ACTIVITY - BASED COSTING (ABC) CLASSIFICATION
OF AUTOMOTIVE PARTS INVENTORY

by

Ms. Supitcha Tiraratthawee

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

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CE 6998 Project

Submitted in Partial Fulfillment
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                  Inventory

Name   Ms. Supitcha Tiraratthawee
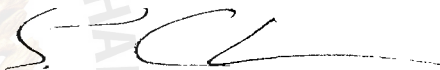
Project Advisor Dr. Chamnong Jungthirapanich

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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.

Approval Committee:

(Dr. Chamnong Ju gthirapanich)   (Prof.Dr. Srisakdi Charmonman)
Dean and Advisor   Chairman

(Asst.Prof.Dr. Boonmark Sirinaovakul)   (Dr. Prapon Phasukyud)
Member   Member

(Assoc.Prof. Somchai Thayarnyong)
MUA Representative

November 2000

ABSTRACT

This project study is concerned with the inventory management for the Auto Parts Shop which sells the BMW automotive parts. The inventory management is one of the critical factors that people in every organization should consider. The ABC Method of Inventory Classification can be applied to this study.

A study is conducted by gathering all possible existing theories, interviewing the shop owner about the automotive parts, and classifying the automotive parts into groups according to the Activity Based Costing (ABC) Method of Inventory Classification.

Since there are hundreds of BMW automotive parts, we can classify the BMW automotive parts according to the model. There are 4 models of BMW cars: E 28, E 30, E 34, and E 36. As for the category models, they are classified by their importance with the ABC analysis technique. In this study, E 30 model is selected to emphasize on because this model is the best seller. However, the method for classifying the ABC classification can be used for any other models because of the same methodology. There are 4 automotive parts in class A, 38 automotive parts in class B, and 53 automotive parts in class C. Moreover, there are 4 automotive parts that should be stocked in class A. For Class B, there are 15 automotive parts that should be stocked, and 23 automotive parts that should not be stocked and there are 4 automotive parts that should be stocked and 49 automotive parts that should not be stocked in class C.

This study can be further applied to any other automotive parts models and other automotive parts shop because of having the same methodology of calculation and most of automotive parts shops use the manual system in doing the inventory management. Therefore, this study can be used as a guideline to any other models and other automotive parts shops.

ACKNOWLEDGEMENTS

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I. INTRODUCTION

1.1 Background

The Auto Parts Shop was opened in March 1999. It is located on Ram-Intra Road, and sells the BMW automotive parts. The automotive parts inventories were recorded manually. There is no planned inventory system. Therefore, the owner may not know exactly which product is in stock or which product is out of stock. As there are many models of BMW cars; E 28, E 30, E 34, and E 36, there are hundreds of items for each BMW model. It is thus difficult to check the stock.

People will normally check stocks manually. It is possible that products may be recorded incorrectly. People may not know whether that product is in the stock. People sometimes keep products in stock for a long period of time, so they lose their value of money in order to keep that product that hardly sell and have the high cost. Adversely, people sometimes have faced the stock out and that product takes time to order. Therefore, it should be the appropriate inventory system.

Inventory control is one of the most important factors that the organization should consider. Since there are many kinds of product items in the organization, it should be well organized in the organization, including both the good management and good performance. For handling the stock, it should investigate the inventory to arrange the inventory according to the product costs. It can be said that there should be the appropriate inventory system.

There are many types of control system, but the organization that I mentioned in this project will emphasize on the Activity Based Costing (ABC) Classification. The ABC Method of Inventory Classification is one of the appropriate inventory systems. People can classify the product items into groups and classify them according to the value of money and the amount of items. Tersine (1994) stated that frequently, a small

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percentage of the inventory items account for most of the total inventory value. It is usually economical to purchase a large supply of low cost items and maintain little control over them. Conversely, small quantities of expensive items are purchased, and tight control should be exercised over them. It is frequently advantageous to divide inventories into three classes according to the monetary volume, which is called ABC Analysis.

The Auto Parts Shop tries to bring the ABC Method of Inventory Classification to be applied to the shop in order to know which product should be kept most and which product should be kept less in order to have the good management in inventory. It can be indicated that inventory is a crucial part of doing business and it is an efficient way to have the appropriate inventory system to allocate a large variety of items.

1.2 Project Objectives

The primary purpose of this project is to develop an analytical approach that will provide a suitable means to classify the automotive parts inventory. The specific objectives of the project are as follows:

(1) To classify the items into 3 groups according to the sales volume and the quantity.

(2) To know which product has a high or low sales volume in order to classify the inventory.

(3) To determine the percentage of items that should be allocated to the classification.

(4) To apply the methodology to the "Automotive Parts Shop".

(5) To provide recommendation to the shop owner regarding the ABC Classification of automotive parts inventory.

(6) To keep an organization from mishandling its inventory management.

1.3 Scope and Limitation of the Project

This project emphasizes the relationship between the monetary value and the percentage of the total items in order to classify the parts items into three groups. The parts mentioned in this project are only the BMW parts, which is divided into four models: E 28, E 30, E 34, and E 36. This project applies the ABC classification concept to an auto parts shop only.

The limitation of this project study is time limitation; that is, the data of the automotive parts are collected from the Auto Parts Shop from March to November 1999 only.

1.4 Statement of Problems

The problems in area of the inventory management for the automotive parts shop are that people normally check the stock manually. They do not know exactly whether the products are in the stock because of the possibility of the incorrectly record. People sometimes keep the product that hardly sell and sometimes face the stocksout. Therefore, it should have the appropriate inventory system.

1.5 Steps of the Project

    (1)   Survey literature

    (2)   Study the existing inventory system and the BMW automotive parts

    (3)   Collect and analyze the BMW automotive parts for ABC approach

    (4)   Propose improvements on the existing inventory management

    (5)   Conclusion and recommendation

1.6 Benefits of the Study

    (1) To provide more meaningful information concerned with the theory of the inventory management, Economic Order Quantity (EOQ) as well as the ABC approach.

(2) To reduce the inventory costs for keeping the unnecessary parts.

(3) To provide the appropriate inventory management.

(4) To improve the overall efficiency of the inventory parts.

(5) To be the guideline of the ABC classification that can be further applied to other automotive parts shop.

1.7 Methodology of Study

1.7.1 Overview

After interviewing the owner of the Auto Parts Shop, Mr. Nontana Anukroadilok, it can be concluded that the Activity Based Costing (ABC) Classification can be applied to the shop. Once the ABC Classification is applied, the owner will know which products are classified in which category, namely, class A, class B, and class C. In addition, he can stock the automotive parts at suitable level. The owner will be able to set appropriate inventory budgets because he can know from the ABC Classification which product he should keep in stock, and how much to keep for each product. Moreover, he will not face the stock out or have too much stock the product. Mostly, classifying the ABC Method of Inventory Classification is classified by total monetary value. Once the products are classified into 3 groups according to the ABC Classification, their stocks will be planned through appropriate inventory management techniques.

1.7.2 Study Determination

This study is taken for the project to gain insight and ideas for the shop owner how many products should be stocked, and which products should be classified in class A, B, or C in order to have the appropriate level of products to be kept in stocks. On the other hand, he will know which products should not be stocked in order to face the problems of shortage costs and carrying costs. As there are 4 automotive models;

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namely, E 28, E 30, E 34, and E 36 model, the E 30 Model is selected to analyze in this study because it is the best seller.

1.7.3 Data Collection Method

Both secondary and primary data are collected for this project. Secondary data was gathered from the published literature, and texts. Primary data was collected from interviewing with the shop owner. The data were collected by interviewing the shop owner, and then it was applied to classify into three categories according to the ABC Classification: Class A, Class B, and Class C.

II. LITERATURE REVIEW

2.1 Inventory Concepts

Clearly, material management exerts great influence in company success, requiring coordination among several decision areas and departments. An essential part of materials management is inventory control. Inventory is a stock of materials held to satisfy some eventual demand. Inventory is created when the rate of receipts exceeds the rate of disbursements. It is depleted when disbursements exceed receipts (Krajewski and Ritzman 1987).

2.1.1 Inventory Control

Waters (1999) stated that inventory control often relies on a balance between conflicting costs. The cost of holding enough stock to give a specified level of customer service, for example, can be balanced by the cost of running out of stock and losing sales. The point at which these balances occur determines the answers to fundamental questions about what should be kept in stock, when should orders be placed, how much should be ordered and so on.

Inventory control systems can be classified in a number of ways, but a particularly useful one differentiates as follows (Waters 1999):

(1)   dependent demand systems, where demand for an item is generally forecast from historic figures;

(2)   independent demand systems, where demand is found directly from production plan.

2.1.2 Inventory Costs

The objective of inventory management is to have the appropriate amounts of materials in the right place, at the right time, and at low cost. Inventory costs are

associated with the operation of an inventory system and result from action or lack of action on the part of management in establishing the system (Tersine 1994).

Three basic costs are associated with inventories: carrying cost or holding cost, ordering cost, and shortage cost.

(1)   Carrying Costs or Holding Costs

Carrying costs are the costs of holding items in inventory. These costs vary with the level of inventory and occasionally with the length of time an item is held; that is, the greater the level of inventory over a period of time, the higher the carrying costs (Russell and Taylor 1998).

Carrying cost or holding cost is the cost of keeping items on hand, including interest, storage and handling, taxes, insurance, and shrinkage (pilferage, obsolescence, and deterioration). Companies usually state an item's holding cost per period of time as a percentage of its value. The annual cost to maintain one unit in inventory during the year typically ranges from 20 to 40 percent of its value (Krajewski and Ritzman 1987).

(2)   Ordering Costs

Ordering costs are the costs associated with replenishing the stock of the inventory being held. These are normally expressed as a monetary amount per order and are independent of the order size. Ordering costs vary with the number of orders made — as the number of orders increases, the ordering cost increases. Costs incurred each time an order is made can include requisition and purchase orders, transportation and shipping, receiving, inspection, handling and storage, and accounting and auditing costs (Russell and Taylor 1998).

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The order/setup cost originates from the expense of issuing a purchase order to an outside supplier or from internal production setup costs. This cost is usually assumed to vary directly with the number of orders or setups placed and not at all with the size of the order. The order cost includes such items as making requisitions, analyzing vendors, writing purchase orders, receiving materials, inspecting materials, following up orders, and doing the processing necessary to complete the transaction. The setup cost comprises the costs of changing over the production process to produce the ordered item. It usually includes preparing the shop order, scheduling the work, preproduction setup, expediting, and quality acceptance (Tersine 1994).

Ordering cost is the cost of preparing a purchase order for a supplier or a production order for the shop. For the same item, the cost is the same, regardless of the size. For a purchased item, someone has to take the time to decide how much to order, select a supplier, and negotiate terms (Krajewski and Ritzman 1987).

Shortage costs

Shortage costs, also referred to as stockout costs, occur when customer demand cannot be met because of insufficient inventory. If these shortages result in a permanent loss of sales, shortage costs include the loss of profits. Shortage can also cause customer dissatisfaction and a loss of goodwill that can result in a permanent loss of customers and future sales (Russell and Taylor 1998).

The shortage cost is the economic consequence of an external or an internal shortage. An external shortage occurs when a customer's order is not filled; an internal shortage occurs when an order of a group or backorder

costs, present profit loss (potential sale), and future profit loss (goodwill erosion). Internal shortages can result in lost production (idle resources) and a delay in a completion date (Tersine 1994).

Shortages occur because carrying inventory is costly. As a result, shortage costs have inverse relationship to carrying costs-as the amount of inventory on hand increases, the carrying cost increases, whereas shortage costs decrease (Russell and Taylor 1998).

2.1.3 Function of Inventory

Tersine (1994) stated that Inventory exists because supply and demand are difficult to synchronize perfectly and it takes time to perform material-related operations. For several reasons, supply and demand frequently differ in the rates at which they respectively provide and require stock. These reasons can best be explained by four functional factors of inventory-time, discontinuity, uncertainty, and economy.

(1) Time

The time factor involves the long process of production and distribution required before goods reach the final consumer. Time is required to develop the production schedule, cut raw material requisitions, ship raw materials from suppliers (transit time), inspect raw materials, produce the product, and ship the product to the wholesaler or consumer (transit time). Few consumers would be willing to wait for such an extended period of time on all their purchases. Inventory enables an organization to reduce the lead time in meeting demand. Profitability can be enhanced by a reputation of having products available immediately or within a reasonable time.

(2)   Discontinuity

The discontinuity factor allows the treatment of various dependent operations (retailing, distributing, warehousing, manufacturing, and purchasing) in an independent and economical manner. Inventories make it unnecessary to gear production directly to consumption or to force consumption to adapt to the necessities of production. Inventories free one stage in the supply-production-distribution process from the next, permitting each to operate more economically. Raw material inventory isolates the supplier from the user, in-process inventory isolates production departments from each other, and finished goods inventory isolates the customer from the producer. The discontinuity factor permits the firm to schedule many operations at a more desirable performance level than if they were integrated dependently.

(3)   Uncertainty

The uncertainty factor concerns unforeseen events that modify the original plans of the organization. It includes errors in demand estimates, variable production yields, equipment breakdowns, strikes, acts of God, shipping delays, and unusual weather conditions. When inventory is available, the organization has some protection from unanticipated or unplanned occurrences.

(4)   Economy

The economic factor permits the organization to take advantage of cost reducing alternatives. It enables the organization to purchase or produce items in economic quantities. Bulk purchases with quantity discounts can reduce cost significantly. Per unit cost can be excessive if items are ordered

separately without regard to transportation and lot size economies. Price

hedging against impending material cost increases may also favor large

quantity purchases. Inventories can be used to smooth production and

stabilize manpower levels in undulating and seasonal businesses.

2.1.4 Types of Inventory

Evans (1994) suggested that there are different types of inventory that are carried.

There are 5 most important classes of inventory.

(1)   Raw materials and purchased parts. Items purchased from outside suppliers

to be used in the production of the firm's output; for example, chemicals,

sheet metal, transistors, nuts, and bolts.

(2)   Components. Subassemblies or parts that are awaiting final assembly.

(3)   Work-in-process. All materials, semi-finished goods, or subassemblies on

the production floor in various stages of processing or between operations.

(4)   Finished goods. Final products waiting to be distributed to or purchased by

customers.

(5)   Supplies. Items that supports production and administrative functions but

are not part of the finished product; for instance, tools, drill bits, office

supplies, and so on.

2.1.5 Classifying Inventory Problems

Evans (1994) stated that one of the first steps in analyzing an inventory problem

should be to describe the essential characteristics of the environment and inventory

system.

(1) Number of items

Many models of inventory control determine the inventory policy for

only one item at a time. For organizations with hundreds or thousands of

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distinct items, applying such an inventory model might prove difficult. In such cases, items are often aggregated, or partitioned, into groups with similar characteristics or monetary value. It is easier to design effective inventory systems for controlling a smaller number or groups of items.

(2)   Nature of Demand

Demand can be classified as either independent or dependent, deterministic and stochastic, and dynamic or static. By Independent demand, we mean demand that is not influenced by operations, but rather by the market. Inventories of finished goods have independent demand characteristics. Items are said to have dependent demand if their demand is related to that of another item.

In many situations, demand is reasonably stable and thus can be accurately forecast. In such cases, demand can be assumed to be known with certainty. We call this deterministic demand. In other cases, demand is highly variable and can be specified only by a probability distribution. In this case, we refer to it as stochastic demand.

Demand may also fluctuate over time or be stable throughout the year. Stable demand is usually called static demand, and demand that varies overtime is referred to as dynamic demand.

(3)   Number of Time Periods

In some cases, the selling season is relatively short, and any leftover items cannot be physically or economically stored until the next season. For example, Christmas trees that have been cut cannot be stored until the following year, and other items, such as seasonal fashions, are sold at a loss simply because there is no storage space or it is uneconomical to keep them

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for the next year. This "single-period" inventory problem requires a different analysis than problems in which inventory is held from one time period to the next.

(4)   Lead Time

Lead time is the amount of time between the placement of an order and its receipt. Lead time may be relatively constant or stochastic. Lead time is affected by transportation carriers. Rail, truck, and air transportation have different characteristics.

(5)   Stockouts

When no stock is available to satisfy the demand for an item, it is either back ordered or a lost sale is incurred. A back order occurs when a customer is willing to wait for the item; a lost sale occurs when the customer is unwilling to wait and purchases the item elsewhere. Back orders result in additional costs for transportation, expediting, or perhaps buying from another supplier at a higher price. A lost sale has an opportunity cost associated with it, which may include loss of goodwill and potential future revenue.

Evans (1994) indicated that Table 2.1 summarizes inventory problems in terms of the characteristics that may exist.

Table 2.1. A Classification Scheme for Inventory Problems (Evans 1994).

Characteristics	Attributes
Number of items	One or many
Nature of Demand	Independent or dependent; deterministic or stochastic; static or dynamic
Number of time periods in planning horizon	One or many
Lead Time	Deterministic or stochastic
Stockouts	Back orders or lost sales

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From these problems, it can be said that inventory is an important part that people should be aware of Inventory system is a necessary part for most businesses. Therefore, people should have the appropriate inventory management. Once we have the appropriate inventory management, we can bring it to calculate the number of parts for the company that will not result in stocksout and have the lowest expense.

2.2 Economic Order Quantity (EOQ) Models

Evans (1994) stated that the Economic Order Quantity Model was developed in the early 1900s. There are several important assumptions made in using the EOQ model:

(1)   Only a single item under continuous review is considered,

(2)   The entire quantity ordered arrives in the inventory at one time,

(3)   The demand for the item has a constant, or nearly constant, rate.

The condition of constant demand rate simply means that the same number of units are taken from inventory each period of time-such as 5 units every day, 25 units every week, 100 units every 4-week period, and so on. We also assume that the lead time is constant and that no stockouts are allowed.

Russell and Taylor (1998) referred that the function of the EOQ model is to determine the optimal order size that minimizes total inventory costs. There are several variations of the EOQ model, depending on the assumptions made about the inventory system. Two model versions will be described as follows:

(a)   The Basic EOQ Model

(b)   The EOQ Model with Noninstantaneous receipt

2.2.1 The Basic EOQ Model

Russell and Taylor (1998) stated that the basic EOQ model is a formula for determining the optimal order size that minimized the sum of carrying costs and

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ordering costs. The model formula is derived under a set of simplifying and restrictive assumptions, as follows:

(1)   Demand is known with certainty and is relatively constant over time.

(2)   No shortages are allowed.

(3)   Lead time for the receipt of order is constant.

(4)   The order quantity is received all at once.

Russell and Taylor (1998) stated that from this point it can be concluded that the EOQ models have the several assumptions, that is,

(1)   The constant demand rate.

(2)   The order quantity is received at one time.

(3)   Lead time of ordered receipt is constant.

(4)   No stockouts are allowed.

Figure 2.1 describes the continuous-inventory order cycle system in the EOQ model. An order quantity, Q, is receipted and is used up over time at a constant rate. When the inventory level decreases to the reorder point, R, a new order is placed; a period of time, referred to as the lead time, is required for delivery. The order is received all at once just at the moment when demand depletes the entire stock of inventory-the inventory level reaches 0 - so there will be no shortages. This cycle is repeated continuously for the same order quantity, reorder point, and lead time (Russell and Taylor 1998).
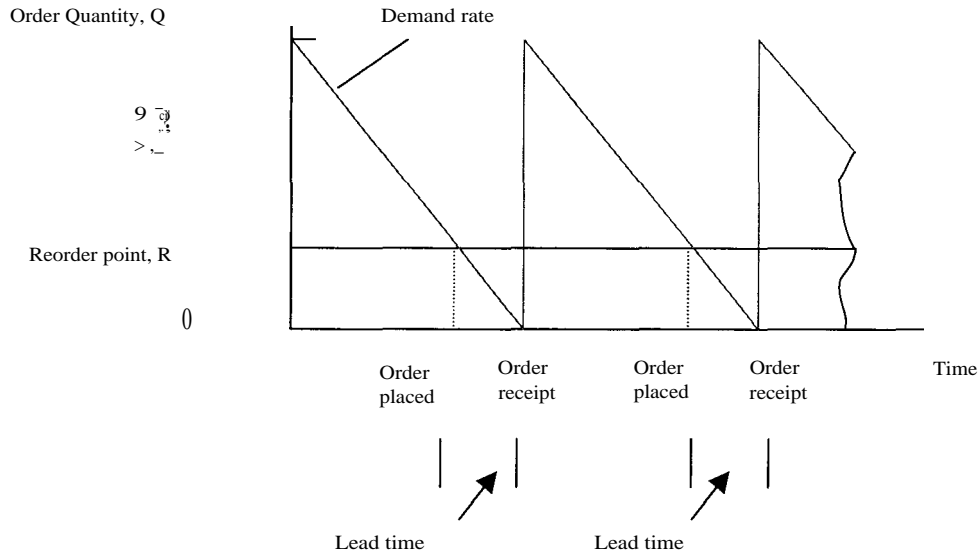
Figure 2.1. The Inventory Order Cycle (Russell and Taylor 1998).

The total annual ordering cost is computed by multiplying the cost per order, designed as C_o, times the number of orders per year. Since annual demand, D, is assumed to be known and to be constant, the number of orders will be D/Q, where Q is the order size and

$$\text{Annual ordering cost} = C_o D/Q \qquad (1)$$

The only variable in this equation is Q; both C_o and D are constant parameters. Thus, the relative magnitude of the ordering cost is dependent upon the order size.

The total carrying cost is computed by multiplying the annual per-unit carrying cost, designed as C_c, times the average inventory level, determined by dividing the order size, Q, by 2: Q/2;

$$\text{Annual carrying cost} = C_oQ/2 \qquad\qquad (2)$$

The total annual inventory cost is the sum of the ordering and carrying costs:

$$TC = C_oD/ Q + C,Q/2 \qquad\qquad (^3)$$

The development of this total-cost model has gone a long way toward helping solve the inventory problem. We are now able to express the total annual cost as a function of one of the decision, how much should be ordered. Equation (3) is the general total-cost equation for inventory situations in which the assumptions of the economic-order-quantity model are valid (Evans 1994).

