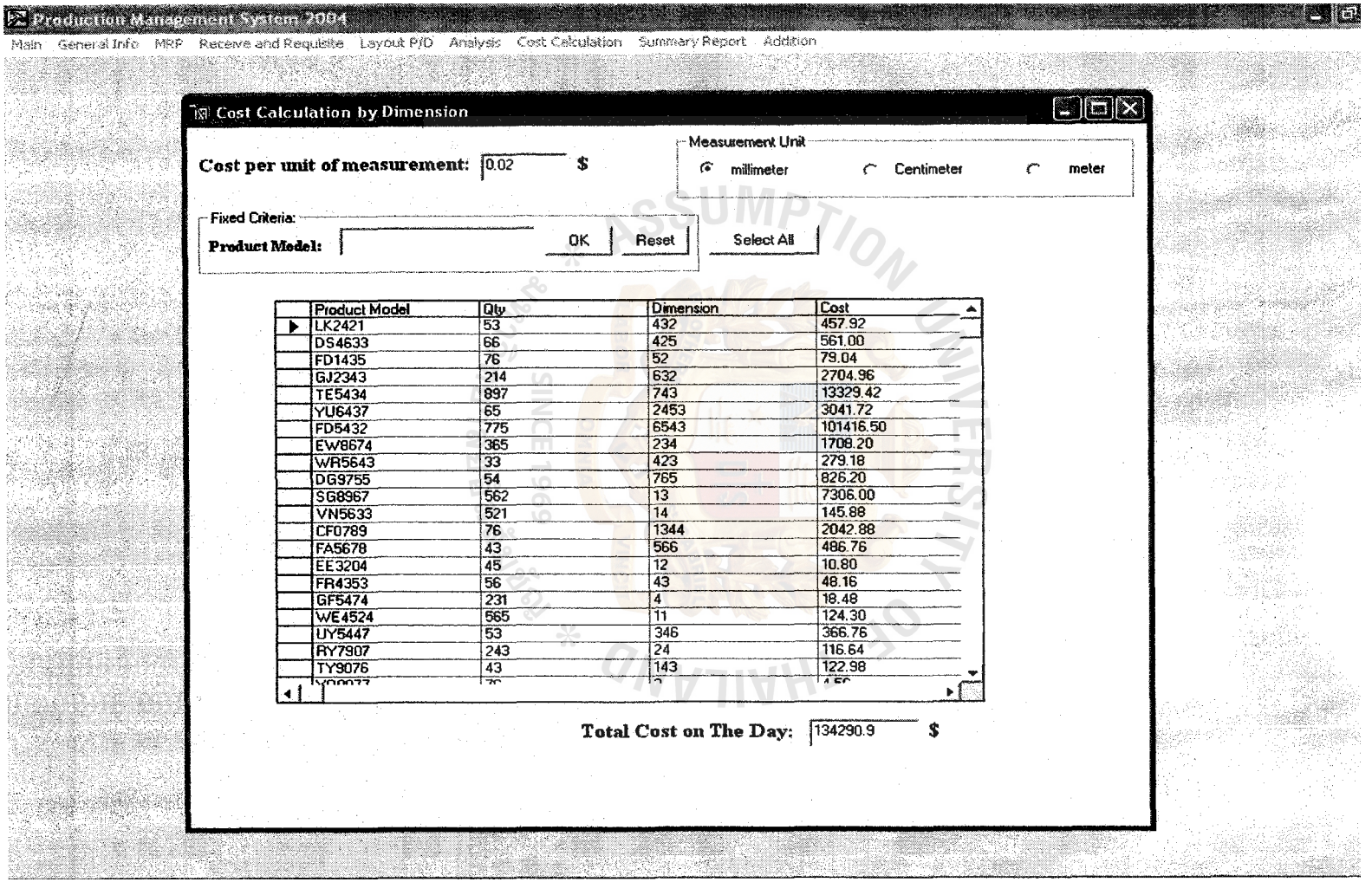