Russell and Taylor (1998) stated that the graph in Figure 2.2 shows the inverse relationship between ordering cost and carrying cost, resulting in a convex total cost curve. The optimal order quantity occurs at the point in Figure 2.2 where the total cost curve is at a minimum, which coincides exactly with the point where the carrying cost curve intersects the ordering cost curve.
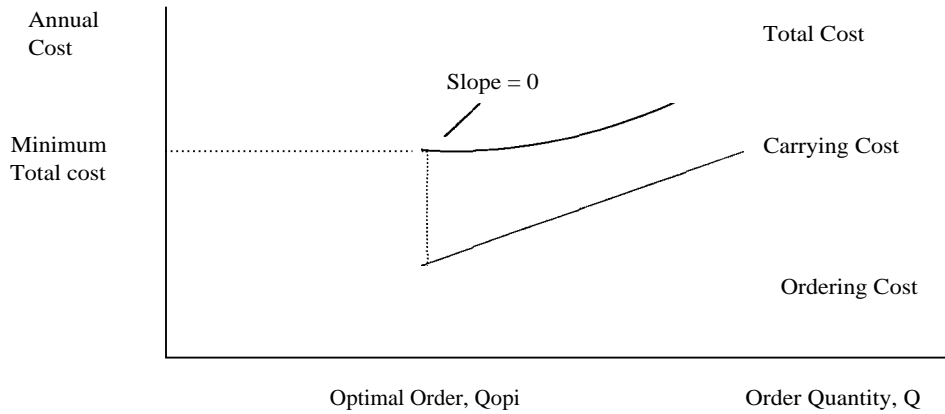
Figure 2.2. The EOQ Cost Model (Russell and Taylor 1998).

Russell and Taylor (1998) also stated that the optimal value of Q can be determined by differentiating the total cost curve with respect to Q, setting the resulting function equal to zero (the slope at the minimum point on the total cost curve), and solving for Q,

$$C_0 D/Q = C_e Q/2$$

$$Q^2 = 2C_0 D/C_c$$

$$Qopt = 2C_0 D/C_c \qquad (4)$$

The total minimum cost is determined by substituting the value for the optimal order size, Qopt, into the total cost equation,

$$TCmin = C_o D/Q_{opt} + C_o Q_{opt}/2 \qquad (^5)$$

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Further, the economic order quantity model is concern with two basic decisions: how much to order and when to place an order (Evans 1994).

(a)   How Much to Order

The how much to order decision involves selecting an order quantity that is a compromise between (1) keeping small inventories and ordering frequently and (2) keeping large inventories and ordering infrequently. The first alternative would probably result in undesirably high ordering costs, while the second alternative would probably result in undesirably high inventory-holding costs. In order to find an optimal compromise between these conflicting alternatives, it has to develop a mathematical model that will show the total cost as the sum of the inventory-holding cost and the ordering cost (Evans 1994).

It can begin by defining Q to be the size of the order. Thus the decision of how much to order necessitates finding the value of Q that will minimize the total inventory-holding and ordering costs for the product (Evans 1994).

(b)   When to Place an Order

The when-to-order decision is most often expressed in terms of the reorder point. For inventory system using the constant-demand rate assumption and a fixed lead time, the reorder point is the same as the lead-time demand. The lead-time demand is the demand that occurs between the time the order is placed and when it is received. The general expression for the reorder point is -

$$r = dm$$

where r = reorder point

d = demand per day

m = lead time for a new order in days   (6)

The question of how frequently the order should be placed can now be answered. This period between orders is referred to as the cycle time. Equation 2 defines D/Q as the number of orders that are placed in a year.

2.2.2 The EOQ Model with Noninstantaneous Receipt

Russell and Taylor (1998) stated that a variation of the basic EOQ model is the nonstantaneous receipt model, also referred to as the gradual usage and production lot-size model. In this EOQ model the assumption that orders are received all at once is relaxed. The order quantity is received gradually over time, and the inventory level is depleted at the same time it is being replenished. This situation is most commonly found when the inventory user is also the producer, as in a manufacturing operation where a part is produced to use in a larger assembly. This situation also can occur when orders are delivered gradually over time or when the retailer is also the producer.
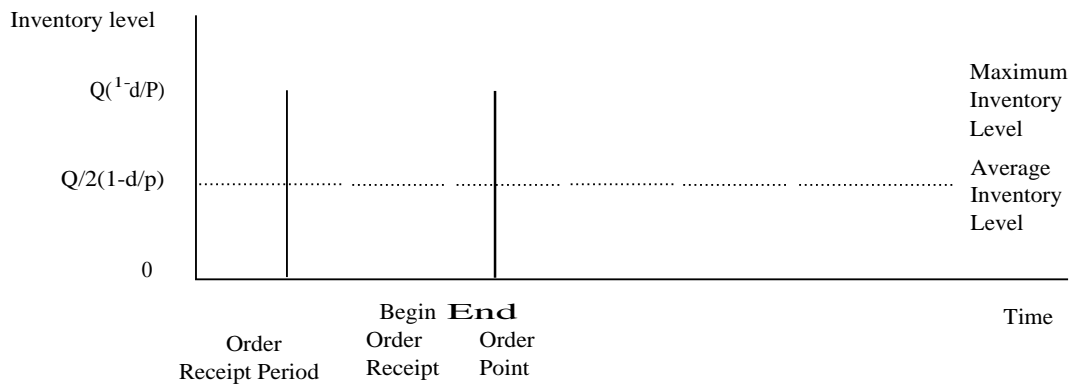
Figure 2.3. The EOQ Model with Noninstantaneous Order Receipt (Russell and Taylor 1998).

The noninstantaneous receipt model is shown graphically in Figure 2.3. The inventory level is gradually replenished as an order is received. In the basic EOQ model, average inventory was half the maximum inventory level, or Q/2, but in this model variation, the maximum inventory level is not simply Q; it is an amount somewhat lower than Q, adjusted for the fact the order quantity is depleted during the order receipt period (Russell and Taylor 1998).

2.3 ABC Classification

Vilfredo Pareto, a nineteenth century Renaissance man, was the first to document the Management Principle of Materiality, which is the basis of ABC Analysis (Fogarty and Hoffmann 1983).

Finch and Luebbe (1995) stated that ABC analysis is often used to aid in identifying appropriate inventory management approaches. It is based on the "80-20 rule", which says that approximately 80 percent of the dollar usage is linked to 20 percent of the items. ABC analysis requires that the inventory be classified in order of importance. "Importance" is usually measured as dollar usage, but other measures of importance, such as the replenishment lead time, may be appropriate in some

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circumstances. Three classifications are typically used: A (very important), B (medium level of importance), and C (least important).

In addition, Stevenson (1990) also stated that the A-B-C approach involves classifying inventory items according to some measure of importance-usually annual usage (i.e., dollar value per unit multiplied by annual usage rate)-and then allocating control efforts accordingly. Typically, three classes of items are used: A (very important, B (moderately important), and C (least important). However, the actual number of categories may vary from organization to organization, depending on the extent to which a firm wants to differentiate control efforts.

ABC curve is sometimes known as Pareto curve. The concept of ABC inventory analysis was first developed by H.F.Dickie at General Electric in the early 1950s for studying inventories consisting of a large number of different items. The technique has been shown to be a very valuable management tool for identifying and controlling important inventory items (Evans 1994).

Moreover, Dilworth (1993) stated that Pareto analysis utilizes the Pareto principle, or 80-20 rule, as it is sometimes called. It is based on a theory expressed by an Italian economist that 20 percent of the people control 80 percent of the wealth. This same idea was discussed regarding inventory items (ABC Classification), since a small percentage of the items usually deserve special attention because they account for a large percentage of the annual expenditure for all items. Pareto analysis determines the relative frequency of various problems or causes for problems so that primary attention can be focused on the most important ones.

Pareto's "principle" suggests that there are the critical few high-cost items of inventory that should be carefully managed and the trivial many items, which are of less concern. So-called A items are the most costly, and should be carefully managed, while

B and C items are less costly categories and receive less management attraction (Stonebraker and Leong 1994).

Pareto analysis computes the total inventory value of the item, either in total cost (the number of units times the item cost) or in item criticality (often measured by perishability, stockout penalty, the cost of closing a work center or facility, or the result of a quality defect) among several items; then the items are resequenced according to total cost (Stonebraker and Leong 1994).

Tersine (1994) stated that it is usually uneconomical to apply detailed inventory control analysis to all items carried in an inventory. Frequently, a small percentage of inventory items accounts for most of the total inventory value. It is usually economical to purchase a large supply of low cost items and maintain little control over them. Conversely, small quantities of expensive items are purchased, and tight control should be exercised over them. It is frequently advantageous to divide inventories into three classes according to total annual costs (the product of annual quantity and the unit purchase cost or production cost). This approach is called "ABC Analysis", which is one useful method for measuring inventory performance.

ABC Analysis consists of categorizing inventory items into three groups, called the "ABC Classification", according to their total annual expenses. The groups are defined as follows (Evans 1994):

(1)   A items account for a large inventory value but a relatively small percentage of total items.

(2)   C items account for a small inventory value but a large percentage of total items.

(3)   B items are between A items and C items.

Typically, A items comprise 70 to 80 percent of the total monetary usage but only 15 to 30 percent of the items, whereas C items account for 5 to 15 percent of the total monetary value and about 50 percent of the items. There is no specific rule on where to make the division between A and B items or between B and C items; the percentages used here simply serve as a guideline (Evans 1994).

Further, Tersine (1994) stated that typically, the A class is high value items whose monetary volume typically accounts for 75-80% of the value of the total inventory, while representing only 15-20% of the inventory items. The B class is lesser value items whose monetary value accounts for 10-15% of the value of the inventory, while representing 20-25% of the inventory items. The C class is low value items whose volume accounts for 5-10% of the inventory value but 60-65% of the inventory items.

Further, Markiand et al. (1995) stated that ABC Classification is one of the most widely known yet least exploited ideas in inventory control. It can be summarized that the rules involved in the proper degree of control as follows:

(1)   A Items. Very tight control, complete and accurate records; regular review by major decision makers.

(2)   B Items. Less tightly controlled, good records, and regular review.

(3)   C Items. Simplest controls possible, minimal records, large inventories, periodic review, and reordering.

Gaither (1994) also stated that because of the large number of materials used in production at many manufacturing plants, it can be desirable to classify materials according to the amount of analysis that can be justified. One scheme for classifying materials is the ABC method, which is based on the idea that only a small percentage of materials represent the majority of inventory value.

The ABC method of classifying materials are as follows (Gaither 1994):

(1)   The A materials represent only 20 percent of the materials in inventory and 75 percent of the inventory value.

(2)   The B materials represent 30 percent of the materials in inventory and 20 percent of the inventory value.

(3)   The C materials represent 50 percent of the materials in inventory and only 5 percent of the inventory value.

This classification suggests that the higher the inventory value of a material, the more analysis that should be applied to the material. Ordinarily, Class A materials would be analyzed extensively and Class C materials would be analyzed little (Gaither 1994).

To determine annual monetary volume for ABC analysis, we measure the annual demand of each inventory item times the cost per unit. Class A items are those on which the annual dollar volume is high. Such items may represent only about 15% of the total inventory items, but they represent 70 to 80% of the total inventory cost. Class B items are those inventory items of medium annual monetary volume. These items may represent about 30% of the items and 15 to 25% of the value. Those with low annual monetary volume are class C, which may represent only 5% of the annual dollar volume, but about 55% of the total items (Render and Heizer 1996).

Waters (1996) stated that an ABC analysis puts items into categories that show the amount of effort worth spending on inventory control. This kind of analysis is sometimes called a Pareto analysis or the "rule of 80/20". This suggests that 20% of inventory items need 80% of the attention, while the remaining 80% of items need only 20% of that attention. ABC analyses define:

(1) A items as expensive and needing special care;

(2)   B items as ordinary ones needing standard care;

(3)   C items as cheap and needing little care.

The purpose of classifying items into groups is thus to establish appropriate levels of control over each item. The ABC analysis is useful for any type of independent demand system (perpetual, periodic, optional replenishment, and so forth). With the periodic system, the ABC analysis can be subdivided so high volume items receive a short review and low volume items receive a much longer review. On a periodic basis, class A items might be ordered weekly, B items might be ordered biweekly, and C items might be ordered quarterly or semiannually. Note that the unit cost of an item is not the sole determinant of the classification. An A item may have a high quantity or high cost and low quantity. Likewise, C items may have a low monetary volume because of low demand or low cost (Tersine 1994).

Further, Stair and Render (1990) stated that the purpose of ABC analysis is to divide all of a company's inventory items into three groups: the A group, the B group, and the C group. Then, depending on the group, it is necessary to decide how the inventory levels should be controlled in general. ABC analysis recognizes the fact that some inventory items are more important than others. A brief description of each group follows, with general guidelines as to which items are A, B, or C.

If items are in a fixed order size system with an EOQ, the EOQ automatically adjusts the lot sizes to an ABC configuration. A low annual demand results in a smaller lot size, while a low unit cost results in a larger lot size. When an item is a C because of low unit cost, it is automatically ordered in a larger lot size. When an item is a C because of a high unit cost and a low unit demand, it may be advisable to order it on a one-for-one basis or to order only when a known demand occurs. Perhaps only one unit

may be kept in stock, and the item is reordered when the existing unit is removed from

stock (Tersine 1994).

The A, B, and C classes are artificial strata. Each organization should tailor its

inventory system to its own peculiarities. Organizations may choose to group their

inventory into more than three classifications, but the principle is the same: high value

items receive the most attention and low value items the least. A comparison of the A,

B, and C classes is contained in Table 2.2.

Table 2.2.   Comparison of A, B, and C Classes (Tersine 1994).

Class	Degree of Control	Type of Records	Lots Sizes	Frequency of Review	Size of Safety Stock
A	Tight	Accurate and complete	Low	Continuous	Small
B	Moderate	Good	Medium	Occasional	Moderate
C	Loose	Simple	Large	Infrequent	Large

The inventory value for each item is obtained by multiplying the annual demand

by the unit cost. Annual demand is used to avoid distortions from seasonal changes. The

entire inventory is listed in descending order of value. The items are classified as

described above (Tersine 1994).

Graphically, the inventory of many organizations would appear as presented in

Figure 2.4.
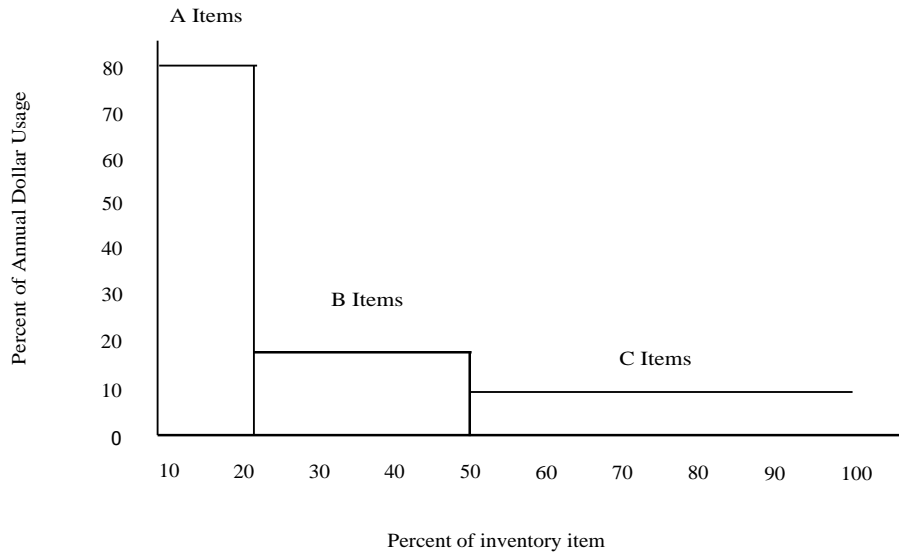
Figure 2.4. Graphic Representation of ABC Analysis (Render and Heizer 1994).

The advantage of dividing inventory items into classes allows policies and control to be established for each class. Policies that may be based on ABC Analysis include the following (Render and Heizer 1994):

(1)   The purchasing resources expended on supplier development should be much higher for individual A items than for individual C items.

(2)   A items, as opposed to B and C items, should have tighter physical inventory control; perhaps they belong in a more secure area, and perhaps the accuracy of inventory records for A items should be verified more frequently.

(3)   Forecasting A items may warrant more care than forecasting other items

Render and Heizer (1994) also stated that Good inventory policies are meaningless if management does not know what inventory is on hand. Accuracy of records is a critical ingredient in production and inventory systems.

There are many different types of ABC system. Procedures for instituting an ABC classification system are as follows (Lee and Schniederjans 1994):

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(1) List all of the inventory items that the organization carries during the year.

(2) List the unit cost of the inventory items.

(3) List the annual unit demand of the inventory items.

(4) Multiply the cost in step 2 by the unit demand in step 3 to derive the annual sales volume of the inventory items.

(5) Assign the items using one of three classifications judgmentally to differentiate their relative sales volume: The classification A indicates a high sales volume inventory item, B indicates a moderate-sales volume inventory item, and C indicates a low sales volume inventory item.

(6) Group the inventory items by their classification in step 5 and determine their total sales volume percentage by classification.

(7) Multiply the total available materials management resources (for example, budgeted costs for inventory control) by the proportions in step 6 determine the allocation of resources by item classification.

The goal of step (6) is to determine the proportion of materials management resources that should be allocated to the inventory items by classification-that is, to determine the percentage of resources that should be allocated to all the inventory items with the A classification, the B classification, and finally the C classification. The three proportions will sum to one, and are usually distributed with the greatest proportion of resources going to the A items (Lee and Schniederjans 1994).

III. DATA ANALYSIS AND INTERPRETATION

3.1 Problem Definition

There are numerous kinds of automotive parts for each car model so it should have a suitable inventory system to manage the organization. Most of the automotive parts shop owners record the stocks manually, where the automotive parts may be recorded incorrectly. Therefore, it should have the suitable inventory management. The ABC Method of Inventory Classification can be used to apply for this study.

Because of various types of automotive parts, ABC classification concept can be applied to the auto parts shop. The automotive parts can be classified into 3 classes; namely, A, B, and C classes. This method can help the shop owner to know how many products should be kept more or less in order not to keep the product parts that hardly sell which cause carrying cost. On the other hand, the shop owner will not face the stockout for the parts that frequently sell. This method lets the shop owner not lose their monetary value for keeping the hardly sold product, and not lose their sales.

3.2 Existing Inventory Data Collection

The data was collected for 9 months since the shop was opened, then applying the data to 1 year by multiplying 12 and dividing by 9 in order to get the data for an annual. The data collecting for 9 months is too short to analyze, so it should be applied in a year for an appropriate information. In addition, the ABC classification should be analyzed in total costs as Waters (1999) stated that the procedure for ABC analysis starts by taking each item and multiplying the number of units used in a year by the unit cost. This gives the total annual use of items in terms of value. Therefore, Table 3.1. classified by total monetary value will be analyzed as an example in this study.

It can be seen that the product's name both in English and Thai, as well as the product's code are shown in Appendix B. Furthermore, there are 4 automotive models: E 28, E 30, E 34, and E 36, which are classified into 2 types: by unit sold, and by total monetary value. It can be seen that there are 145 automotive parts of E 28, 153 automotive parts of E 30, 155 automotive parts of E 34, and 158 automotive parts of E 36.

It can be indicated that all models have the same products' name but there will not have some products in any other models. However, the method of calculating is the same. It is indicated that there are 4 automotive models: E 28, E30, E34, and E36 which are classified into 2 groups: classified by unit sold, and total monetary value, the E 30 model is selected to be an example of the ABC classification in this study. The reason is that this model is the best seller and many authors such as Gaither (1994), Tersine (1994), Waters (1999), etc. who wrote about the ABC Method of Inventory Classification classified the ABC Method of Inventory Classification by looking into the total monetary value and nobody classifies the ABC Method of Inventory Classification by classifying by unit. Classifying the ABC Method of Inventory Classification by total monetary value gives more pictures of the total cost or expense than classifying by unit sold. Therefore, E 30 model classified by total monetary value is analyzed in this study. For those other models both classified by total monetary value, and by unit sold are shown in Appendix C, D, E, F, G, H, and I respectively.

Both unit sold and monetary value are important factors to be considered. It can be said that unit sold is one of the important factors because it is to be known which product is sold most or less and how much to be sold. Each automotive part can be sold occasionally. The demand of each product depends on customers' need or it can be said that each automotive part is required when it is damaged or it can be replaced by a new

one in order not to face the stock out. Alternatively, Monetary value is also one of the significant factors because it is needed to be known how much the monetary value should be invested in for stocking the automotive parts. Therefore, classifying the ABC Method of Inventory Classification classified by total monetary value is mostly applied for appropriate inventory management.

Another factor that should be considered in this chapter, that is, the average unit. The average unit is calculated by dividing the unit sale from each product by 9 in order to get the average monthly unit sold. The reason that it is divided by 9 is because the data was collected for 9 months since the shop was opened. In this column, it is shown how many units were sold each month for each product. Since the data collecting for 9 months is too short to analyze, the average unit sold also was applied into annual form by multiplying 12 and then dividing by 9 in order to get the annual average unit sold each month.

It is seen that, in Table 3.1, there are 58 items which cannot be sold for the whole period of time. Should we stock those products where the carrying costs are occurred. The greater stocking the inventory, the higher the carrying cost. Therefore, it should have the appropriate level of inventory in stock. It is mandatory to classify the products by applying the ABC classification concept to the Auto Parts Shop.

Apart from considering the carrying costs, the lead time should be also considered. It should be considering the lead time because customers sometimes do not want to wait for the products. If it takes time for receiving the products, it should have those products in stock even though the carrying costs occur. However, it should not stock those products too much. If there are a lot of hardly sold products in stock, the greater is the carrying costs. If there is not enough products in stock, the shortage costs occurred and also got the loss sale. Therefore, it should be considered the carrying costs

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as well as lead time and shortage costs. Moreover, the sales predict is also important factor that should be considered. Should we make an error on predict sales, it can cause loss of sales, suffer to loss, shortage costs, and loss of profit. Furthermore, the method of back order can be applied if the customers are willing to wait for receiving the products.

Since we have talked with the shop owner, it is seen that it takes a short period of time for receiving the automotive parts since we have ordered. Therefore, it can be concluded that the automotive parts should not be stocked much in order to reduce the carrying cost. Most of the automotive parts can be received within 2-3 days since it was ordered. Once the automotive parts are analyzed into 3 classes according to the ABC Method of Inventory Management, it can be seen that which automotive parts should be more or less emphasized on in order to have an appropriate inventory management.

3.3 ABC Classification

There are 153 automotive parts in Table 3.1 showing the E 30 model classified by total monetary vale. There are 95 automotive parts can be sold, and there are 58 automotive parts cannot be sold. As the ABC classification can be used to apply in this study, so it can be classified into 3 classes: class A, B, and C from the automotive parts sold. There are 4 automotive parts in class A, 38 automotive parts in class B, and 53 automotive parts in class C. The unsold automotive parts cannot be classified in any class. The ABC classification is shown in Figure 3.1.

3.3.1 Class A

There are 4 automotive parts in class A, that is, Right Tie Rod, Water Pump, Left Tie Rod, and Rear Shock Absorber. It can be seen that Right Tie Rod can be sold annually approximately 96 units. The annual cost is 153,600 bahts. Water Pump can be sold annually 71 units. The annual total cost is around 130,733 bahts. Left Tie Rod can

be sold annually 77 units. The annual cost is about 112,133 bahts. Rear Shock Absorber can be sold 20 units annually. The annual cost is 87,800 bahts.

3.3.2 Class B

There are 38 automotive parts in class B. In this group the total cost of this group is in between 10,800 — 68,666.67 bahts. In this part, the automotive parts would be classified from high cost to low cost. Wiper Blade can be sold annually 137 units, and total annual cost is 68,667 bahts. Swing Support can be sold 77 units annually, and the annual cost is 65,733 bahts. Front Shock Absorber can be sold 16 units yearly, and the annual cost is 55,200 bahts. Engine Mounting can be sold 124 units yearly and the annual cost is 49,600 bahts. Left Trailing Arm can be sold 7 units annually and the total cost is around 45,333 bahts.

In addition, Steering Column can be sold 5 unit yearly and the total cost is 37,760 bahts. Wheel Brake Cylinder can be sold annually 60 units and the total cost is 36,000 bahts. Oil Filter can be sold annually 112 units, and the total cost is 32, 480 bahts. Set Rubber Mounting can be sold 64 units annually, and the cost is 32,000 bahts. Right Tail Light can be sold 13 units annually and the total cost is around 29,333 bahts. Front Repair Kit Brake Pad can be sold 27 units annually and the total cost is around 29,333 bahts. Repair Set Brake Caliper can be sold 56 units annually, and the total cost is 28,000 bahts. Right Door Handle Inner can be sold 100 units annually and the total cost is 28,000 bahts. Brake Servo can be sold 5 unit annually and the total cost is 27,733 bahts. Right Trailing Arm can be sold 4 units annually and the total cost is 27,200 bahts. Trunk Lid Gasket can be sold annually 16 units and the total cost is 25,600 bahts. Cylinder Head Gasket can be sold annually 25 units and the total cost is 25,333 bahts. Thermostat can be sold annually 45 units and the total cost is 22,666 bahts. Rotor can be sold 37 units annually and the total cost is 22,400 bahts. Stabilizer Rubber Mounting

can be sold annually 184 units and the total cost is 22,080 bahts. Rear Carrier can be sold 4 units annually and the total cost is 21,600 bahts. Rear Repair Kit Brake Pad can be sold annually 25 units and the total cost is 25 units and the total cost is 21,533 bahts. Brake Master Cylinder can be sold 7 units annually and the total cost is 20,000 bahts.

Moreover, Left Door Handle Inner can be sold 67 units and the total cost is 18,666 bahts. Rear Bumper Trim Panel can be sold 1 unit annually and the total cost is 18,653 bahts. Engine Cap can be sold 43 units and the total cost is 17,066 bahts. Front Brake Disc can be sold 8 units annually and the total cost is 16,800 bahts. Right Wishbone can be sold annually 5 units and the total cost is 15,733 bahts. Spark Plugs can be sold annually 320 units and the total cost is 14,400 bahts. Gas Pressurized Spring can be sold annually 27 units and the total cost is 13,333 bahts. Expansion Tank can be sold 7 units annually and the total cost is 12,000 bahts. Spray Nozzle can be sold annually 43 units and the total cost is around 11,947 bahts. Left Tail Light can be sold annually 5 units and the total cost is 11,733 bahts. Ignition Cable can be sold annually 8 units and the total cost is 11,600 bahts. Fan Coupling can be sold annually 4 units and the total cost is 11,400 bahts. Air Filter Element can be sold annually 20 units and the total cost is 11,200 bahts. Left Front Side Panel can be sold annually 1 unit and the total cost is 11,139 bahts. Fan 8 can be sold annually 8 units and the total cost is 10,800 bahts.

3.3.3 Class C

There are 53 units in class C. The total cost in this group is ranged from 573.33 to 9,066.67 bahts Left and Right Head Light can be sold annually 1 unit each and the total cost is around 9,067 bahts each. Right Upper Wishbone can be sold annually 1 unit and the total cost is around 8,707 bahts. Locking Kit can be sold annually 7 units and the total cost is around 8,333 bahts. Repair Kit Boot Inner can be sold annually 43 units and

the total cost is 8,107 bahts. Left Wishbone can be sold annually 3 units and the total cost is 7,867 bahts. Front Carrier can be sold annually 1 unit and the total cost is 7,333 bahts. Brake Pad Wear Sensor can be sold annually 40 units and the total cost is 7,200 bahts. Stabilizer Bar Front can be sold annually 1 unit and the total cost is 6,853 bahts. Fuel Filter can be sold annually 13 units and the total cost is around 6,667 bahts.

In addition, Wheel Bolt can be sold annually 43 units and the total cost is 5,973 bahts. Ignition Coil can be sold annually 4 units and the total cost is 5,800 bahts. Left Moulding Door Rear can be sold annually 4 units and the total cost is 5,800 bahts. Protective Rubber Strip can be sold annually 4 units and the total cost is 5,740 bahts Left and Right Grille can be sold annually 5 units each and the total cost is 5,600 bahts each. Engine Mounting can be sold 5 units and the total cost is 5,333 bahts. Gasket with Heat Prod Shield can be sold 13 units and the total cost is around 4,667 bahts. Rear Set Mud Flap can be sold annually 24 units and the total cost is 4,320 bahts. Lower Spring Plate can be sold annually 68 units and the total cost is 4,080 bahts.

Then, Engine Damper can be sold annually 3 units and the total cost is 4,000 bahts. Distributor Cap can be sold annually 13 units and the total cost is 4,000 bahts. Right Rear Door Seal can be sold annually 3 units and the total cost is around 3,867 bahts. Front Set Mud Flap can be sold annually 21 units and the total cost is 3,840 bahts. Upper Spring Plate can be sold annually 64 units and the total cost is 3,840 bahts. Gasket can be sold annually 20 units and the total cost is 3,600 bahts Sound Insulating Engine Hood can be sold annually 1 unit and the total cost is 3,413 bahts. Center Grille can be sold annually 3 units and the total cost is 3,333 bahts. Left Additional Flasher can be sold annually 4 units and the total cost is 3,200 bahts. Horn can be sold annually 4 units and the total cost is 2,720 bahts. Left and Right Fog Lamp can be sold 1 unit each and the total cost is around 2,667 bahts each. Fluid Container can be sold annually

1 unit and the total cost is around 2,467 bahts. Left Front Moudling Fender can be sold 3 units annually and the total cost is 2,453 bahts. Left Outer Rear Window Channel Cover can be sold annually 4 units and the total cost is 2,420 bahts. Right Additional Flasher can be sold annually 3 units and the total cost is 2,133 bahts.

Moreover, Left Front Door Seal can be sold annually 1 unit and the total cost is 1,993 bahts. Right Front Moulding Door can be sold annually 1 unit and the total cost is 1,933 bahts. Left Rear Door Seal can be sold annually 1 unit and the total cost is 1,933 bahts. Left Front Window Guide can be sold annually 1 unit and the total cost is around 1,887 bahts. Left Outer Front Window Channel Cover can be sold annually 3 units and the total cost is 1,773 bahts. Wash Pump can be sold annually 3 units and the total cost is 1,733 bahts. Right Inner Rear Window Channel Cover can be sold annually 3 units and the total cost is 1,613 bahts. Right Outer Rear Window Channel Cover can be sold annually 2 units and the total cost is 1,613 bahts. Base can be sold annually 1 unit and the total cost is around 1,507 bahts. Left Inner Front Window Channel Cover can be sold annually 3 units and the total cost is around 1,467 bahts. Left and Right Air Duct can be sold annually 5 units each and the total cost is 1,200 bahts each. Right Outer Front Window Channel Cover can be sold annually 1 unit and the total cost is 873 bahts. Left Inner Rear Window Channel Cover can be sold annually 1 unit and the total cost is around 807 bahts. Left and Right Front Wheel Housing can be sold annually 1 unit each and the total cost is around 747 bahts each. Fan Shroud can be sold annually 1 unit and the total cost is 573 bahts.

In summary, there are 153 automotive parts in E 30 Model. There are 95 automotive parts that can be sold and 58 automotive parts that cannot be sold. The ABC Classification can be applied to this study. There are 4 automotive parts in class A, 38 automotive parts in class B, and 53 automotive parts in class C.

Table 3.1. E 30 Model Classified by Total Monetary Value.

Code	Unit Sales	Price E30	Annual Sales	Total	Annual Price
103	-				-
101	-	-			-
21	-	-			-
105	-	-			-
104	-	-			-
6	-	-			-
5	-	-	-	-	-
98	-	-	-	-	-
97	-	-	-	-	-
142	72	1,600.00	96	115,200.00	153,600.00
64	53	1,850.00	71	98,050.00	130,733.33
143	58	1,450.00	77	84,100.00	112,133.33
42*	15	4,390.00	20	65,850.00	87,800.00
55*	103	500.00	137	51,500.00	68,666.67
141	58	850.00	77	49,300.00	65,733.33
41*	12	3,450.00	16	41,400.00	55,200.00
120	93	400.00	124	37,200.00	49,600.00
67	5	6,800.00	7	34,000.00	45,333.33
18	4	7,080.00	5	28,320.00	37,760.00
10	45	600.00	60	27,000.00	36,000.00
152	84	290.00	112	24,360.00	32,480.00
53	48	500.00	64	24,000.00	32,000.00
96	10	2,200.00	13	22,000.00	29,333.33
72	20	1,100.00	27	22,000.00	29,333.33
36	42	500.00	56	21,000.00	28,000.00
112	75	280.00	100	21,000.00	28,000.00
156	4	5,200.00	5	20,800.00	27,733.33
66	3	6,800.00	4	20,400.00	27,200.00
125	12	1,600.00	16	19,200.00	25,600.00
58	19	1,000.00	25	19,000.00	25,333.33

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Table 3.1. E 30 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price	Annual Sales	Total	Annual Price
144	34	500.00	45	17,000.00	22,666.67
159	28	600.00	37	16,800.00	22,400.00
140	138	120.00	184	16,560.00	22,080.00
31	3	5,400.00	4	16,200.00	21,600.00
73	19	850.00	25	16,150.00	21,533.33
114	5	3,000.00	7	15,000.00	20,000.00
112	50	280.00	67	14,000.00	18,666.67
16	1	13,990.00	1	13,990.00	18,653.33
83	32	400.00	43	12,800.00	17,066.67
32*	6	2,100.00	8	12,600.00	16,800.00
68	4	2,950.00	5	11,800.00	15,733.33
158	240	45.00	320	10,800.00	14,400.00
40	20	500.00	27	10,000.00	13,333.33
12	5	1,800.00	7	9,000.00	12,000.00
157	32	280.00	43	8,960.00	11,946.67
99	4	2,200.00	5	8,800.00	11,733.33
38	6	1,450.00	8	8,700.00	11,600.00
20	3	2,850.00	4	8,550.00	11,400.00
154	15	560.00	20	8,400.00	11,200.00
49	1	8,354.00	1	8,354.00	11,138.67
56	6	1,350.00	8	8,100.00	10,800.00
109	1	6,800.00	1	6,800.00	9,066.67
108	1	6,800.00	1	6,800.00	9,066.67
70	1	6,530.00	1	6,530.00	8,706.67
111	5	1,250.00	7	6,250.00	8,333.33
37	32	190.00	43	6,080.00	8,106.67
69	2	2,950.00	3	5,900.00	7,866.67
30	1	5,500.00	1	5,500.00	7,333.33
151	30	180.00	40	5,400.00	7,200.00
160	1	5,140.00	1	5,140.00	6,853.33

Table 3.1. E 30 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price	Annual Sales	Total	Annual Price
153	10	500.00	13	5,000.00	6,666.67
145	32	140.00	43	4,480.00	5,973.33
22	3	1,450.00	4	4,350.00	5,800.00
29	3	1,450.00	4	4,350.00	5,800.00
119	3	1,435.00	4	4,305.00	5,740.00
45	4	1,050.00	5	4,200.00	5,600.00
44	4	1,050.00	5	4,200.00	5,600.00
19	4	1,000.00	5	4,000.00	5,333.33
59	10	350.00	13	3,500.00	4,666.67
116	18	180.00	24	3,240.00	4,320.00
128	51	60.00	68	3,060.00	4,080.00
39	2	1,500.00	3	3,000.00	4,000.00
81	10	300.00	13	3,000.00	4,000.00
126	2	1,450.00	3	2,900.00	3,866.67
115	16	180.00	21	2,880.00	3,840.00
127	48	60.00	64	2,880.00	3,840.00
57	15	180.00	20	2,700.00	3,600.00
14	1	2,560.00	1	2,560.00	3,413.33
43	2	1,250.00	3	2,500.00	3,333.33
102	3	800.00	4	2,400.00	3,200.00
47*	3	680.00	4	2,040.00	2,720.00
107	1	2,000.00	1	2,000.00	2,666.67
106	1	2,000.00	1	2,000.00	2,666.67
11	1	1,850.00	1	1,850.00	2,466.67
25	2	920.00	3	1,840.00	2,453.33
136	3	605.00	4	1,815.00	2,420.00
100	2	800.00	3	1,600.00	2,133.33
122	1	1,495.00	1	1,495.00	1,993.33
26	1	1,450.00	1	1,450.00	1,933.33
124	1	1,450.00	1	1,450.00	1,933.33

Table 3.1. E 30 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price	Annual Sales	Total	Annual Price
147	1	1,415.00	1	1,415.00	1,886.67
130	2	665.00	3	1,330.00	1,773.33
110	2	650.00	3	1,300.00	1,733.33
133	2	605.00	3	1,210.00	1,613.33
135	2	605.00	3	1,210.00	1,613.33
78	1	1,130.00	1	1,130.00	1,506.67
132	2	550.00	3	1,100.00	1,466.67
35	4	225.00	5	900.00	1,200.00
34	4	225.00	5	900.00	1,200.00
129	1	655.00	1	655.00	873.33
134	1	605.00	1	605.00	806.67
88	1	560.00	1	560.00	746.67
87	1	560.00	1	560.00	746.67
52	1	430.00	1	430.00	573.33
13	0	20,680.00	0	0.00	0.00
65	0	13,070.00	0	0.00	0.00
33*	0	2,000.00	0	0.00	0.00
139	0	6,500.00	0	0.00	0.00
84	0	220.00	0	0.00	0.00
82	0	120.00	0	0.00	0.00
92	0	830.00	0	0.00	0.00
91	0	830.00	0	0.00	0.00
54	0	1,850.00	0	0.00	0.00
61	0	18,887.00	0	0.00	0.00
60	0	18,887.00	0	0.00	0.00
9	0	1,780.00	0	0.00	0.00
8	0	1,780.00	0	0.00	0.00
63	0	18,887.00	0	0.00	0.00
62	0	18,887.00	0	0.00	0.00
23	0	3,850.00	0	0.00	0.00

Table 3.1. E 30 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price	Annual Sales	Total	Annual Price
15	0	10,170.00	0	0.00	0.00
121	0	1,495.00	0	0.00	0.00
126	0	545.00	0	0.00	0.00
162	0	3,814.00	0	0.00	0.00
48	0	8,350.00	0	0.00	0.00
138	0	500.00	0	0.00	0.00
137	0	500.00	0	0.00	0.00
74	0	7,260.00	0	0.00	0.00
79	0	1,580.00	0	0.00	0.00
131	0	550.00	0	0.00	0.00
7	0	2,200.00	0	0.00	0.00
27	0	1,450.00	0	0.00	0.00
28	0	1,450.00	0	0.00	0.00
24	0	920.00	0	0.00	0.00
150	0	3,100.00	0	0.00	0.00
95	0	13,400.00	0	0.00	0.00
155	0	7,100.00	0	0.00	0.00
51	0	12,712.00	0	0.00	0.00
50	0	12,100.00	0	0.00	0.00
90	0	380.00	0	0.00	0.00
89	0	380.00	0	0.00	0.00
118	0	1,130.00	0	0.00	0.00
117	0	1,130.00	0	0.00	0.00
77	0	10,060.00	0	0.00	0.00
76	0	10,060.00	0	0.00	0.00
2	0	3,600.00	0	0.00	0.00
1	0	3,600.00	0	0.00	0.00
4	0	3,600.00	0	0.00	0.00
3	0	3,600.00	0	0.00	0.00
161	0	4,600.00	0	0.00	0.00

Table 3.1. E 30 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price	Annual Sales	Total	Annual Price
46	0	1,320.00	0	0.00	0.00
94	0	220.00	0	0.00	0.00
93	0	220.00	0	0.00	0.00
86	0	950.00	0	0.00	0.00
85	0	250.00	0	0.00	0.00
75	0	5,260.00	0	0.00	0.00
80	0	15,400.00	0	0.00	0.00
71	0	6,530.00	0	0.00	0.00
149	0	1,260.00	0	0.00	0.00
146	0	1,410.00	0	0.00	0.00
148	0	1,260.00	0	0.00	0.00
17*	0	3,100.00	0	0.00	0.00
				1,252,944.00	1,670,658.67

Figure 3.1.   shows the graph of the E 30 Model which is classified by total

monetary value. The automotive parts in this model can also be divided into three

classes: class A, class B, and class C as shown in Figure 3.2, Figure 3.3, and Figure 3.4.
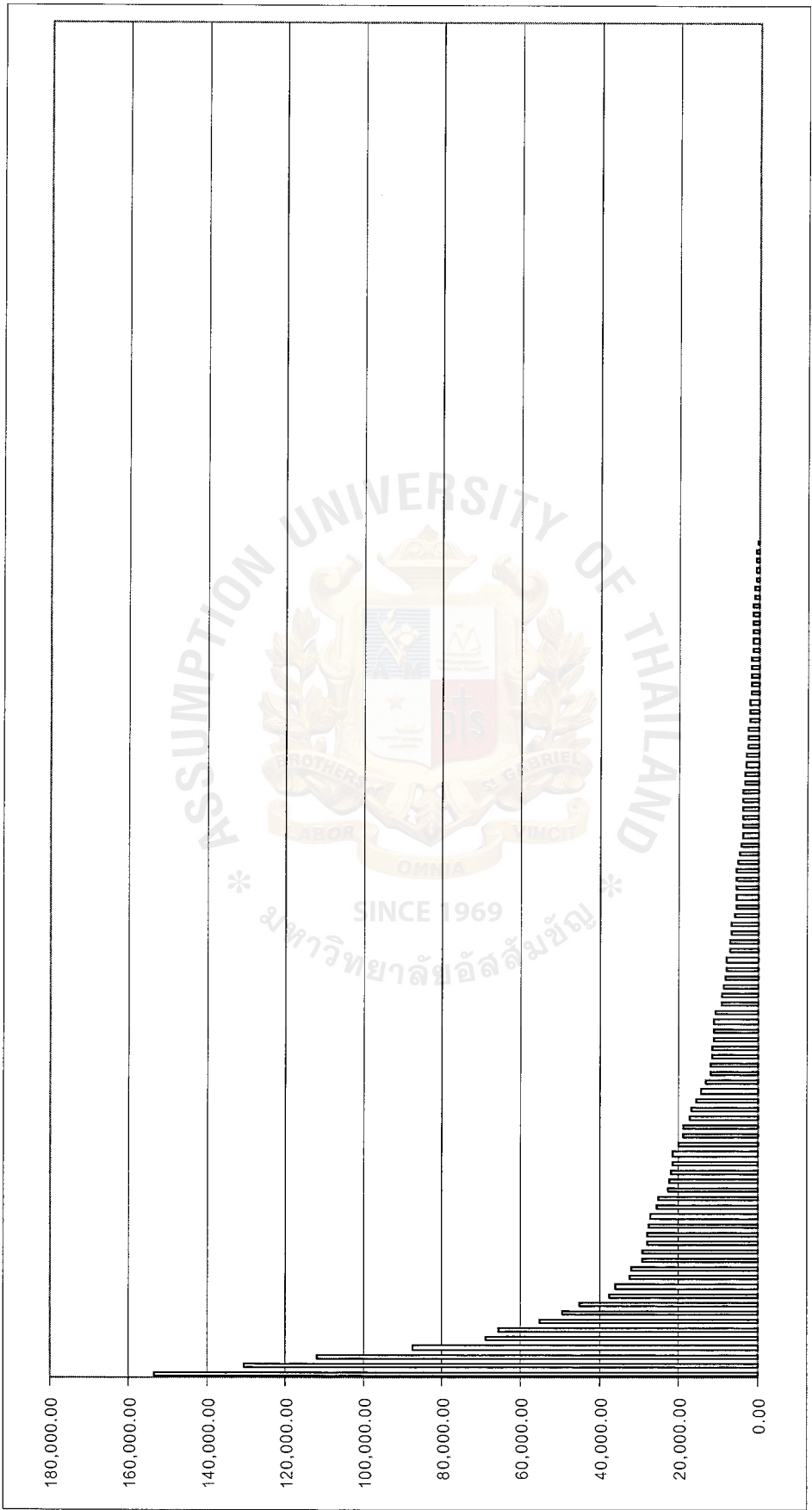
Annual Sales Volume for Different Parts of The E 30 Model.