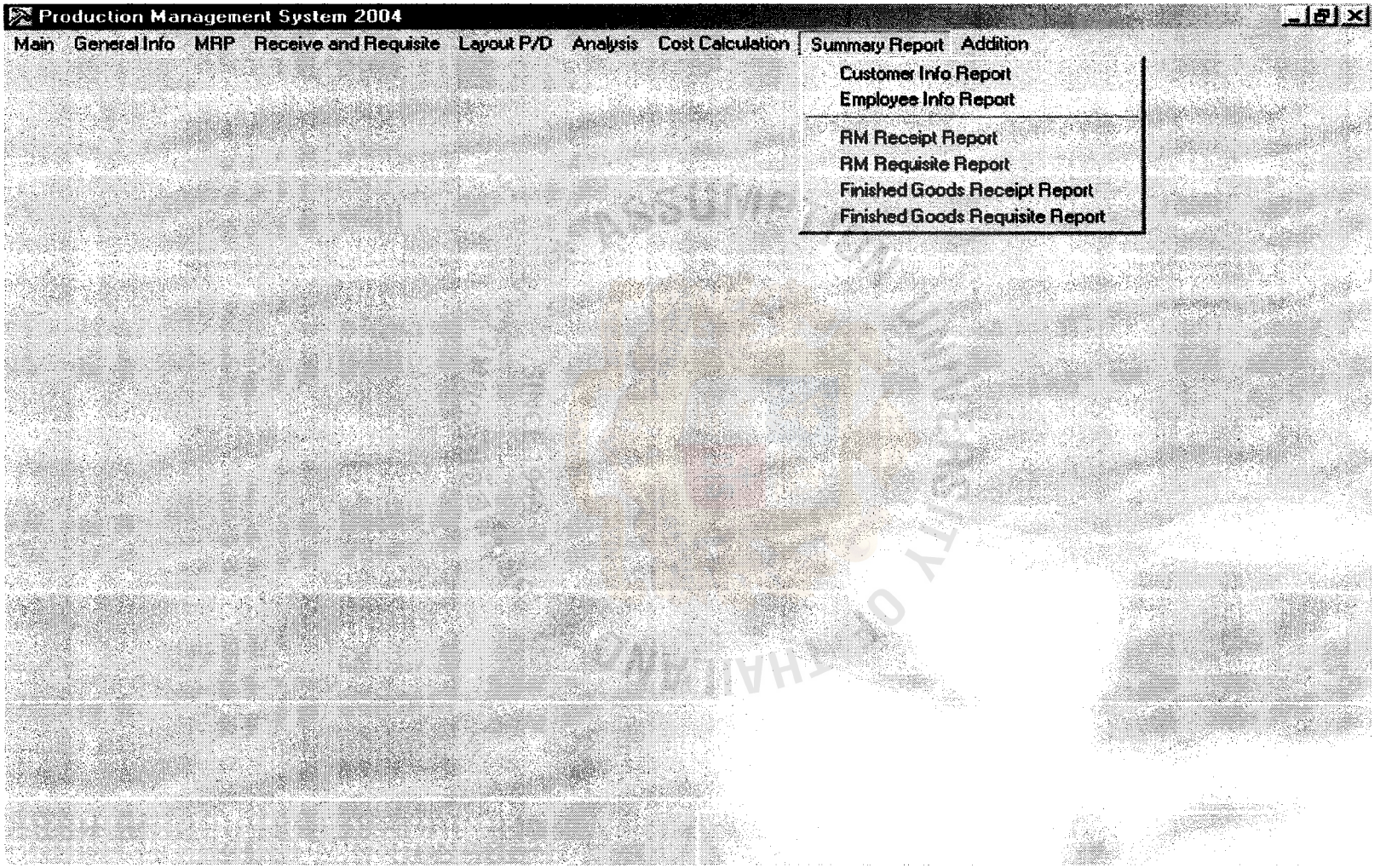