Class A of The E 30 Model Classified by Total Monetary Value.

Class B of The E 30 Model Classified by Total Monetary Value.

Class C of The E 30 Model Classified by Total Monetary Value.

IV. PROCUREMENT AND INVENTORY STRATEGIES BASED ON THE ABC CLASSIFICATION

In doing the inventory management, there are many factors to be considered besides the inventory costs, inventory control, function of the inventory, types of inventory or even the inventory problems, and so on. It is needed to be known about the lot size, lead time, etc. It can be identified that when the products should be ordered or reordered, how much to be ordered each time, and how long for receiving the products after ordering.

Since it takes a short period of time for receiving the ordered products, a back order can be applied to the shop when customers are willing to wait for the products. It can be concluded that the products can be received within 2-3 days, the customers are willing to wait for the products. This method can save the carrying cost. It is not needed to carry the products in stock if the customers are willing to wait for the products. If the products take a long period of receiving the products, it should have the products in stock in order not to face the stockout and loss of sales. Moreover, the hardly sold products should not be kept in stock, it can be ordered once the customers need. The frequently sold products can be kept in stock but should be stocked in the appropriate level. However, the reorder point can be calculated by multiplying lead time and annual sales per day.

4.1 Class A

There are 4 automotive parts in this class. Due to the high inventory value of class A products, it is needed to check its inventory frequently. The degree of control should be tight, and the size of safety stock should be small. Therefore, it is needed to check its stock weekly, if possible, because of high value of annual use.

It can be identified that Right Tie Rod can be sold 8 units each month or 96 units sold a year, and it is needed to be ordered 10 units each time of ordering. In addition, it takes 4 days for receiving the products. It should be reordered when the product is left 1 unit in stock. The reason is because it takes 4 days for receiving the products after ordering. It can be seen that it takes quite a long time in receiving the products that most customers are not willing to wait for the products.

Water Pump can be sold 6 units each month or 71 units sold a year. It should be ordered 1 unit for lot size and the lead time is 3 days. It is also needed to check the stock frequently because of high value products. It may check the stock weekly. Once the product is left 1 unit, it is needed to reorder.

Left Tie Rod can be sold around 6 unit each month or 77 units sold a year. Lot size is 10 units and lead time is 4 days. It should be reordered once the product is left in stock is only 1 unit because it takes quite a long time for receiving the products. Therefore, it is needed to check its stock weekly in order not to face the stockout and loss of sales.

Rear Shock Absorber can be sold 2 units each month or 20 units sold a year, lot size is 1 unit and lead time is 5 days. It should be sold in pair. The lot size is only 1 pair. It is needed to check its stock weekly because of the high value of products. Because it takes 5 days in lead time, customers are not willing to wait for the product. Although it is sold only 20 units a year and the lot size is 1 unit, it should be stocked due to the long period of time in receiving the products.

It can be concluded that it is a high inventory value of class A product, it is needed to check its stocks frequently, may be weekly or biweekly. It can be said that the degree of control is tight, and the safety stock is small.

4.2   Class B

There are 38 automotive parts in this class. Due to the moderate inventory value of class B products, it is needed to be checked monthly. It is not to be checked as frequently as class A products. The degree of control and the size of safety stock should be moderate.

Wiper Blade should be sold in pair. It can be sold around 11 pairs each month or 137 pairs sold a year, lot size is 10 pairs and lead time is 5 days. It can be seen that it takes a lot of time for taking the stock, it is needed to keep the product in stock in order not to lose sales. When the product is left only 2 pairs, it can be reordered because it takes 5 days in receiving the products.

Swing Support can be sold around 6 units a month or 77 units sold a year. It should be ordered 1 unit each time and the lead time is 3 days. It can be indicated that it takes a short time of receiving the product which customers can wait for. However, it should have some products in stock. The reorder point is 1 unit.

Front Shock Absorber needed to be sold in pair. It can be sold 1 pair a month or 16 units sold a year, lot size is 1 pair and lead time is 5 days. Although it is a hardly sold products, it is needed to stock the product due to the long period of time in receiving the products. Therefore, it should be stocked at least 1 pair.

Engine Mounting can be sold 10 units a month or 124 units sold a year, lot size is 1 unit, and lead time is 3 days. It can be seen that there are only 3 days in receiving the products, so it could be possible not to stock the product. The back order can be applied to this case. However, it could be possible to keep the product in stock. It should be left the product in stock 1 unit. Therefore, the reorder point is 1 unit.

Left Trailing Arm can be sold 1 unit each month in an average or 7 units sold a year, lot size is 1 unit, and lead time is 4 days. It can be seen that it is a hardly sold

product, so there is no need to keep product in stock. The back order can be applied to this case.

Steering Column cannot be sold in an average or 5 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be seen that this product cannot be sold in an average, so the back order can be applied to this case because it takes a short period of time for receiving the products after ordering as customers can wait for the products.

Wheel Brake Cylinder can be sold 5 units a month or 60 units sold a year, lot size is 1 unit, and lead time is 3 days. It can be seen that it takes only 3 days in receiving the products after ordering, so the back order can be applied to this case.

Oil Filter can be sold 9 units a month or 112 units sold a year, lot size is 24 units, and lead time is 3 days. It can be estimated that each time of ordering can be stocked for 2-3 months. Therefore, the degree of control is moderate. It takes a few days for receiving the products, so it can be reordered once the product is left 1 unit.

Set Rubber Mounting can be sold 5 units each month or 64 units sold a year, lot size is 1 unit, and lead time is 5 days. It should be reordered once the product is left 1 unit because it takes a long period of time for receiving after ordering.

Right Tail Light can be sold 1 unit a month or 13 units sold a year, lot size is 1 unit, and lead time is 5 days. It takes a long period of time for receiving the products after ordering. It can be said that it is a hardly sold product, so the back order can be applied to this case.

Front Repair Kit Brake Pad can be sold 2 units a month or 27 units sold a year, lot size is 10 units, and lead time is 5 days. It can be estimated that each time of ordering can be used for 5 months. Due to the long period of time of ordering and a hardly sold product, it could be possible not to keep the product in stock. However, it should be stocked because most customers cannot wait for the products.

Repair Set Brake Caliper can be sold 5 units a month or 56 units sold a year, lot size is 1 unit, and lead time is 5 days. Due to the long period of receiving the products, it can be reordered once the product is left 1 unit in stock in order not to have stockout. Therefore, the reorder point is 1 unit.

Right Door Handle Inner can be sold 8 units a month or 100 units sold a year, lot size is 10 units, and lead time is 3 days. It is possible that each time of ordering can be used 1 month. The degree of control would be moderate, and the size of safety stock is also moderate. Once the product is left only one unit, it could be reordered because it takes only 3 days for receiving the product after ordering.

Brake Servo cannot be sold in an average or 5 units sold a year, lot size is 1 unit, and lead time is 7 days. It can be seen that this product cannot be sold and it takes a long period of receiving the products, it should have some products available in stock. However, it is a hardly sold product, it is no need to keep products in stock. Therefore, a back order can be applied in this case.

Right Trailing Arm cannot be sold in an average or 4 units sold a year, lot size is 1 unit, and lead time is 4 days. It can be seen that this product cannot be sold and it takes a long period of receiving the products, it should have some products available in stock. However, it should have only one unit in stock.

Trunk Lid Gasket can be sold 1 unit each month or 16 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be seen that it takes only 2 days for receiving the products, so the back order can be applied for this case.

Cylinder Head Gasket can be sold 2 units a month or 25 units sold a year, lot size is 3 units, and lead time is 2 days. The back order can be applied for this product due to the short time for receiving the products.

Thermostat can be sold 4 units a month or 45 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be said that the back order can be applied for this product because it takes a short period of receiving the products after ordering.

Rotor can be sold 3 units each month or 37 units sold a year, lot size is 1 unit, and lead time is 5 days. It can be seen that it takes a long period of time for receiving the products. It is possible that it should be reordered once the product is left only one unit in order not to face the stockout.

Stabilizer Rubber Mounting can be sold 15 units a month or 184 units sold a year, lot size is 10 units, and lead time is 5 days. It is possible to reorder when the product is left 3 units in stock. It should have some products in stock because it takes a long period of time for receiving the products.

Rear Carrier cannot be sold in an average or only 4 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be seen that it takes only 2 days for receiving the products, so the back order can be applied for this case.

Rear Repair Kit Brake Pad can be sold 2 units a month or 35 units sold a year, lot size is 10 units, and lead time is 5 days. It can be said that this product is a hardly sold product. It can be estimated that each time of ordering can be used for 5 months. Due to the long period of time for receiving the products, it is no need to have some products available in stock. Therefore, a back order can be applied to this case.

Brake Master Cylinder can be sold 1 unit a month or only 7 units sold a year, lot size is 1 unit, and lead time is 3 days. It can be said that this product is also a hardly sold product. It can be seen that it takes only 3 days for receiving the products and customers can wait for the product, so the back order can be applied for this case.

Left Door Handle Inner can be sold 6 units each month or 67 units sold year, lot size is 10 units, and lead time is 3 days. It can be indicated that the products can be

received only 3 days after ordering. Each time of ordering can be used for one and a half month at an average. It can be possible to reorder when the product is left 1 unit in stock.

Rear Bumper cannot be sold in an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. In an average this product cannot be sold each month, and lead time is only 2 days. It can be indicated that customers are willing to wait for the products, so the back order can be applied to this product.

Engine Cap can be sold 4 units a month, lot size is 1 unit or 43 units sold a year, and lead time is 2 days. It is possible to have this product in stock because it is estimated that it can be sold 1 unit a week. It can be reordered once it has only one unit in stock. It is also possible to use back order in this case because it takes a short period of time for receiving the product.

Front Brake Disc should be sold in pair. It can be sold 1 pair a month or 8 pairs sold a year, lot size is 5 pairs, and lead time is 5 days. It is estimated that each time of ordering can be used for 5 months. Due to the long period of time for receiving the products after ordering, it should have some products available in stock. However, it is a hardly sold product, it is possible not to keep products in stock. Therefore, the back order can be applied to this case.

Right Wishbone cannot be sold in an average or 5 units sold a year, lot size is 1 unit, and lead time is 4 days. It can be said that this product is also a hardly sold product, so it is not needed to keep products in stock. Therefore, the back order can be applied to this case.

Spark Plugs can be sold 27 units a month or 320 units sold a year, lot size is 5 boxes, each box contains 10 units, and lead time is 5 days. It can be estimated that each

time of ordering can be used for 2 months. Because of long period of time for receiving the products, it is possible to reorder once the product is left around 4 units.

Gas Pressurized Spring can be sold 2 units each month or 27 units sold a year, lot size is 1 unit, and lead time is 3 days. The back order can be applied to this case due to the short period of time for ordering. It is also possible to have the product in stock. It can be reordered if the product is left only one unit in stock.

Expansion Tank can be sold 1 unit a month or 7 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that this product is a hardly sold product, and it is a short period of time for receiving the product. Therefore, a back order can be applied in this case.

Spray Nozzle can be sold 4 units a month or 43 units sold a year, lot size is 1 unit, and lead time is 2 days. The back order can be applied to this case because of a short period of time fore receiving the product.

Left Tail Light cannot be sold in an average or 5 units sold a year, lot size is 1 unit, and lead time is 5 days. It should have the product in stock at least one unit in stock because it takes a long period of time for receiving the product. However, it is not needed to keep products in stock. The back order can be applied to this case.

Ignition Cable can be sold 1 unit a month or only 8 units sold a year, lot size is 1 unit, and lead time is 5 days. Due to the long period of time for receiving the product, it should have some products available in stock. Once the product is sold, it is possible to reorder. However, the back order can be applied to this case because it is a hardly sold product.

Fan Coupling cannot be sold at an average or only 4 units sold a year, lot size is 5 units, and lead time is 4 days. Due to the hardly sold products, the back order can be applied to this case.

Air Filter can be sold 2 units each month or 20 units sold a year, lot size is 10 units, and lead time is 5 days. It can be estimated that each time of ordering the product can be used for 5 months. Due to the long period of time for receiving the products, it is possible to reorder if the product is left only 1 unit. However, it could be possible not to have some products available in stock. The back order can be applied to this case.

Left Front Side Panel cannot be sold at an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. It can be said that the back order can be applied for this case because it takes only 2 days for receiving the product, and it cannot be sold in an average. Therefore, it should not have the product in stock.

Fan can be sold 1 unit each month or 8 units sold a year, lot size is 1 unit, and lead time is 2 days. The back order can be applied for this case due to the short period of time for receiving the product.

It can be indicated that it is a moderate inventory value of the class B products, the stock should be checked biweekly or monthly. The degree of control is moderate and the size of safety stock is also moderate.

4.3 Class C

There are 53 automotive parts in this class. Due to the small inventory value of class C products, it could be possible to check the products semiannually. The degree of control could be loose, and size of safety stock could be large because it is not needed to check stock frequently.

Left and Right Head Light cannot be sold at an average or only 1 unit sold a year, lot size is 1 unit for each item, and lead time is 5 days. Due to a long period of time for receiving the products, it should have some products available in the stock in order not to face loss of sales. However, it can be seen that it is a hardly sold product. The back order can be applied to this case.

Right Upper Wishbone cannot be sold in an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 4 days. It also takes a long period of time for receiving the product, so it should have the product available in stock. However, the back order can be applied to this case because it is a hardly sold product.

Locking Kit can be sold 1 unit each month or 7 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that back order can be applied in this case due to a short period of time for receiving the product. It is thus not necessary to keep product in stock in order to save the carrying cost.

Repair Kit Boot Inner can be sold 4 units a month or 43 units sold a year, lot size is 1 unit, and lead time is 4 days. It can be estimated that this product can be sold 1 unit a week. Due to the long period of time for receiving the products and most customers are not awaiting for the products, it is possible to reorder the product if the product is left only one unit.

Left Wishbone cannot be sold at an average or only 3 units sold a year, lot size is 1 unit, lead time is 4 days. Due to the hardly sold product, the back order can be applied to this case.

Front Carrier cannot be sold at an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. Due to a short period of time for receiving the products, the back order can be applied for this case. It can be said that the customers are willing to wait for the product, so it is not needed to stock this product that can save the carrying cost.

Brake Pad Wear Sensor can be sold 3 units a month or 40 units sold a year, lot size is 1 unit, and lead time is 3 days. It takes a short period of time for receiving the products, so it is possible to use back order in this case. It is also reordered if there is only one unit in stock.

Front Stabilizer Bar cannot be sold at an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. The back order can be applied for this case because it takes a short period of time for receiving the product.

Fuel Filter can be sold 1 unit a month or 13 units sold a year, lot size is 10 units, and lead time is 5 days. It takes a long period of time for receiving the products, and it can be seen that each time of ordering can be used for 10 months at an average, so it could be possible not to keep the product in stock. Therefore, the back order can be applied to this case.

Wheel Bolt can be sold 4 units a month or 43 units sold a year, lot size is 50 units, and lead time is 7 days. It can be seen that it takes a long time for receiving the products, each time of ordering can be used for 12 months in an average. Therefore, it is possible to reorder when there is only one unit in stock.

Ignition Coil cannot be sold in an average or only 4 units sold a year, lot size is 1 unit, and lead time is 5 days. It is seen that it takes a long period of time for receiving the product, so it should have some products available in stock. However, it is a hardly sold product, the back order can be applied to this case.

In addition, it can be seen that there are 2 automotive parts that can be grouped together due to the same criteria. Left Rear Moulding Door, and Protective Rubber Strip. The reason is that they all cannot be sold at an average, lot size is 1 unit, and lead time is 2 days. it can be indicated that the customers are willing to wait for the products, so the back order can be applied to this case.

Left and Right Grille, and Engine Mounting can be grouped together. The reason is that they all cannot be sold at an average or it can be sold 5 units a year, lot size is 1 unit, and lead time is 2 days. It can seen that it takes only 2 days for receiving the

product, and the customers are willing to wait for the products, it is thus not needed to keep the product in stock. A back order can be applied for this case.

Gasket with Heat Prod can be sold 1 unit a month or 13 units sold a year, lot size is 1 unit, and lead time is 2 days. A back order can be applied for this case because the customers are willing to wait for the products due to a short period of time for receiving the product.

Rear Set Mud Flap can be sold 2 units a month or 24 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be seen that it takes only 2 days for receiving the product where customers can wait for the product. A back order can be applied for this case. It is thus not needed to keep this product in stock.

Lower Spring Plate can be sold 6 units a month or 68 units sold a year, lot size is 10 units, and lead time is 5 days. It can be estimated that each time of ordering can be used for nearly 2 months. It can be reordered when the product is left only one unit.

Engine Damper cannot be sold at an average or 3 units sold a year, lot size is 1 unit, and lead time is 3 days. It can be seen that a back order can be applied to this case because it takes only a few days for receiving the products, and it cannot be sold at an average. It is thus not needed to keep the product in stock in order to save the carrying cost.

Distributor Cap can be sold 1 unit a month or 13 units sold a year, lot size is 1 unit, and lead time is 5 days. It takes a long period of time for receiving the product so it is possible to reorder when the product is sold. However, the back order can be applied to this case due to the hardly sold product.

Right Rear Door Seal cannot be sold at an average or only 3 units sold a year, lot size is 1 unit, and lead time is 2 days. A back order can be applied to this case due to a

short period of time for receiving the product. It is seen that this product cannot be sold at an average, it is thus not needed to keep the product in stock.

Front Set Mud Flap can be sold 2 units a month or 21 units sold a year, lot size is 1 unit, and lead time is 2 days. Due to a short period of time for receiving the product, a back order can be applied for this case.

Upper Spring Plate can be sold 5 units a month or 64 units sold a year, lot size is 10 units, and lead time is 5 days. It can be estimated that each time of ordering can be used for 2 months. Due to a long period of time for receiving the products, it is possible to reorder when the product is left one unit.

Gasket can be sold 2 units a month or 20 units sold a year, lot size is 1 unit, and lead time is 5 days. Due to the long period of time for receiving the product, it should have some products available in stock. When the product is left only one unit, it is possible to reorder. However, it is possible not to keep the products in stock due to the hardly sold product. Therefore, the back order can be applied to this case.

Sound Insulating Engine Hood cannot be sold at an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. Due to a short period of time for receiving the products and a hardly sold product, a back order can be applied for this case.

Center Grille cannot be sold at an average or 3 units sold a year, lot size is 1 unit, lead time is 2 days. The back order can be applied for this case because it takes only 2 days for receiving the product, it cannot be sold at an average. It is thus not needed to keep the product in stock.

Left Additional Flasher cannot be sold at an average or 4 units sold a year, lot size is 1 unit, and lead time is 2 days. It takes a short period of time for receiving the

product, and it cannot be sold at an average. The back order can also be applied to this case.

Horn should be sold in pair. It cannot be sold at an average or only 4 pairs sold a year, lot size is 5 pairs, and lead time is 5 days. It can be said that this product is a hardly sold product and it also takes a long period of time for receiving the product. It can be reordered if the product is left only one unit. However, it is a hardly sold product, it could be possible not to keep products in stock. Therefore, the back order can be applied to this case.

Left and. Right Fog Lamp cannot be sold at an average or only 1 unit sold a year for each product, lot size is 10 units each, and lead time is 5 days. It is be possible to reorder when the product is left only one unit because the product cannot be sold at an average. However, the back order can be applied to this case because only one unit is sold a year. Therefore, it is not needed to have some products available in stock.

Fluid Container cannot be sold at an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that customers are willing to wait for the products, so the back order can be applied to this case due to a short period of time for receiving the product after ordering.

Left Front Moudling Fender cannot be sold at an average or 3 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that the back order can be applied to this case due to the hardly sell products and a short time for receiving the products.

Left Outer Rear Window Channel Cover cannot be sold at an average, or 4 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that the back order can be applied to this case due to the hardly sold products and a short time for receiving the products.

Right Additional Flasher cannot be sold at an average or 3 units sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that the back order can be applied to this case due to the hardly sold products and a short time for receiving the products.

However, some automotive parts can group together because of having the same information. In this case, there are 4 automotive parts that have the same information; that is, cannot be sold each month at an average, lot size is 1 unit, and lead time is 1 day. It can be seen that Left Front Door Seal, Right Front Moulding Door, Left Rear Door Seal, and Front Left Window Guide can group together because of having the same information. Due to a short period of time for receiving the product, the back order can be applied to this case.

Left Outer Front Window Channel Cover cannot be sold at an average or 3 units sold at an average, lot size is 1 unit, and lead time is 2 days. It can be indicated that it takes a short period of time for receiving the products, so the back order can be applied to this case.

Wash Pump cannot be sold at an average or 3 units sold a year, lot size is 1 unit, and lead time is 3 days. Back order can be also applied to this study because it takes a short period of time for receiving the product. It should not be kept in stock because it is a hardly sold product.

In addition, these automotive parts can also be set in the same group. There are 2 automotive parts can be in the same group which have the same information; that is, the products cannot be sold at an average, lot size is 1 unit, and lead time is 2 days. Right Inner Rear Window Channel Cover and Rear Window Channel Cover can be grouped together. A back order can be applied to this case because it takes a short period of time in receiving the products.

Base cannot be sold at an average, or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that the back order can be applied to this case because the customers are willing to wait for the products.

Left Inner Front Window Channel Cover cannot be sold at an average or only 1 unit sold a year, lot size is 1 unit, and lead time is 2 days. It can be indicated that the back order can be applied to this case because the customers are willing to wait for the products.