Figure B.13. Cost Calculation by Product Dimension.

Production Management System 2004
Main
General Info
MRP
Receive and Requisite
Layout P/D
Analysis
Cost Calculation
Summary Report
Addition
Customer Info Report
Employee Info Report
RM Receipt Report
RM Requisite Report
Finished Goods Receipt Report
Finished Goods Requisite Report



ABC Analysis.

APPENDIX C

Report Design

PAN CONTINENTAL LTD.

FACTORY ORDER

TO: _____ Ei0 140.

TYPE *see* FERD NO.

GOLD TYPE _____ 11411/PC _____ G 17E11 - _____

STAMP _____ DATE _____

OELDERY DATE

rraa t &sopa.	OESCR71110N STONE PCS ! SHAPE z	• TOTAL ACT. P. tn. CTS.	REMARK

Nolto

RECEIVED BY APPROVED BY _____

PREPARED BY _____

Iltorsatay„ February 26, 2801 *PAW ef*

Figure C.1 Factory Order of Production Management System 2004

PAN CONTINENTAL LTD.
13ULDING.+6 MAHESAK ROAD SOI 3, Min 603. BANGRAK. BANGKOK MOO THAILAND.
Tet(662)63564223 FEIK;(662)63564211 Mobial(661)8471049 E-maiL markritwaissehotmad.com

INS:

111111111110;

PLikt:
Ref Inv.No.;
Dab:

BOX NO.: **1 BOX SZE :**

	SUB TOTAL:	**PCS**	GMS
	GRANO TOTAL :	**PCS**	**MSS**

TOTAL BOXES ***#En*** **BOWS**
TOTAL NET SWANN ; **Onis.**
TOTAL GROSS WEIGHT : Ong,
PACKING
OBI :
COUNTRY OF ORKNN : DIA/LAND
NOTE :

Figure C.2 Packing Slip of Production Management System 2004

PAN CONTINENTAL LTD.

J.K BUILDING,4-6 MANESAK ROAD 301 3, SUITE 603, BANGRAK, BANGKOK Iowa THAILAND.
Tat(682$356422-3 Fax:(56)6356428 Mobile:(661)134741343 matknhaissielannalLcom

CERTIFICATE OF GUARANTEE

Wit

Rd. **U00005**

Model **VENUSI 0**

Downiption :
Diamond

Odor Stone :

THIS IS TO CERTIFY THAT THE MERCHANDISE YOU PURCHASED HAS BEEN MANUFACTURED BY SKILLED atArrmei, FULLY PASSED HIGH QUALITY CONTROL AND SUCCESSFULLY COMPLETED 114T BY OUR GRADUATED GEMOLOGIST (GEMOLOGICAL INSITTUTE OF AMERICA)

WE HEREBY GUARANTEE IS TTS AUTHENTICITY AS THE DESCRIPTION ABOVE

SOW BY _____SIGNATURE _____
(MANAGER)

REMARK _____

Figure C.3 Certificate of Guarantee of Production Management System 2004

APPENDIX D

TABLE REFERENCE

Properties

Table name:	LoginRec
Table type:	Entity
Database location:	PMS.mdb
Table description:	Login file

Table D.1. Login Record Table.

Field Name	Field Type	Field Property	Description
Login ID	Number	Long Integer	
Username	Text	8 characters	The unique word for represent each one when want to log in.
Password	Text	10 characters	The unique word for confirms the person who is logging in he or she is right person.
LogDate	Date/Time	Short date	Date when logged in.
LogTime	Date/Time	Short time	Time when logged in.

Properties

Table name: UserRecord

Table type: Entity

Database location: PMS.mdb

Table description: User name and password file

Table D.2. User Record Table.

Field Name	Field Type	Field Property	Description
Usemame	Text	8 characters	The unique word for represent each one when want to log in.
Password	Text	10 characters	The unique word for confirms the person who is logging in he or she is right person.
EmpiD	Text	10 characters	The unique code for each employee.
Read	Yes/No	Yes/No	The user can do only read data but not able to write or change.
Full	Yes/No	Yes/No	The user has full permission to read, write and change data.

Properties

Table name: Employee

Table type: Entity

Database location: PMS.mdb

Table description: Employee file

Table D.3. Employee Table.

Field Name	Field Type	Field Property	Description
EmpID	Text	10 characters	The unique code for each employee.
Emp_Name	Text	100 characters	Name of employee
Emp Position	Text	50 characters	Position of employee
Emp_addrl	Text	150 characters	Employee's address as home number, road name, soi, and etc.
Emp_addr2	Text	150 characters	Employee's address as district, province, and country.
Zipcode	Number	6 characters	Zip Code of Employee's address
Phone	Text	(00)-0000000	Home Phone of Employee
Mobile	Text	(00)-0000000	Cell Phone of Employee
Email	Text	50 characters	Email account of Employee

Properties

Table name: Product

Table type: Entity

Database location: PMS.mdb

Table description: Employee file

Table D.4. Product Table.