It can be indicated that Left and Right Air Duct can be grouped together due to having the same information. They cannot be sold at an average or 5 units sold a year, lot size is 1 unit, and lead time is only 2 days. The back order can be applied to this case because the customers are willing to wait for the products.

It can be indicated that there are 5 units that can be grouped together because of having the same information. Right Outer Front Window Channel Cover, Left Inner Rear Window Channel Cover, Left and Right Front Wheel Housing, and Fan Shroud cannot be sold at an average, the lot size is 1 unit, and lead time is 2 days. It could be possible that the back order can be applied to this case. It is not needed to keep the products in stock because the customers are willing to wait for the products.

It can be seen that most of the automotive parts in class C cannot be sold in an average, and lot size is 1 unit. In addition, it takes 2 days in lead time. It can be identified that the automotive parts in class C should not be kept in stock because it is the hardly sold products. Most customers are willing to wait for the products, so the back order can be applied to this case. It can be concluded that the products in class C should be in loose control, and simple records.

It is possible to say that the back order can be applied for those products that takes only few days for receiving the products after ordering. For those products that have a

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long period of time of ordering, it should have the products available in stock for the appropriate level in order to save the carrying cost, and not face the loss of sales.

It can be summarized that there are 4 automotive parts in class A, 38 automotive parts in class B, and 53 automotive parts in class C. The summarization of class A, B and C is shown in Table 4.1, Table 4.2, and Table 4.3 respectively.

Table 4.1. Inventory Strategies for Class A Items.

Product's Name	Lot Size	Lead Time	Reorder Point	Annual Sales	Annual Sales Per Day	Total
Right Tied Rod	10	4	1	96	0.2630136986	153,600.00
Water Pump	1	3	1	71	0.1945205479	130,733.00
Left Tied Rod	10	4	1	77	0.2109589041	112,133.00
Rear Shock Absorber	1	5	0	20	0.0547945205	87,800.00
				Total		484,266.00

Table 4.2. Inventory Strategies for Class B Items.

Product's Name	Lot Size	Lead Time	Reorder Point	Annual Sales	Annual Sales Per Day	Total
Wiper Blade	10	5	2	137	0.3753424658	68,666.67
Swing Support	1	3	1	77	0.2109589041	65,733.33
Front Shock Absorber	1	5	0	16	0.0438356164	55,200.00
Engine Mounting	1	3	1	124	0.3397260274	49,600.00
Left Trailing Arm	1	4	0	7	0.0191780822	45,333.33
Steering Column	1	2	0	5	0.0136986301	37,760.00
Wheel Brake Cylinder	1	3	0	60	0.1643835616	36,000.00
Oil Filter	24	3	1	112	0.3068493151	32,480.00
Set Rubber Mounting	1	5	1	64	0.1753424658	32,000.00
Right Tail Light	1	5	0	13	0.0356164384	29,333.33
Front Repair Kit Brake Pad	10	5	0	27	0.0739726027	29,333.33
Repair Set Brake Caliper	1	5	1	56	0.1534246575	28,000.00
Right Door Handle Inner	10	3	1	100	0.2739726027	28,000.00
Brake Servo	1	7	0	5	0.0136986301	27,733.33

Table 4.2. Inventory Strategies for Class B Items. (Continued)

Product's Name	Lot Size	Lead Time	Reorder Point	Annual Sales	Annual Sales Per Day	Total
Right Trailing Arm	1	4	0	4	0.0109589041	27,200.00
Trunk Lid Gasket	1	2	0	16	0.0438356164	25,600.00
Cylinder Had Gasket	3	2	0	25	0.0684931507	25,333.33
Thermostat	1	2	0	45	0.1232876712	22,666.67
Rotor	1	5	1	37	0.1013698630	22,400.00
Stabilizer Rubber Mounting	10	5	3	184	0.5041095890	22,080.00
Rear Carrier	1	2	0	4	0.0109589041	21,600.00
Rear Repair Kit Break Pad	10	5	0	25	0.0684931507	21,533.33
Brake Master Cylinder	1	3	0	7	0.0191780822	20,000.00
Left Door Handle Inner	10	3	1	67	0.1835616438	18,666.67
Rear Bumper	1	2	0	1	0.0027397260	18,653.33
Engine Cap	1	2	0	43	0.1178082192	17,066.67
Front Brake Disc	1	5	0	8	0.0219178082	16,800.00
Right Wishbone	1	4	0	5	0.0136986301	15,733.33
Spark Plugs	50	5	4	320	0.8767123288	14,400.00
Gas Pressurized Spring	1	3	0	27	0.0739726027	13,333.33
Expansion Tank	1	2	0	7	0.0191780822	12,000.00
Spray Nozzle	1	2	0	43	0.1178082192	11,946.67
Left Tail Light	1	5	0	5	0.0136986301	11,733.33
Ignition Cable	1	5	0	8	0.0219178082	11,600.00
Fan Coupling	5	4	0	4	0.0109589041	11,400.00
Air Filter	10	5	0	20	0.0547945205	11,200.00
Left Front Side Panel	1	2	0	1	0.0027397260	11,138.67
Fan	1	2	0	8	0.0219178082	10,800.00
				Total		980,058.65

Table 4.3. Inventory Strategies for Class C Items.

Product's Name	Lot Size	Lead Time	Reorder Point	Annual Sales	Annual Sales Per Day	Total
Left Head Light	1	5	0	1	0.0027397260	9,066.67
Right Head light	1	5	0	1	0.0027397260	9,066.67
Right Upper Wishbone	1	4	0	1	0.0027397260	8,706.67
Locking Kit	1	2	0	7	0.0191780822	8,333.33
Repair Kit Boot Inner	1	4	0	43	0.1178082192	8,106.67
Left Wishbone	1	4	0	3	0.0082191781	7,866.67
Front Carrier	1	2	0	1	0.0027397260	7,333.33
Brake Pad Wear Sensor	1	3	0	40	0.1095890411	7,200.00
Front Stabilizer Bar	1	2	0	1	0.0027397260	6,853.33
Fuel Filter	10	5	0	13	0.0356164384	6,666.67
Wheel Bolt	50	7	1	43	0.1178082192	5,973.33
Ignition Coil	1	5	0	4	0.0109589041	5,800.00
Left Rear Moulding Door	1	2	0	4	0.0109589041	5,800.00
Protective Rubber Strip	1	2	0	4	0.0109589041	5,740.00
Left Grille	1	2	0	5	0.0136986301	5,600.00
Right Grille	1	2	0	5	0.0136986301	5,600.00
Engine Mounting	1	2	0	5	0.0136986301	5,333.33
Gasket with Heat Prod	1	2	0	13	0.0356164384	4,666.67
Rear Set Mud Flap	1	2	0	24	0.0657534247	4,320.00
Lower Spring Plate	10	5	1	68	0.1863013699	4,080.00
Engine Damper	1	3	0	3	0.0082191781	4,000.00
Distributor Cap	1	5	0	13	0.0356164384	4,000.00
Right Rear Door Seal	1	2	0	3	0.0082191781	3,866.67
Front Set Mud Flap	1	2	0	21	0.0575342466	3,840.00
Upper Spring Plate	10	5	1	64	0.1753424658	3,840.00
Gasket	1	5	0	20	0.0547945205	3,600.00
Sound Insulating Engine Hood	1	2	0	1	0.0027397260	3,413.33
Center Grille	1	2	0	3	0.0082191781	3,333.33
Left Additional Flasher	1	2	0	4	0.0109589041	3,200.00
Horn	5	5	0	4	0.0109589041	2,720.00

Table 4.3. Inventory Strategies for Class C Items. (Continued)

Product's Name	Lot Size	Lead Time	Reorder Point	Annual Sales	Annual Sales Per Day	Total
Left Fog Lamp	10	5	0	1	0.0027397260	2,666.67
Right Fog Lamp	10	5	0	1	0.0027397260	2,666.67
Fluid Container	1	2	0	1	0.0027397260	2,466.67
Left Front Moulding Fender	1	2	0	3	0.0082191781	2,453.33
Left Outer Rear Window Channel Cover	1	2	0	4	0.0109589041	2,420.00
Right Additional Flasher	1	2	0	3	0.0082191781	2,133.33
Left Front Door Seal	1	2	0	1	0.0027397260	1,993.33
Right Front Moulding Door	1	2	0	1	0.0027397260	1,933.33
Left Rear Door Seal	1	2	0	1	0.0027397260	1,933.33
Front Left Window Guide	1	2	0	1	0.0027397260	1,886.67
Left Outer Front Window Channel Cover	1	2	0	3	0.0082191781	1,773.33
Wash Pump	1	3	0	3	0.0082191781	1,733.33
Right Inner Rear Window Channel Cover	1	2	0	3	0.0082191781	1,613.33
Rear Window Channel Cover	1	2	0	3	0.0082191781	1,613.33
Base	1	2	0	1	0.0027397260	1,506.67
Left Inner Front Window Chanel Cover	1	2	0	3	0.0082191781	1,466.67
Left Air Duct	1	2	0	5	0.0136986301	1,200.00
Right Air Duct	1	2	0	5	0.0136986301	1,200.00
Right OuterFront Window Channel Cover	1	2	0	1	0.0027397260	873.33
Left Inner Rear Window Chanel Cover	1	2	0	1	0.0027397260	806.67
Left Front Wheel Housing	1	2	0	1	0.0027397260	746.67
Right Front Wheel Housing	1	2	0	1	0.0027397260	746.67
Fan Shroud	1	2	0	1	0.0027397260	573.33
				Total		206,333.33

It can be also summarized the inventory value of class A, B, and C in Tables 4.4, 4.5, and 4.6 respectively.

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Table 4.4. The Inventory Value for Class A Items.

Product's Name	Stock or Not	Unit Price	Total Inventory
Right Tie Rod	Stock	1,600.00	8,000.00
Water Pump	Stock	1,850.00	925.00
Left Tie Rod	Stock	1,450.00	7,250.00
Rear Shock Absorber	Stock*	4,390.00	2,195.00
		Total	18,370.00

Table 4.5. The Inventory Value for Class B Items.

Product's Name	Stock or Not	Unit Price	Total Inventory
Wiper Blade	Stock	500.00	2,500.00
Swing Support	Stock	850.00	425.00
Front Shock Absorber	Stock*	3,450.00	1,725.00
Engine Mounting	Stock	400.00	200.00
Left Trailing Arm	Not Stock	6,800.00	3,400.00
Steering Column	Not Stock	7,080.00	3,540.00
Wheel Brake Cylinder	Not Stock	600.00	300.00
Oil Filter	Stock	290.00	3,480.00
Set Rubber Mounting	Stock	500.00	250.00
Right Tail Light	Not Stock	2,200.00	1,100.00
Front Repair Kit Brake Pad	Stock*	1,100.00	5,500.00
Repair Set Brake Caliper	Stock	500.00	250.00
Right Door Handle Inner	Stock	280.00	1,400.00
Brake Servo	Not Stock	5,200.00	2,600.00
Right Trailing Arm	Not Stock	6,800.00	3,400.00
Trunk Lid Gasket	Not Stock	1,600.00	800.00
Cylinder Head Gasket	Not Stock	1,000.00	1,500.00
Thermostat	Not Stock	500.00	250.00
Rotor	Stock	600.00	300.00
Stabilizer Rubber Mounting	Stock	120.00	600.00
Rear Carrier	Not Stock	5,400.00	2,700.00

Table 4.5. The Inventory Value for Class B Items. (Continued)

Product's Name	Stock or Not	Unit Price	Total Inventory
Rear Repair Kit Brake Pad	Stock*	850.00	4,250.00
Brake Master Cylinder	Not Stock	3,000.00	1,500.00
Left Door Handle Inner	Stock	280.00	1,400.00
Rear Bumper	Not Stock	1,390.00	695.00
Engine Cap	Not Stock	400.00	200.00
Front Break Disc	Not Stock	2,100.00	1,050.00
Right Wishbone	Not Stock	2,950.00	1,475.00
Spark Plugs	Stock	45.00	1,125.00
Gas Pressurized Spring	Not Stock	500.00	250.00
Expansion Tank	Not Stock	1,800.00	900.00
Spray Nozzle	Not Stock	280.00	140.00
Left Tail Light	Not Stock	2,200.00	1,100.00
Ignition Cable	Not Stock	1,450.00	725.00
Fan Coupling	Not Stock	2,850.00	7,125.00
Air Filter	Stock*	560.00	2,800.00
Left Front Side Panel	Not Stock	8,354.00	4,177.00
Fan	Not Stock	1,350.00	675.00
		Total	65,807.00

Table 4.6. The Inventory Value for Class C Items.

Product's Name	Stock or Not	Unit Price	Total Inventory
Left Head Light	Not Stock	6,800.00	3,400.00
Right Head light	NotStock	6,800.00	3,400.00
Right Upper Wishbone	Not Stock	653.00	326.50
Locking Kit	Not Stock	1,250.00	625.00
Repair Kit Boot Inner	Stock*	190.00	95.00
Left Wishbone	Not Stock	2,950.00	1,475.00
Front Carrier	Not Stock	5,500.00	2,750.00
Break Pad Wear Sensor	Not Stock	180.00	90.00

Table 4.6. The Inventory Value for Class C Items. (Continued)

Product's Name	Stock or Not	Unit Price	Total Inventory
Front Stabilizer Bar	Not Stock	5,140.00	2,570.00
Fuel Filter	Not Stock	500.00	2,500.00
Wheel Bolt	Stock	140.00	3,500.00
Ignition Coil	Not Stock	1,450.00	725.00
Left Rear Moulding Door	Not Stock	1,450.00	725.00
Protective Rubber Strip	Not Stock	1,435.00	717.50
Left Grille	Not Stock	1,050.00	525.00
Right Grille	Not Stock	1,050.00	525.00
Engine Mounting	Not Stock	1,000.00	500.00
Gasket with Heat Prod	Not Stock	350.00	175.00
Rear Set Mud Flap	Not Stock	180.00	90.00
Lower Spring Plate	Stock	60.00	300.00
Engine Damper	Not Stock	1,500.00	750.00
Distributor Cap	Not Stock	300.00	150.00
Right Rear Door Seal	Not Stock	1,450.00	725.00
Front Set Mud Flap	Not Stock	180.00	90.00
Upper Spring Plate	Stock	60.00	300.00
Gasket	Not Stock	180.00	90.00
Sound Insulating Engine Hood	Not Stock	2,560.00	1,280.00
Center Grille	Not Stock	1,250.00	625.00
Left Additional Flasher	Not Stock	800.00	400.00
Horn	Not Stock	680.00	1,700.00
Left Fog Lamp	Not Stock	2,000.00	10,000.00
Right Fog Lamp	Not Stock	2,000.00	10,000.00
Fluid Container	Not Stock	1,850.00	925.00
Left Front Moulding Fender	Not Stock	920.00	460.00
Left Outer Rear Window Channel Cover	Not Stock	605.00	302.50
Right Additional Flasher	Not Stock	800.00	400.00
Left Front Door Seal	Not Stock	1,495.00	747.50
Right Front Moulding Door	Not Stock	1,450.00	725.00

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Table 4.6. The Inventory Value for Class C Items. (Continued)

Product's Name	Stock or Not	Unit Price	Total Inventory
Left Rear Door Seal	Not Stock	1,450.00	725.00
Front Left Window Guide	Not Stock	1,415.00	707.50
Left Outer Front Window Channel Cover	Not Stock	665.00	332.50
Wash Pump	Not Stock	650.00	325.00
Right Inner Rear Window Channel Cover	Not Stock	605.00	302.50
Rear Window Channel Cover	Not Stock	605.00	302.50
Base	Not Stock	1,130.00	565.00
Left Inner Front Window Chanel Cover	Not Stock	550.00	275.00
Left Air Duct	Not Stock	225.00	112.50
Right Air Duct	Not Stock	225.00	112.50
Right OuterFront Window Channel Cover	Not Stock	655.00	327.50
Left Inner Rear Window Chanel Cover	Not Stock	605.00	302.50
Left Front Wheel Housing	Not Stock	560.00	280.00
Right Front Wheel Housing	Not Stock	560.00	280.00
Fan Shroud	Not Stock	430.00	215.00
		Total	59,849.00

To consider whether to stock or not stock the automotive parts, many factors should be considered such as lead time, lot size, annual sales, and unit cost. Moreover, it is needed to know when to reorder the stock. The reorder point can be calculated from multiplying lead time by annual sales per day. Although some spare parts could not be stocked according to the reorder point calculation, it is sometime needed to stock due to the lead time. It can be indicated that most of customers are willing to wait for the products if it takes less than 3 days in receiving the products. Therefore, some spare parts need to be stocked although the reorder point is zero. The spare parts that have the asterisk marks are those products that reorder point is zero but they should be stoked since customers are not willing to wait for receiving the products.

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V. CONCLUSIONS

There are 8 tables showing the 4 automotive models: E 28, E 30, E 34, and E 36, which are classified by 2 types: by unit sold, and by total monetary value. However, it is emphasized on total monetary value because most of the authors such as Gaither (1994), Tersine (1994), Waters (1999) and so on classified the ABC Method of Inventory Classification by total monetary value.

The automotive model E 30 is emphasized in this study. It is emphasized on classifying by total monetary value because each automotive parts stocked in the inventory is costly, and the demand of each product depends on customers' need. In addition, the total monetary value is also a crucial factor to be considered, so it is needed to have the appropriate inventory management. Therefore, it should have the appropriate classifications of inventory items for the benefit of better inventory management.

The automotive parts can be classified into class A, B, and C in order to know which automotive parts should be grouped in which class. In addition, Stevenson (1990) stated that the A-B-C approach involves classifying inventory items according to some measure of importance — usually annual monetary usage, and then allocating control efforts accordingly. Therefore, it can be indicated that class A is very important, class B is moderately important, and class C is least important.

This project utilizes the ABC Method of Inventory Classification for applying to the Auto Parts Shop and the classification of the inventory system includes many factors such as lead time, carrying cost, and lot size. Not only the inventory value is considered, the carrying cost should also be considered since the greater the stocked inventory, the higher the carrying cost.

The ABC Method of Inventory is applied to E 30 Model, which is an example of this study because it is the best seller. This method can also be applied to any other models because they use the same method in classifying the ABC Method of Inventory Classification.

In classifying the ABC Method of Inventory Classification, it can be indicated that this model has 153 automotive parts in E 30 Model. There are 95 automotive parts that can be sold, and there are 58 automotive parts that cannot be sold. For those automotive parts that can be sold can be classified into three categories; that is, class A, B, and C. There are 4 automotive parts in class A, 38 automotive parts in class B, and 53 automotive parts in class C. In addition, the 58 automotive parts that cannot be sold in this category cannot be classified in any class. For the other models, it can be seen in the Appendix showing the ABC Method of Inventory Classification.

In the E 30 model classified by total monetary value, there are 4 automotive parts that should be stocked in class A. For class B, there are 15 automotive parts that should be stocked, and there are also 23 automotive parts that should be stocked, and there are 4 automotive parts that should be stocked, and there are 49 automotive parts that should not be stocked for class C.

In addition, it can be identified that if it takes more than 3 days in lead time, it is needed to stock the products. If it takes only a few days in lead time, it is not needed to keep products in stock. Moreover, it is needed to know when to reorder the products. Most of the automotive parts are reordered when the product is left 1 or 2 units. It depends on the lot size and usage of each automotive parts as well as lead time. However, reorder point can be calculated by multiplying lead time and annual sales per day. Therefore, it is known when to reorder the products.

Although the data was collected for 9 months since the shop was opened, the data should be prorated into an annually basis and analyzed yearly for the appropriate information. Therefore, the data collected for 9 months is applied in a yearly basis by multiplying 12, and then dividing by 9 in order to get the data for an annually basis.

VI. RECOMMENDATIONS

Once we know which one can be sold frequently or hardly sold, we can know how many of each automotive parts should be stocked. Moreover, we should also know when to replenish the stock. Lead time should also be another factor to be considered because it is not good to have stockout. In addition, it should be known when to replenish and how long to receive the automotive parts. If we face the problem of stockout, we may lose our sales that can cause shortage cost. On the other hand, if we face the problem of too much stock, we may lose our money for keeping the stock (carrying cost).

The benefit of this study can help the shop owner know the importance of each automotive parts, so he will know which one should be more emphasized or less emphasized. This study can also help to provide the appropriate inventory management according to the ABC Method of Inventory Classification. Therefore, the organization should set the appropriate inventory system since the inventory control is one of the most crucial factors for any organization that has many kinds of product items.

This study can be a guideline of ABC classification that can further apply to any other automotive parts models. The E 30 Model is selected to be an example in this study by using the ABC Method of Inventory Classification, so this method can be further applied to any other models due to the same methodology of calculation. Moreover, this study can be a guideline that can be further applied to any other automotive parts shop. It is believed that many other automotive parts shop have the same inventory management by using manual system which may cause error during recording data. Therefore, it is needed to have the appropriate inventory system. The ABC Method of Inventory Classification is one of the appropriate inventory system that can be further applied to other automotive parts shops.

Although the project is verified by the theory, it is not validated for implementation since the time to do the project is limited. However, it can be studied further to prove whether the implementation is possible and whether it can be applied in the real world situation in order to obtain the better improvement on this classification.

Actually, it should compare the proposed inventory and the existing inventory data collection in order to know whether the proposed inventory system can reduce the inventory cost. Because we do not have the inventory cost of the existing inventory, we cannot compare whether the proposed inventory system can reduce the inventory cost. Therefore, it could be possible to compare the inventory cost of the existing inventory system and the proposed system if we know the inventory cost of the existing system.

To keep the products in stock, it takes a lot of money to invest the products in stock. Therefore, it needs to have the appropriate inventory management in order to invest in the lowest cost for keeping the products in stock.

In conclusion, the ABC Method of Inventory Classification could be one of the appropriate systems that can be further applied for any other automotive parts models, and other automotive parts shop that helps the shop owners manage the inventory system very well.

APPENDIX A

GLOSSARY

GLOSSARY

(1)   ABC system: a method for classifying inventory items according to their monetary value to the firm based on the principle that only a few items account for the greatest monetary value of total inventory (Russell and Taylor 1998).

(2)   Backlogging: the process of holding customer orders to be filled later when they cannot be shipped immediately (Gaither 1994).

(3)   Carrying costs: the cost of holding an item in inventory including lost opportunity costs, shortage, rent, cooling, lighting, interest on loans, and so on (Russell and Taylor 1998).

(4)   Economic Order Quantity (EOQ) is the optimal order quantity that will minimize total inventory costs (Russell and Taylor 1998).

(5)   Inventory: a stored resource that is used to satisfy a current or future need (Heizer and Render).

(6)   Lead time (LT): length of time required to replenish the inventory for a material from the time that a need for additional material is sensed until the new order for the material is in inventory and ready to use (Gaither 1994).

(7)   Lot-sizing: determining how many units of a product to produce to minimize unit cost (Gaither 1994).

(8)   Order quantity: quantity of a material ordered each time inventory is replenished (Gaither 1994).

(9)   Reorder point: a level of inventory in stock at which a new order is placed (Russell and Taylor 1998).

(10)   Safety stock: quantity of a material held in inventory to be used in time periods when demand is greater than expected or when demand is greater than expected or when supply is less than expected (Gaither 1994).

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(11) Shortage costs: temporary or permanent loss of sales that will result when customer demand cannot be met (Russell and Taylor 1998).

(12) Stockout: an inventory shortage occurring when demand exceeds the inventory in stock (Russell and Taylor 1998).

APPENDIX B

CODE AND DESCRIPTION OF AUTOMOTIVE PARTS

Table B.1. Code and Description of Automotive Parts.

Code	Product	Product's Name
1	nTnnthtverryn	Side Window Green Front Right
2	rbs:','9nthīnp?ĩriliti	Side Window Green Front Left
3	nTnniin1114111T1	Side Window Green Rear Right
4	ninnii5T-VpiAt62hU	Side Window Green Rear Left
5	nr,59nVIvinjVii:iTini	Right Lamp Lens
6	ninnlyllvinjw1Trin	Left Lamp Lens
7	rmīindmal	Interior Rear View Mirror
8	rIT:','9nVjihlVi61.11qi	Door Glass Fixed Green Right
9	nr.59ne'11ia1fiti	Door Glass Fixed Green Left
10	nñutna.i78	Wheel Brake Cylinder
11	riTtiltAmiLdu	Fluid Container
12	nsnl'alvTnill	Expansion Tank
13	nsnฺnivrivatf	Fluid Container
14	ehornasihudVITLUN'unlq	Sound Insulating Engine Hood
15	tilnuviiiq	Front Bumper
16	rims um A1	Rear Bumper
17*	tiquilfriZqdu	Wiper Arm*
18	66n1dtitUri218Ji6t1	Steering Column
19	TILI,V11,MI'a1	Engine Mounting
20	A6111411/TAn1	Fan Coupling
21	At'aqiileily	Connector
22	AMONleild	Ignition Coil
23	priudinKALIN	Engine Hood Joint
24	AQil1TilM,11A£i'lll'il	Right Front Moulding Fender
25	mulinmararirm	Left Front Moulding Fender
26	Agli=VAIITATI	Right Front Moulding Door
27	Aqiin'frp`a`ri'M	Left Front Moulding Door
28	FaLIT:¡ppiA'1119`1	Right Rear Moulding Door
29	Áqth:;.,'QVIAĩarriti	Left Rear Moulding Door
30	TA Sliiirtuvitl̃1	Front Carrier
31	TPisl efut um 61	Rear Carrier

Table B.1. Code and Description of Automotive Parts. (Continued)

Code	Product	Product's Name
32*	911ILLITRIAlh	Front Brake Disc*
33*	91949M11341	Rear Brake Disc*
34	9iMIAITLIMIITTY1	Right Air Duct
35	IkalnIritentwalirm	Left Air Duct
36	reikaani6UTP1	Repair Set Break Caliper
37	Vriin11112-41A	Repair Kit Boot Inner
38	1,1fflqUiraltrk	Ignition Cable
39	tiloAlinIa1	Engine Damper
40	I'lln611ef'inn-tiism:1-1	Gas Pressurized Spring
41*	WIA6AiVi1!i'1	Front Shock Absorber*
42*	Tim&1141	Rear Shock Absorber*
43	VI:',66nNadMM1	Center Grille
44	n6Ln841A9a'llYn	Right Grille
45	ffro;LLnNvrt:1-41ti	Left Grille
46	FT-A11601frl	Sun Visor
47*	66P1S	Horn*
48	1714InflUMTITTI	Front Right Side Panel
49	iilinMrd,hernti	Front Left Side Panel
50	iiItimula'nqi	Rear Right Side Panel
51	iTlinMrglelliti	Rear Left Side Panel
52	1711nrviilaq	Fan Shroud
53	VitiInun	Set Rubber Mounting
54	LUTniiV.',Q,	Door Brake
55*	lullvaldu	Wiper Blade*
56	1111T MI	Fan
57	1.15nrivahLwilt1	Gasket
58	1Jsduriueh	Cylinder Head Gasket
59	11rn6f/tat LAU	Gasket with Heat Prot Shield
60	limpil-rni	Front Right Door
61	liMpill'leht1	Front Left Door
62	liS:',TA611191	Rear Right Door

Table B.1. Code and Description of Automotive Parts. (Continued)

Code	Product	Product's Name
63	ilsno4141Tti	Rear Left Door
64	&Ili	Water Pump
65	&ALM iTais	AT-Vane Pump
66	il nurn4lwarrni	Right Trailing Arm
67	ilnunviAwanihu	Left Trailing Arm
68	il nunwaTyn	Right Wishbone
69	TinunviiIiiinti	Left Wishbone
70	lnunia"Theyn	Right Upper Wishbone
71	Tlnunvaliughti	Left Upper Wishbone
72	iT16l_lTA1//l11	Front Repair Kit Brake Pad
73	es-ILLlM141	Rear Repair Kit Brake Pad
74	eil l41M1	Roof Lining
75	6l,W141Tti	Trail Trim
76	66W1111Inm4waliulval	Right Section of Front Wheel
77	imilinInman!ialaillu	Left Section of Front Wheel
78	us.ham1qt.i	Base
79	efinntliVIA111	Hood
80	r.finntii21141	Trunk Lid
81	d1911A1f.1	Distributor Cap
82	ehilmntthai viii	Cover for Wind Shield Cleaning
83	dit0111T:511t1IT01.11	Engine Cap
84	d'iiaMrinvvrai	Cover
85	ellilmilmnniviA	Towing Hinge Flap
86	djW)169111	Themostat Housing
87	PlMaine0.14'a14'111q1	Right Front Wheel Housing
88	INflqa144.1k1A014qU	Left Front Wheel Housing
89	111fliartilAVIA611191	Right Rear Wheel Housing
90	ItiManicAtialehtl	Left Rear Wheel Housing
91	ll4Maninetuthlyn	Right Covering
92	ItMlarlinr114TherrlE1	Left Covering
93	VlMAFIr11:11q1ANTT1	Right Support

Table B.1. Code and Description of Automotive Parts. (Continued)

Code	Product	Product's Name
94	viaqoAnIT1O1A⁻1l.1l⁻m	Left Support
95	l1Ol═1O1	Electrical Fan
96	1,3^1flqUTT1	Right Tail Light
97	1,1^Iiiltrl1nn TT)	Rear Light, White Turn Indicator, Right
98	llAWItrIllqii'M	Rear Light , White Turn Indicator, Left
99	WitAn	Left Tail Light
100	irligurrihliiltnworn	Right Additional Flasher
101	liAllityrii⁻iliTtnfluryrinq	Right White Additional Flasher
102	1ll4ll12iⲦ1,91Ⲧ1Influerin	Left Additional Flasher
103	NI:au') ihliTlInmeihunq	Left White Additional Flasher
104	Nitn°11TrInq	Right Front White Turn Indicator
105	TA Arringefnu	Left Front White Turn Indicator
106	NOilitfrAM/iiril	Right Fog Lamp
107	liAitill'aR1Mign	Left Fog Lamp
108	1l411q1AtiiTATI	Right Head Light
109	ⁱirfriAqi:ATintl	Left Head Light
110	3.1`06Frd ⁿⁱMell'Irs11,1	Wash Pump
111	31aCilmilir,	Locking Kit
112	VitElnds:;q1,1411T1	Right Inner Door Handle
113	At aiMi2r, ◠441qtl	Left Inner Door Handle
114	6l3A.1611SA	Break Master Cylinder
115	tneci,ATR WZi	Front Set Mud Flap
116	tn1tTUTAR14941	Rear Set Mud Flap
117	trletegUITaTIN1	Right Rubber Strip
118	EnliT14111.M:i'leihE	Left Rubber Strip
119	tnliTtniViA61 nflql	Protective Rubber Strip
120	tn16671141,4asl	Engine Mounting
121	UilliraTlAhT91	Right Front Door Seal
122	tYllthr-Vgd,h6ri'M	Left Front Door Seal
123	2n11.12:,111)1611Yr	Right Rear Door Seal
124	UilliTn,11,414qE1	Left Rear Door Seal

Table B.1. Code and Description of Automotive Parts. (Continued)

Code	Product	Product's Name
125	trildli'M	Trunk Lid Gasket
126	tnsIV.IMAti:C1	Front Engine Hood Seating
127	tillS9MSITMJU	Spring Plate Upper
128	trIlTlgiinsIA¯11	Spring Plate Lower
129	2J11ïTA1,111Ã141WarATI	Right Outer Front Window Channel Cover
130	tlisfïA114114tnehi	Left Outer Front Window Channel Cover
131	trAM11114'111,Atql	Right Inner Front Window Channel Cover
132	f1111011111411,1441121	Left Inner Front Window Channel Cover
133	UrNiATIA611,Winl	Right Inner Rear Window Channel Cover
134	Elilln111441,14'121	Left Inner Rear Window Channel Cover
135	ElNSMITVïMWarrni	Right Outer Rear Window Channel Cover
136	tri4IMILVraTtraniïti	Left Outer Rear Window Channel Cover
137	tnlefiliAaltql	Right Gasket
138	firmv,ifN1/1618iiti	Left Gasket
139	fit.111,2f	Condencer Air Conditioning
140	IntnAAMMA1	Stabilizer Rubber Mounting
141	Tivi3.1intTUTAM vrik)	Swing Support
142	9,,f11,13.11fl AdifITTI	Right Tie Rod
143	qn1ł1.11141,11Tnehti	Left Tie Rod
144	Qlffïl,t1	Thermostat
145	ainik	Wheel Bolt
146	krinio)t¯mnsnrivra¯riyn	Right Front Window Guide
147	Kninqms¯mnsz,9mZ¯rihti	Left Front Window Guide
148	kruirM11nTnn1/16ł1n1	Right Rear Window Guide
149	kvis-wrilnnin14141-m	Left Rear Window Guide
150	A¯12166111119J'aft41:116Aᵗ	Pulse Generator
151	ATOM 6l'aULLITP1	Brake Pad Wear Sensor
152	lanTtArdU6P1121	Oil Filter
153	lannl&an	Fuel Filter
154	lalf1Ttl'alf11ᵖᴵ	Air Filter
155	ł42111	Radiator

Table B.1. Code and Description of Automotive Parts. (Continued)

Code	Product	Product's Name
156	lel'an111.12A	Brake Servo
157	*Am11-1du	Spray Nozzle
158	VT9 AA!	Spark Plugs
159	ITQTTI,Rvf	Rotor
160	ViAkrTIARMIAI:i'l	Front Stabilizer Bar
161	lanfiuTPlq1141	Rear Stabilizer Bar
162	nanUthOlq	Front Panel

Remarks

(1)   Prices are subjected to change without notice

(2)   * Prices are included for 2 pieces

APPENDIX C

E 28 MODEL CLASSIFIED BY TOTAL MONETARY VALUE

Table C.1. E 28 Model Classified by Total Monetary Value.

Code	Unit Sales	Price E 28	Annual Sales	Total	Annual Price
102	-	-	-	-	-
103	-	-	-	-	-
100	-	-	-	-	-
101	-	-	-	-	-
21	-	-	-	-	-
39	-	-	-	-	-
107	-	-	-	-	-
106	-	-	-	-	-
105	-	-	-	-	-
104	-	-	-	-	-
6	-	-	-	-	-
5	-	-	-	-	-
98	-	-	-	-	-
97	-	-	-	-	-
94	-	-	-	-	-
93	-	-	-	-	-
85	-	-	-	-	-
41*	5	7,000.00	7	35,000.00	46,666.67
64	15	2,000.00	20	30,000.00	40,000.00
72	29	1,000.00	39	29,000.00	38,666.67
69	10	2,450.00	13	24,500.00	32,666.67
68	10	2,450.00	13	24,500.00	32,666.67
143	15	1,450.00	20	21,750.00	29,000.00
142	15	1,450.00	20	21,750.00	29,000.00
10	22	980.00	29	21,560.00	28,746.67
141	20	980.00	27	19,600.00	26,133.33
159	42	450.00	56	18,900.00	25,200.00
155	2	8,900.00	3	17,800.00	23,733.33
36	22	700.00	29	15,400.00	20,533.33
55*	24	500.00	32	12,000.00	16,000.00
152	30	350.00	40	10,500.00	14,000.00

Table C.1. E 28 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price	Annual Sales	Total	Annual Price
42*	2	5,200.00	3	10,400.00	13,866.67
86	4	2,100.00	5	8,400.00	11,200.00
53	10	750.00	13	7,500.00	10,000.00
99	1	6,500.00	1	6,500.00	8,666.67
96	1	6,500.00	1	6,500.00	8,666.67
124	3	1,980.00	4	5,940.00	7,920.00
114	2	2,900.00	3	5,800.00	7,733.33
150	2	2,900.00	3	5,800.00	7,733.33
154	10	560.00	13	5,600.00	7,466.67
158	120	45.00	160	5,400.00	7,200.00
29	3	1,670.00	4	5,010.00	6,680.00
144	10	500.00	13	5,000.00	6,666.67
37	20	250.00	27	5,000.00	6,666.67
140	40	120.00	53	4,800.00	6,400.00
1	1	4,320.00	1	4,320.00	5,760.00
157	10	400.00	13	4,000.00	5,333.33
126	2	1,980.00	3	3,960.00	5,280.00
111	3	1,250.00	4	3,750.00	5,000.00
112	15	250.00	20	3,750.00	5,000.00
116	12	280.00	16	3,360.00	4,480.00
27	2	1,670.00	3	3,340.00	4,453.33
28	2	1,670.00	3	3,340.00	4,453.33
58	3	1,000.00	4	3,000.00	4,000.00
73	3	980.00	4	2,940.00	3,920.00
20	1	2,850.00	1	2,850.00	3,800.00
115	10	280.00	13	2,800.00	3,733.33
145	20	140.00	27	2,800.00	3,733.33
153	5	500.00	7	2,500.00	3,333.33
113	10	250.00	13	2,500.00	3,333.33
7	1	2,450.00	1	2,450.00	3,266.67
14	1	2,300.00	1	2,300.00	3,066.67

Table C.1. E 28 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E 28	Annual Sales	Total	Annual Price
119	1	2,150.00	1	2,150.00	2,866.67
125	1	1,970.00	1	1,970.00	2,626.67
118	1	1,900.00	1	1,900.00	2,533.33
146	1	1,885.00	1	1,885.00	2,513.33
151	10	180.00	13	1,800.00	2,400.00
26	1	1,670.00	1	1,670.00	2,226.67
136	2	805.00	3	1,610.00	2,146.67
46	1	1,450.00	1	1,450.00	1,933.33
40	2	680.00	3	1,360.00	1,813.33
47*	2	680.00	3	1,360.00	1,813.33
34	3	390.00	4	1,170.00	1,560.00
128	22	50.00	29	1,100.00	1,466.67
120	3	350.00	4	1,050.00	1,400.00
25	1	980.00	1	980.00	1,306.67
24	1	980.00	1	980.00	1,306.67
129	1	805.00	1	805.00	1,073.33
135	1	805.00	1	805.00	1,073.33
110	1	800.00	1	800.00	1,066.67
35	2	390.00	3	780.00	1,040.00
127	15	50.00	20	750.00	1,000.00
88	1	680.00	1	680.00	906.67
87	1	680.00	1	680.00	906.67
59	2	250.00	3	500.00	666.67
84	1	485.00	1	485.00	646.67
90	1	480.00	1	480.00	640.00
57	2	220.00	3	440.00	586.67
83	1	400.00	1	400.00	533.33
13	0	3,200.00	0	0.00	0.00
65	0	15,220.00	0	0.00	0.00
78	0	110.00	0	0.00	0.00
32*	0	6,000.00	0	0.00	0.00

Table C.1. E 28 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E 28	Annual Sales	Total	Annual Price
33*	0	4,000.00	0	0.00	0.00
30	0	5,800.00	0	0.00	0.00
31	0	5,200.00	0	0.00	0.00
139	0	5,200.00	0	0.00	0.00
82	0	120.00	0	0.00	0.00
92	0	850.00	0	0.00	0.00
91	0	850.00	0	0.00	0.00
54	0	1,450.00	0	0.00	0.00
61	0	14,500.00	0	0.00	0.00
60	0	14,500.00	0	0.00	0.00
9	0	2,100.00	0	0.00	0.00
8	0	2,100.00	0	0.00	0.00
63	0	14,500.00	0	0.00	0.00
62	0	14,500.00	0	0.00	0.00
23	0	4,500.00	0	0.00	0.00
19	0	1,250.00	0	0.00	0.00
12	0	1,980.00	0	0.00	0.00
56	0	1,250.00	0	0.00	0.00
52	0	800.00	0	0.00	0.00
11	0	1,950.00	0	0.00	0.00
15	0	8,950.00	0	0.00	0.00
122	0	1,980.00	0	0.00	0.00
121	0	1,980.00	0	0.00	0.00
126	0	485.00	0	0.00	0.00
162	0	4,200.00	0	0.00	0.00
49	0	8,500.00	0	0.00	0.00
48	0	8,500.00	0	0.00	0.00
138	0	580.00	0	0.00	0.00
137	0	580.00	0	0.00	0.00
43	0	2,100.00	0	0.00	0.00
45	0	1,250.00	0	0.00	0.00

Table C.1. E 28 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E 28	Annual Sales	Total	Annual Price
44	0	1,250.00	0	0.00	0.00
109	0	7,900.00	0	0.00	0.00
108	0	7,900.00	0	0.00	0.00
74	0	6,540.00	0	0.00	0.00
79	0	14,500.00	0	0.00	0.00
22	0	1,550.00	0	0.00	0.00
38	0	2,200.00	0	0.00	0.00
132	0	745.00	0	0.00	0.00
131	0	745.00	0	0.00	0.00
134	0	805.00	0	0.00	0.00
133	0	805.00	0	0.00	0.00
18	0	5,800.00	0	0.00	0.00
130	0	805.00	0	0.00	0.00
156	0	6,700.00	0	0.00	0.00
81	0	850.00	0	0.00	0.00
95	0	12,000.00	0	0.00	0.00
16	0	10,250.00	0	0.00	0.00
51	0	9,800.00	0	0.00	0.00
50	0	9,800.00	0	0.00	0.00
89	0	480.00	0	0.00	0.00
117	0	1,900.00	0	0.00	0.00
77	0	9,750.00	0	0.00	0.00
76	0	9,750.00	0	0.00	0.00
2	0	4,320.00	0	0.00	0.00
4	0	4,320.00	0	0.00	0.00
3	0	4,320.00	0	0.00	0.00
160	0	6,750.00	0	0.00	0.00
161	0	6,900.00	0	0.00	0.00
75	0	6,500	0	0.00	0.00
67	0	7,900.00	0	0.00	0.00
66	0	7,900.00	0	0.00	0.00

Table C.1. E 28 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E 28	Annual Sales	Total	Annual Price
80	0	13,950.00	0	0.00	0.00
71	0	3,850.00	0	0.00	0.00
70	0	3,850.00	0	0.00	0.00
147	0	1,885.00	0	0.00	0.00
149	0	1,950.00	0	0.00	0.00
148	0	1,950.00	0	0.00	0.00
17*	0	2,800.00	0	0.00	0.00
				473,910.00	631,880.00

Remark

(1)   * Prices are subjected to change without notice

(2)   ** Prices are included for 2 pieces

E 28 Model Classified by Total Monetary Value.

Class A of E 28 Model Classified by Total Monetary Value.

Class B of E 28 Model Classified by Total Monetary Value.

U   Class C of E 28 Model Classified by Total Monetary Value.