Field Name	Field Type	Field Property	Description
ProductCode	Text	10 characters	The unique code for each product
ProductName	Text	10 characters	Name of product
Barcode	Number	Long Integer	Code that is entered from barcode
SupplierID	Text	10 characters	The unique code for each supplier
QtyOnHand	Number	Long Integer	Qty of product in stock
WarehouselD	Text	10 characters	The unique code for each warehouse
AreaID	Text	10 characters	The unique code for each location
GroupID	Text	10 characters	Group of product type
ProductType	Text	100 characters	Type of product
ProductModel	Text	100 characters	Model of product
CountUnit	Text	20 characters	Unit for counting product
MinStock	Number	Long Integer	Minimum product quantity in stock
Width	Number	Long Integer	Width of product size
Length	Number	Long Integer	Length of product size
Height	Number	Long Integer	Height of product size
Packing	Text	10 characters	Packing property of product
Dimension	Number	Long Integer	Size of product
UnitPrice	Currency		Price per unit of product
ParentProdID	Text	10 characters	Code of main product

Properties

Table name:	PCProduct
Table type:	Entity
Database location:	PMS.mdb
Table description:	Hierarchy of product file

Table D.5. Parent/Child of Product Table.

Field Name	Field Type	Field Property	Description
ChildProdID	Text	10 characrters	Product is composed in Parent
ParentProdID	Text	10 characrters	Product that is Main Model
QtyComp	Number	Long Integer	Qty that is required

Properties

Table name: Supplier

Table type: Entity

Database location: PMS.mdb

Table description: Supplier file

Table D.6. Supplier Table.

Field Name	Field Type	Field Property	Description
SupplierlD	Text	10 characters	The unique code for each supplier
SupplierName	Text	10 characters	Name of supplier
ContPers	Text	150 characters	Contact person at supplier office
Position	Text	50 characters	Position of contact person
Address	Text	255 characters	Address of supplier
Zipcode	Number	Long Integer	Zipcode for supplier's address
Phone	Text	(00)-0000000	Home Phone of supplier
Fax	Text	(00)-0000000	Fax Phone of supplier
Email	Text	30 characters	Email of supplier
Brand	Text	50 characters	Brand name of supplier's product

Properties

Table name: Company

Table type: Entity

Database location: PMS.mdb

Table description: Company file

Table D.7. Company Table.

Field Name	Field Type	Field Property	Description
Branch ED	Text	10 characters	The unique code of branch
BranchName	Text	100 characters	Name of branch
Address	Text	255 characters	Address of branch
Zipcode	Number	Long Integer	Zipcode for branchress
Tel	Text	(00)-0000000	Home Phone of branch
Fax	Text	(00)-0000000	Fax Phone of branch
Email	Text	30 characters	Email of branch

Properties

Table name: Customer

Table type: Entity

Database location: PMS.mdb

Table description: Customer file

Table D.B. Customer Table.

Field Name	Field Type	Field Property	Description
CustomerID	Text	10 characters	The unique of customer
CustName	Text	10 characters	Name of customer
Address	Text	255 characters	Address of branch
ZipCode	Number	Long Integer	Zipcode for branchress
Tel	Text	(00)-0000000	Home Phone of branch
Fax	Text	(00)-0000000	Fax Phone of branch
Capitallnv	Currency		Capital Investment of customer
ContactPers	Text	150 characters	Contact person at customer's office
OrgBusiness	Text	250 characters	Business type of customer

Properties

Table name: Warehouse

Table type: Entity

Database location: PMS.mdb

Table description: Warehouse file

Table D.9. Warehouse Table.

Field Name	Field Type	Field Property	Description
WarehlD	Text	10 characters	The unique code of warehouse
WarehName	Text	10 characters	Name of warehouse
WarhWidth	Number	Long Integer	Width of warehouse
WarhLength	Number	Long Integer	Length of warehouse
WarhHeight	Number	Long Integer	Height of warehouse

Properties

Table name:	Location
Table type:	Entity
Database location:	PMS.mdb
Table description:	Location file

Table D.10. Location Table.

Field Name	Field Type	Field Property	Description
LocID	Text	10 characters	The unique code of location
WarehID	Text	10 characters	Name of location
LocWidth	Number	Long Integer	Width of location
LocLength	Number	Long Integer	Length of location
LocHeight	Number	Long Integer	Height of location

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