97
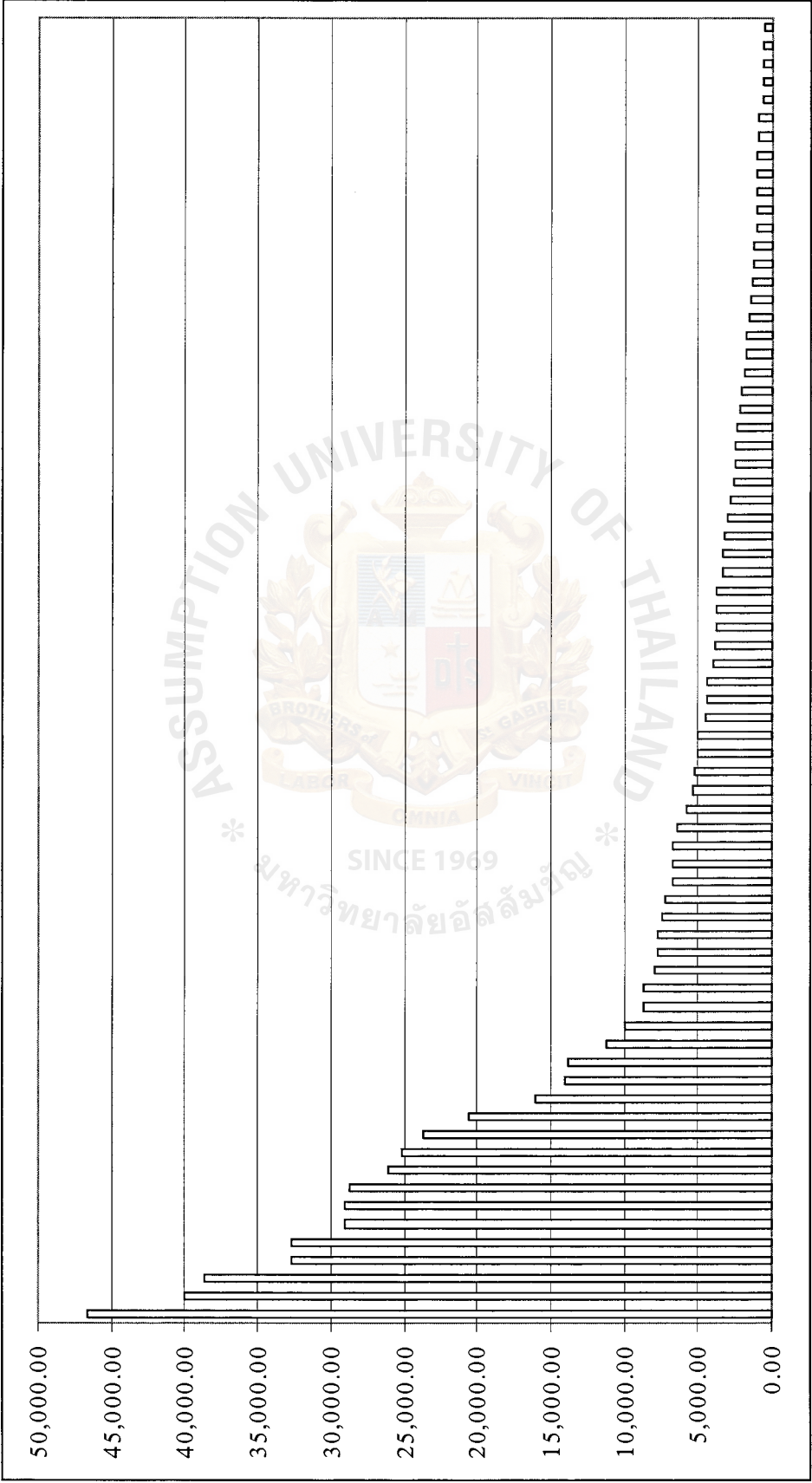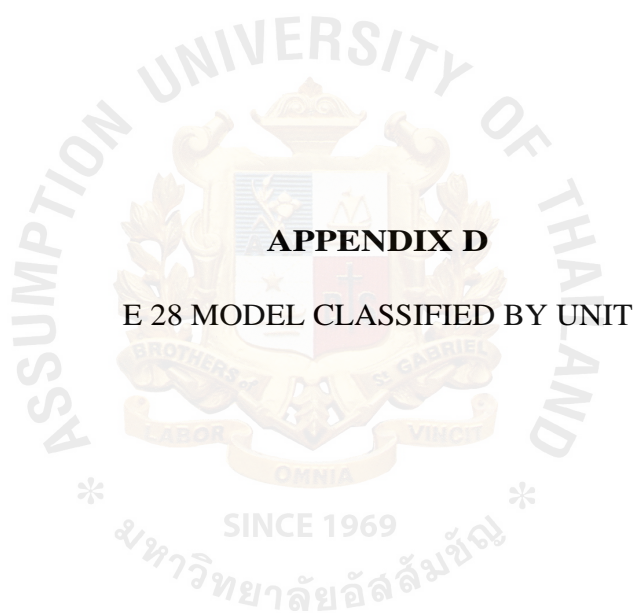
APPENDIX D

E 28 MODEL CLASSIFIED BY UNIT

Table D.1. E 28 Model Classified by Unit.

Code	Average Unit	Unit Sales	Price E 28	Annual Sale	Total	Annual Price
102	-	-	-	-	-	-
103	-	-	-	-	-	-
100	-	-	-	-	-	-
101	-	-	-	-	-	-
21	-	-	-	-	-	-
39	-	-	-	-	-	-
107	-	-	-	-	-	-
106	-	-	-	-	-	-
105	-	-	-	-	-	-
104	-	-	-	-	-	-
6	-	-	-	-	-	-
5	-	-	-	-	-	-
98	-	-	-	-	-	-
97	-	-	-	-	-	-
94	-	-	-	-	-	-
93	-	-	-	-	-	-
85	-	-	-	-	-	-
158	13	120	45.00	160	5,400.00	7,200.00
159	5	42	450.00	56	18,900.00	25,200.00
140	4	40	120.00	53	4,800.00	6,400.00
152	3	30	350.00	40	10,500.00	14,000.00
72	3	29	1,000.00	39	29,000.00	38,666.67
55*	3	24	500.00	32	12,000.00	16,000.00
36	2	22	700.00	29	15,400.00	20,533.33
128	2	22	50.00	29	1,100.00	1,466.67
10	2	22	980.00	29	21,560.00	28,746.67
37	2	20	250.00	27	5,000.00	6,666.67
141	2	20	980.00	27	19,600.00	26,133.33
145	2	20	140.00	27	2,800.00	3,733.33
112	2	15	250.00	20	3,750.00	5,000.00
64	2	15	2,000.00	20	30,000.00	40,000.00

Table D.1. E 28 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E 28	Annual Sale	Total	Annual Price
127	2	15	50.00	20	750.00	1,000.00
143	2	15	1,450.00	20	21,750.00	29,000.00
142	2	15	1,450.00	20	21,750.00	29,000.00
116	1	12	280.00	16	3,360.00	4,480.00
154	1	10	560.00	13	5,600.00	7,466.67
151	1	10	180.00	13	1,800.00	2,400.00
113	1	10	250.00	13	2,500.00	3,333.33
115	1	10	280.00	13	2,800.00	3,733.33
53	1	10	750.00	13	7,500.00	10,000.00
157	1	10	400.00	13	4,000.00	5,333.33
144	1	10	500.00	13	5,000.00	6,666.67
69	1	10	2,450.00	13	24,500.00	32,666.67
68	1	10	2,450.00	13	24,500.00	32,666.67
153	1	5	500.00	7	2,500.00	3,333.33
41*	1	5	7,000.00	7	35,000.00	46,666.67
86	0	4	2,100.00	5	8,400.00	11,200.00
34	0	3	390.00	4	1,170.00	1,560.00
58	0	3	1,000.00	4	3,000.00	4,000.00
111	0	3	1,250.00	4	3,750.00	5,000.00
29	0	3	1,670.00	4	5,010.00	6,680.00
124	0	3	1,980.00	4	5,940.00	7,920.00
73	0	3	980.00	4	2,940.00	3,920.00
120	0	3	350.00	4	1,050.00	1,400.00
35	0	2	390.00	3	780.00	1,040.00
114	0	2	2,900.00	3	5,800.00	7,733.33
40	0	2	680.00	3	1,360.00	1,813.33
57	0	2	220.00	3	440.00	586.67
59	0	2	250.00	3	500.00	666.67
47*	0	2	680.00	3	1,360.00	1,813.33
27	0	2	1,670.00	3	3,340.00	4,453.33
28	0	2	1,670.00	3	3,340.00	4,453.33

Table D.1. E 28 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E 28	Annual Sale	Total	Annual Price
136	0	2	805.00	3	1,610.00	2,146.67
150	0	2	2,900.00	3	5,800.00	7,733.33
155	0	2	8,900.00	3	17,800.00	23,733.33
126	0	2	1,980.00	3	3,960.00	5,280.00
42*	0	2	5,200.00	3	10,400.00	13,866.67
84	0	1	485.00	1	485.00	646.67
20	0	1	2,850.00	1	2,850.00	3,800.00
88	0	1	680.00	1	680.00	906.67
87	0	1	680.00	1	680.00	906.67
7	0	1	2,450.00	1	2,450.00	3,266.67
26	0	1	1,670.00	1	1,670.00	2,226.67
25	0	1	980.00	1	980.00	1,306.67
24	0	1	980.00	1	980.00	1,306.67
129	0	1	805.00	1	805.00	1,073.33
135	0	1	805.00	1	805.00	1,073.33
119	0	1	2,150.00	1	2,150.00	2,866.67
83	0	1	400.00	1	400.00	533.33
90	0	1	480.00	1	480.00	640.00
118	0	1	1,900.00	1	1,900.00	2,533.33
1	0	1	4,320.00	1	4,320.00	5,760.00
14	0	1	2,300.00	1	2,300.00	3,066.67
46	0	1	1,450.00	1	1,450.00	1,933.33
99	0	1	6,500.00	1	6,500.00	8,666.67
96	0	1	6,500.00	1	6,500.00	8,666.67
125	0	1	1,970.00	1	1,970.00	2,626.67
110	0	1	800.00	1	800.00	1,066.67
146	0	1	1,885.00	1	1,885.00	2,513.33
13	0	0	3,200.00	0	0.00	0.00
65	0	0	15,220.00	0	0.00	0.00
78	0	0	110.00	0	0.00	0.00
32*	0	0	6,000.00	0	0.00	0.00

101

Table D.1. E 28 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E 28	Annual Sale	Total	Annual Price
33*	0	0	4,000.00	0	0.00	0.00
30	0	0	5,800.00	0	0.00	0.00
31	0	0	5,200.00	0	0.00	0.00
139	0	0	5,200.00	0	0.00	0.00
82	0	0	120.00	0	0.00	0.00
92	0	0	850.00	0	0.00	0.00
91	0	0	850.00	0	0.00	0.00
54	0	0	1,450.00	0	0.00	0.00
61	0	0	14,500.00	0	0.00	0.00
60	0	0	14,500.00	0	0.00	0.00
9	0	0	2,100.00	0	0.00	0.00
8	0	0	2,100.00	0	0.00	0.00
63	0	0	14,500.00	0	0.00	0.00
62	0	0	14,500.00	0	0.00	0.00
23	0	0	4,500.00	0	0.00	0.00
19	0	0	1,250.00	0	0.00	0.00
12	0	0	1,980.00	0	0.00	0.00
56	0	0	1,250.00	0	0.00	0.00
52	0	0	800.00	0	0.00	0.00
11	0	0	1,950.00	0	0.00	0.00
15	0	0	8,950.00	0	0.00	0.00
122	0	0	1,980.00	0	0.00	0.00
121	0	0	1,980.00	0	0.00	0.00
126	0	0	485.00	0	0.00	0.00
162	0	0	4,200.00	0	0.00	0.00
49	0	0	8,500.00	0	0.00	0.00
48	0	0	8,500.00	0	0.00	0.00
138	0	0	580.00	0	0.00	0.00
137	0	0	580.00	0	0.00	0.00
43	0	0	2,100.00	0	0.00	0.00
45	0	0	1,250.00	0	0.00	0.00

Table D.1. E 28 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E 28	Annual Sale	Total	Annual Price
44	0	0	1,250.00	0	0.00	0.00
109	0	0	7,900.00	0	0.00	0.00
108	0	0	7,900.00	0	0.00	0.00
74	0	0	6,540.00	0	0.00	0.00
79	0	0	14,500.00	0	0.00	0.00
22	0	0	1,550.00	0	0.00	0.00
38	0	0	2,200.00	0	0.00	0.00
132	0	0	745.00	0	0.00	0.00
131	0	0	745.00	0	0.00	0.00
134	0	0	805.00	0	0.00	0.00
133	0	0	805.00	0	0.00	0.00
18	0	0	5,800.00	0	0.00	0.00
130	0	0	805.00	0	0.00	0.00
156	0	0	6,700.00	0	0.00	0.00
81	0	0	850.00	0	0.00	0.00
95	0	0	12,000.00	0	0.00	0.00
16	0	0	10,250.00	0	0.00	0.00
51	0	0	9,800.00	0	0.00	0.00
50	0	0	9,800.00	0	0.00	0.00
89	0	0	480.00	0	0.00	0.00
117	0	0	1,900.00	0	0.00	0.00
77	0	0	9,750.00	0	0.00	0.00
76	0	0	9,750.00	0	0.00	0.00
2	0	0	4,320.00	0	0.00	0.00
4	0	0	4,320.00	0	0.00	0.00
3	0	0	4,320.00	0	0.00	0.00
160	0	0	6,750.00	0	0.00	0.00
161	0	0	6,900.00	0	0.00	0.00
75	0	0	6,500.00	0	0.00	0.00
67	0	0	7,900.00	0	0.00	0.00
66	0	0	7,900.00	0	0.00	0.00

Table D.1. E 28 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E 28	Annual Sale	Total	Annual Price
80	0	0	13,950.00	0	0.00	0.00
71	0	0	3,850.00	0	0.00	0.00
70	0	0	3,850.00	0	0.00	0.00
147	0	0	1,885.00	0	0.00	0.00
149	0	0	1,950.00	0	0.00	0.00
148	0	0	1,950.00	0	0.00	0.00
17*	0	0	2,800.00	0	0.00	0.00
					473,910.00	631,880.00

Remark

(1)   * Prices are subjected to change without notice

(2)   ** Prices are included for 2 pieces

E 28 Model Classified by Unit.

Class A of E 28 Model Classified by Unit.

Class B of E 28 Model Classified by Unit.
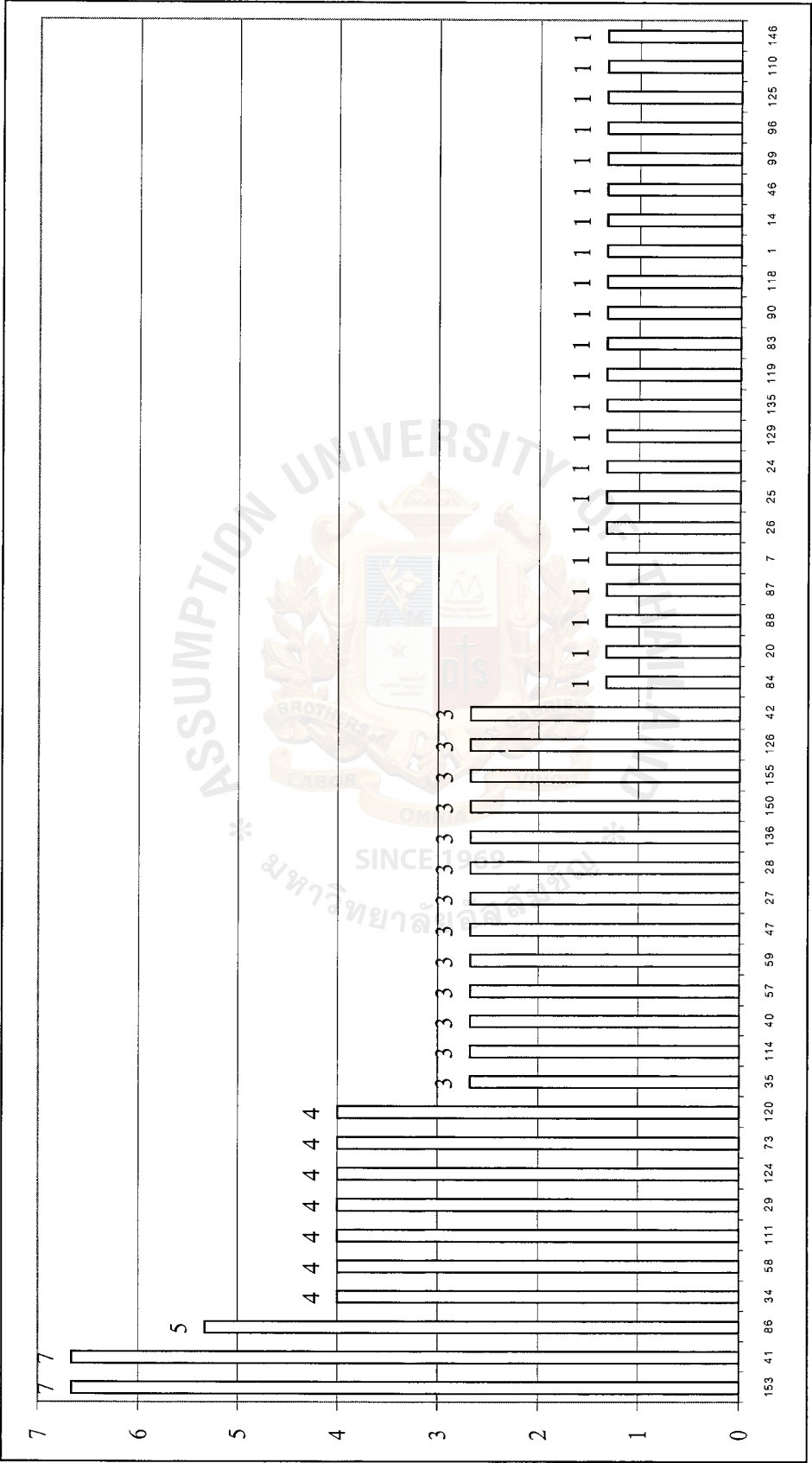
Figure D.4.   Class C of E 28 Model Classified by Unit.

APPENDIX E

E 30 MODEL CLASSIFIED BY UNIT

Table E.1. E 30 Model Classified by Unit.

Code	Average Unit	Unit Sales	Price E30	Annual Sale	Total	Annual Price
103	-	-	-	-	-	-
101	-	-	-	-	-	-
21	-	-	-	-	-	-
105	-	-	-	-	-	-
104	-	-	-	-	-	-
6	-	-	-	-	-	-
5	-	-	-	-	-	-
98		-	-	-	-	-
97	-	-	-	-	-	-
158	27	240	45.00	320	10,800.00	14,400.00
140	15	138	120.00	184	16,560.00	22,080.00
55*	11	103	500.00	137	51,500.00	68,666.67
120	10	93	400.00	124	37,200.00	49,600.00
152	9	84	290.00	112	24,360.00	32,480.00
112	8	75	280.00	100	21,000.00	28,000.00
142	8	72	1,600.00	96	115,200.00	153,600.00
141	6	58	850.00	77	49,300.00	65,733.33
143	6	58	1,450.00	77	84,100.00	112,133.33
64	6	53	1,850.00	71	98,050.00	130,733.33
128	6	51	60.00	68	3,060.00	4,080.00
113	6	50	280.00	67	14,000.00	18,666.67
53	5	48	500.00	64	24,000.00	32,000.00
127	5	48	60.00	64	2,880.00	3,840.00
10	5	45	600.00	60	27,000.00	36,000.00
36	5	42	500.00	56	21,000.00	28,000.00
144	4	34	500.00	45	17,000.00	22,666.67
83	4	32	400.00	43	12,800.00	17,066.67
37	4	32	190.00	43	6,080.00	8,106.67
157	4	32	280.00	43	8,960.00	11,946.67
145	4	32	140.00	43	4,480.00	5,973.33
151	3	30	180.00	40	5,400.00	7,200.00

Table E.1. E 30 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E30	Annual Sale	Total	Annual Price
159	3	28	600.00	37	16,800.00	22,400.00
40	2	20	500.00	27	10,000.00	13,333.33
72	2	20	1,100.00	27	22,000.00	29,333.33
58	2	19	1,000.00	25	19,000.00	25,333.33
73	2	19	850.00	25	16,150.00	21,533.33
116	2	18	180.00	24	3,240.00	4,320.00
115	2	16	180.00	21	2,880.00	3,840.00
154	2	15	560.00	20	8,400.00	11,200.00
57	2	15	180.00	20	2,700.00	3,600.00
42*	2	15	4,390.00	20	65,850.00	87,800.00
41*	1	12	3,450.00	16	41,400.00	55,200.00
125	1	12	1,600.00	16	19,200.00	25,600.00
153	1	10	500.00	13	5,000.00	6,666.67
59	1	10	350.00	13	3,500.00	4,666.67
81	1	10	300.00	13	3,000.00	4,000.00
96	1	10	2,200.00	13	22,000.00	29,333.33
32*	1	6	2,100.00	8	12,600.00	16,800.00
56	1	6	1,350.00	8	8,100.00	10,800.00
38	1	6	1,450.00	8	8,700.00	11,600.00
114	1	5	3,000.00	7	15,000.00	20,000.00
12	1	5	1,800.00	7	9,000.00	12,000.00
111	1	5	1,250.00	7	6,250.00	8,333.33
67	1	5	6,800.00	7	34,000.00	45,333.33
35	0	4	225.00	5	900.00	1,200.00
34	0	4	225.00	5	900.00	1,200.00
19	0	4	1,000.00	5	4,000.00	5,333.33
45	0	4	1,050.00	5	4,200.00	5,600.00
44	0	4	1,050.00	5	4,200.00	5,600.00
18	0	4	7,080.00	5	28,320.00	37,760.00
156	0	4	5,200.00	5	20,800.00	27,733.33
99	0	4	2,200.00	5	8,800.00	11,733.33

Table E.1. E 30 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E30	Annual Sale	Total	Annual Price
68	0	4	2,950.00	5	11,800.00	15,733.33
102	0	3	800.00	4	2,400.00	3,200.00
31	0	3	5,400.00	4	16,200.00	21,600.00
20	0	3	2,850.00	4	8,550.00	11,400.00
47*	0	3	680.00	4	2,040.00	2,720.00
22	0	3	1,450.00	4	4,350.00	5,800.00
29	0	3	1,450.00	4	4,350.00	5,800.00
136	0	3	605.00	4	1,815.00	2,420.00
119	0	3	1,435.00	4	4,305.00	5,740.00
66	0	3	6,800.00	4	20,400.00	27,200.00
100	0	2	800.00	3	1,600.00	2,133.33
39	0	2	1,500.00	3	3,000.00	4,000.00
43	0	2	1,250.00	3	2,500.00	3,333.33
132	0	2	550.00	3	1,100.00	1,466.67
133	0	2	605.00	3	1,210.00	1,613.33
25	0	2	920.00	3	1,840.00	2,453.33
130	0	2	665.00	3	1,330.00	1,773.33
135	0	2	605.00	3	1,210.00	1,613.33
126	0	2	1,450.00	3	2,900.00	3,866.67
110	0	2	650.00	3	1,300.00	1,733.33
69	0	2	2,950.00	3	5,900.00	7,866.67
78	0	1	1,130.00	1	1,130.00	1,506.67
30	0	1	5,500.00	1	5,500.00	7,333.33
52	0	1	430.00	1	430.00	573.33
11	0	1	1,850.00	1	1,850.00	2,466.67
107	0	1	2,000.00	1	2,000.00	2,666.67
106	0	1	2,000.00	1	2,000.00	2,666.67
122	0	1	1,495.00	1	1,495.00	1,993.33
49	0	1	8,354.00	1	8,354.00	11,138.67
88	0	1	560.00	1	560.00	746.67
87	0	1	560.00	1	560.00	746.67

Table E.1. E 30 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E30	Annual Sale	Total	Annual Price
109	0	1	6,800.00	1	6,800.00	9,066.67
108	0	1	6,800.00	1	6,800.00	9,066.67
134	0	1	605.00	1	605.00	806.67
26	0	1	1,450.00	1	1,450.00	1,933.33
129	0	1	655.00	1	655.00	873.33
16	0	1	13,990.00	1	13,990.00	18,653.33
124	0	1	1,450.00	1	1,450.00	1,933.33
14	0	1	2,560.00	1	2,560.00	3,413.33
160	0	1	5,140.00	1	5,140.00	6,853.33
70	0	1	6,530.00	1	6,530.00	8,706.67
147	0	1	1,415.00	1	1,415.00	1,886.67
13	0	0	20,680.00	0	0.00	0.00
65	0	0	13,070.00	0	0.00	0.00
33*	0	0	2,000.00	0	0.00	0.00
139	0	0	6,500.00	0	0.00	0.00
84	0	0	220.00	0	0.00	0.00
82	0	0	120.00	0	0.00	0.00
92	0	0	830.00	0	0.00	0.00
91	0	0	830.00	0	0.00	0.00
54	0	0	1,850.00	0	0.00	0.00
61	0	0	18,887.00	0	0.00	0.00
60	0	0	18,887.00	0	0.00	0.00
9	0	0	1,780.00	0	0.00	0.00
8	0	0	1,780.00	0	0.00	0.00
63	0	0	18,887.00	0	0.00	0.00
62	0	0	18,887.00	0	0.00	0.00
23	0	0	3,850.00	0	0.00	0.00
15	0	0	10,170.00	0	0.00	0.00
121	0	0	1,495.00	0	0.00	0.00
126	0	0	545.00	0	0.00	0.00
162	0	0	3,814.00	0	0.00	0.00

Table E.1. E 30 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E30	Annual Sale	Total	Annual Price
48	0	0	8,350.00	0	0.00	0.00
138	0	0	500.00	0	0.00	0.00
137	0	0	500.00	0	0.00	0.00
74	0	0	7,260.00	0	0.00	0.00
79	0	0	1,580.00	0	0.00	0.00
131	0	0	550.00	0	0.00	0.00
7	0	0	2,200.00	0	0.00	0.00
27	0	0	1,450.00	0	0.00	0.00
28	0	0	1,450.00	0	0.00	0.00
24	0	0	920.00	0	0.00	0.00
150	0	0	3,100.00	0	0.00	0.00
95	0	0	13,400.00	0	0.00	0.00
155	0	0	7,100.00	0	0.00	0.00
51	0	0	12,712.00	0	0.00	0.00
50	0	0	12,100.00	0	0.00	0.00
90	0	0	380.00	0	0.00	0.00
89	0	0	380.00	0	0.00	0.00
118	0	0	1,130.00	0	0.00	0.00
117	0	0	1,130.00	0	0.00	0.00
77	0	0	10,060.00	0	0.00	0.00
76	0	0	10,060.00	0	0.00	0.00
2	0	0	3,600.00	0	0.00	0.00
1	0	0	3,600.00	0	0.00	0.00
4	0	0	3,600.00	0	0.00	0.00
3	0	0	3,600.00	0	0.00	0.00
161	0	0	4,600.00	0	0.00	0.00
46	0	0	1,320.00	0	0.00	0.00
94	0	0	220.00	0	0.00	0.00
93	0	0	220.00	0	0.00	0.00
86	0	0	950.00	0	0.00	0.00
85	0	0	250.00	0	0.00	0.00

Table E.1. E 30 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E30	Average Price	Total	Annual Price
75	0	0	5,260.00	0	0.00	0.00
80	0	0	15,400.00	0	0.00	0.00
71	0	0	6,530.00	0	0.00	0.00
149	0	0	1,260.00	0	0.00	0.00
146	0	0	1,410.00	0	0.00	0.00
148	0	0	1,260.00	0	0.00	0.00
17*	0	0	3,100.00	0	0.00	0.00
					1,252,944.00	1,670,658.67

Remark

(1)   * Prices are subjected to change without notice

(2)   ** Prices are included for 2 pieces
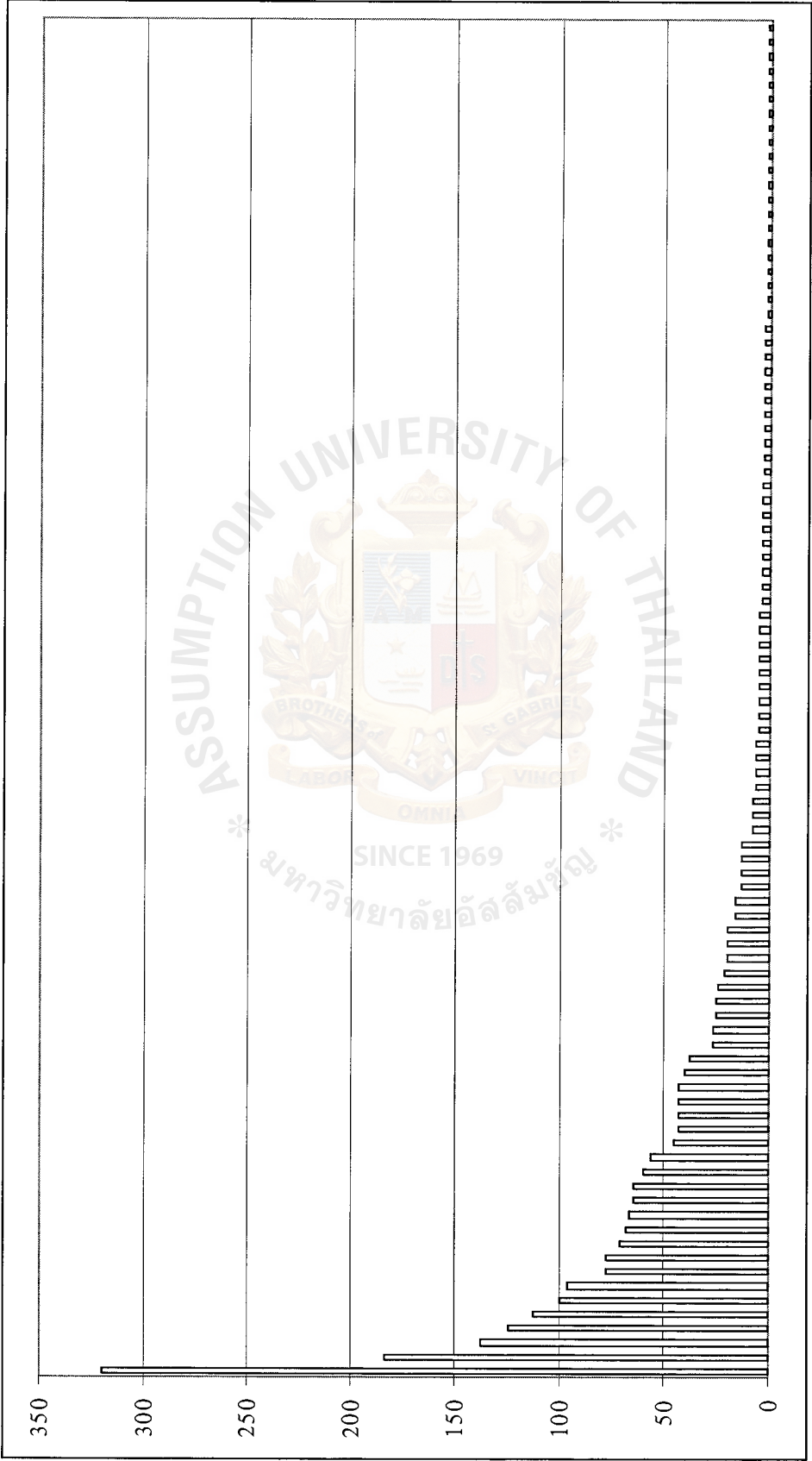
E 30 Model Classified by Unit.

Class A of E 30 Model Classified by Unit.
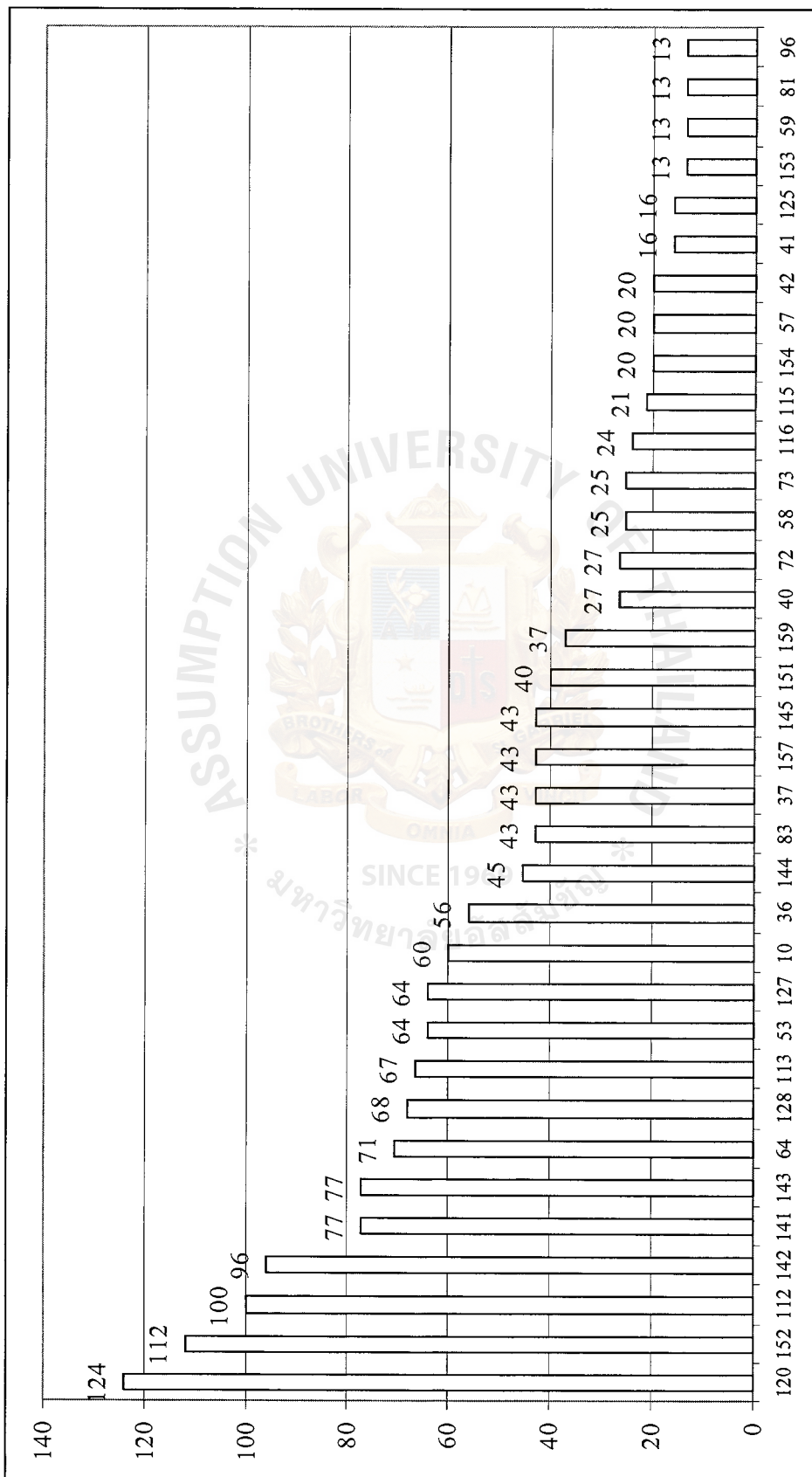
Class B of E 30 Model Classified by Unit.
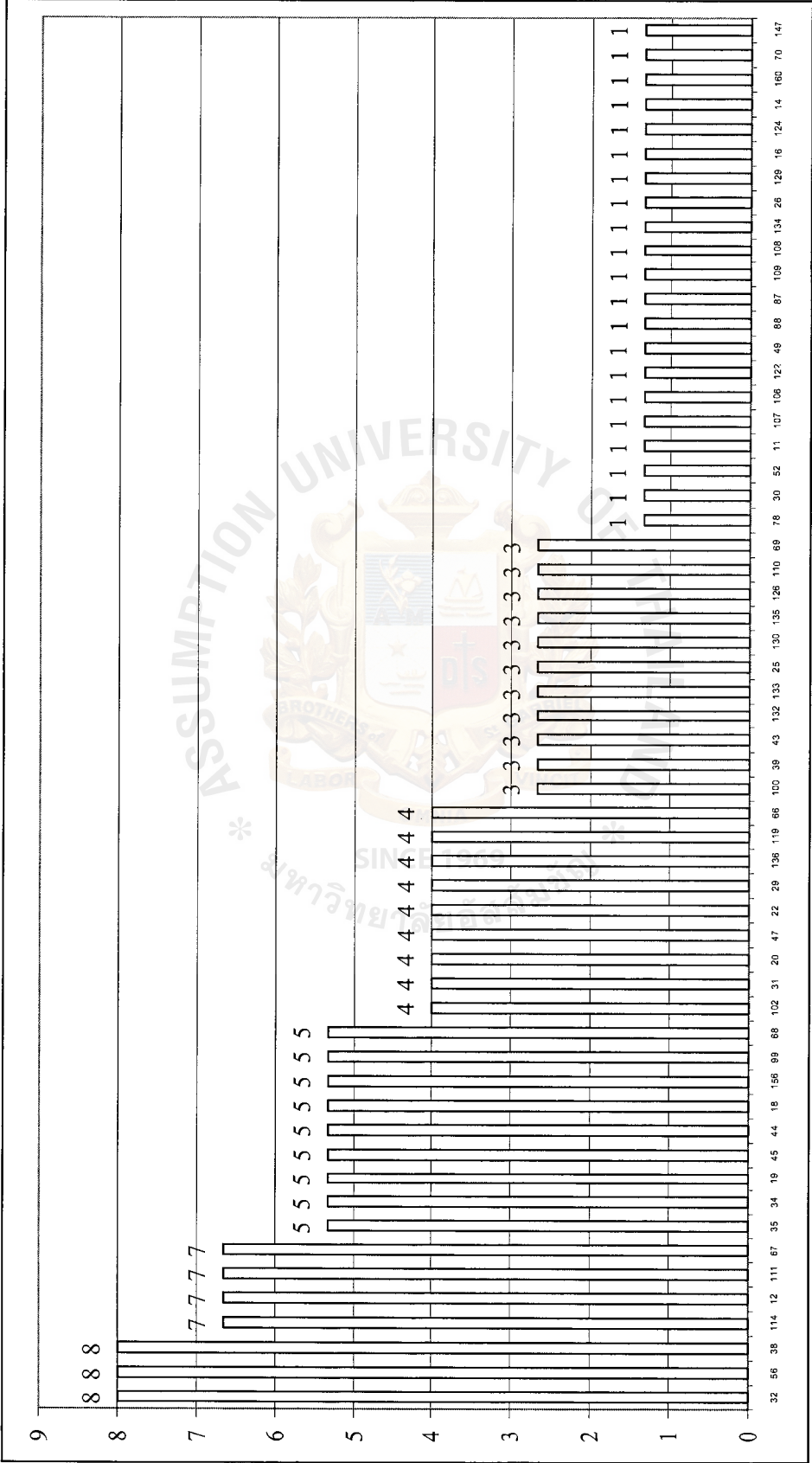
Class C of E30 Model Classified by Unit.

APPENDIX F

E 34 MODEL CLASSIFIED BY TOTAL MONETARY VALUE

Table F.1. E 34 Model Classified by Total Monetary Value.

Code	Unit sales	Price E34	Annual Sales	Total	Annual Price
21	-	-	-	-	-
39	-	-	-	-	-
6	-	-	-	-	-
5	-	-	-	-	-
159	-	-	-	-	-
94	-	-	-	-	-
93	-	-	-	-	-
155	18	18,500.00	24	333,000.00	444,000.00
96	24	10,500.00	32	252,000.00	336,000.00
68	49	3,200.00	65	156,800.00	209,066.67
41*	19	8,200.00	25	155,800.00	207,733.33
42*	22	6,200.00	29	136,400.00	181,866.67
99	12	10,550.00	16	126,600.00	168,800.00
69	38	3,200.00	51	121,600.00	162,133.33
55*	68	1,450.00	91	98,600.00	131,466.67
141	92	980.00	123	90,160.00	120,213.33
120	59	1,250.00	79	73,750.00	98,333.33
53	82	890.00	109	72,980.00	97,306.67
97	6	11,500.00	8	69,000.00	92,000.00
98	5	11,500.00	7	57,500.00	76,666.67
64	18	3,100.00	24	55,800.00	74,400.00
95	2	19,850.00	3	39,700.00	52,933.33
83	88	400.00	117	35,200.00	46,933.33
32*	8	4,200.00	11	33,600.00	44,800.00
152	85	350.00	113	29,750.00	39,666.67
73	22	1,350.00	29	29,700.00	39,600.00
116	24	1,100.00	32	26,400.00	35,200.00
143	18	1,450.00	24	26,100.00	34,800.00
142	18	1,450.00	24	26,100.00	34,800.00
26	12	1,950.00	16	23,400.00	31,200.00
115	18	1,100.00	24	19,800.00	26,400.00

Table F.1. E 34 Model Classified by Total Monetary Value. (Continued)

Code	Unit sales	Price E34	Annual Sales	Total	Annual Price
158	190	100.00	253	19,000.00	25,333.33
86	23	790.00	31	18,170.00	24,226.67
150	4	3,800.00	5	15,200.00	20,266.67
72	10	1,500.00	13	15,000.00	20,000.00
14	3	4,800.00	4	14,400.00	19,200.00
24	13	1,050.00	17	13,650.00	18,200.00
126	4	2,850.00	5	11,400.00	15,200.00
140	89	120.00	119	10,680.00	14,240.00
49	1	10,200.00	1	10,200.00	13,600.00
58	10	1,000.00	13	10,000.00	13,333.33
27	5	1,950.00	7	9,750.00	13,000.00
1	1	8,900.00	1	8,900.00	11,866.67
139	1	8,500.00	1	8,500.00	11,333.33
154	12	650.00	16	7,800.00	10,400.00
153	15	500.00	20	7,500.00	10,000.00
144	15	500.00	20	7,500.00	10,000.00
157	18	400.00	24	7,200.00	9,600.00
125	3	2,280.00	4	6,840.00	9,120.00
145	48	140.00	64	6,720.00	8,960.00
33*	2	3,200.00	3	6,400.00	8,533.33
37	14	450.00	19	6,300.00	8,400.00
28	3	1,950.00	4	5,850.00	7,800.00
20	2	2,850.00	3	5,700.00	7,600.00
124	2	2,850.00	3	5,700.00	7,600.00
149	2	2,540.00	3	5,080.00	6,773.33
114	1	4,500.00	1	4,500.00	6,000.00
40	5	900.00	7	4,500.00	6,000.00
85	5	850.00	7	4,250.00	5,666.67
104	2	2,100.00	3	4,200.00	5,600.00
25	4	1,050.00	5	4,200.00	5,600.00
46	2	1,950.00	3	3,900.00	5,200.00

Table F.1. E 34 Model Classified by Total Monetary Value. (Continued)

Code	Unit sales	Price E34	Annual Sales	Total	Annual Price
100	3	1,200.00	4	3,600.00	4,800.00
84	3	1,100.00	4	3,300.00	4,400.00
10	3	1,100.00	4	3,300.00	4,400.00
56	2	1,450.00	3	2,900.00	3,866.67
107	1	2,800.00	1	2,800.00	3,733.33
106	1	2,800.00	1	2,800.00	3,733.33
103	2	1,400.00	3	2,800.00	3,733.33
101	2	1,400.00	3	2,800.00	3,733.33
78	2	1,350.00	3	2,700.00	3,600.00
88	2	1,280.00	3	2,560.00	3,413.33
127	42	60.00	56	2,520.00	3,360.00
128	30	80.00	40	2,400.00	3,200.00
151	13	180.00	17	2,340.00	3,120.00
52	2	1,100.00	3	2,200.00	2,933.33
54	1	2,100.00	1	2,100.00	2,800.00
105	1	2,100.00	1	2,100.00	2,800.00
29	1	1,950.00	1	1,950.00	2,600.00
133	2	885.00	3	1,770.00	2,360.00
112	4	420.00	5	1,680.00	2,240.00
92	1	1,450.00	1	1,450.00	1,933.33
91	1	1,450.00	1	1,450.00	1,933.33
87	1	1,280.00	1	1,280.00	1,706.67
102	1	1,200.00	1	1,200.00	1,600.00
57	3	350.00	4	1,050.00	1,400.00
136	1	885.00	1	885.00	1,180.00
110	1	850.00	1	850.00	1,133.33
113	2	420.00	3	840.00	1,120.00
59	3	250.00	4	750.00	1,000.00
47*	1	680.00	1	680.00	906.67
82	1	150.00	1	150.00	200.00
35	0	485.00	0	0.00	0.00

Table F.1. E 34 Model Classified by Total Monetary Value. (Continued)

Code	Unit sales	Price E34	Annual Sales	Total	Annual Price
34	0	480.00	0	0.00	0.00
13	0	40,800.00	0	0.00	0.00
65	0	24,000.00	0	0.00	0.00
30	0	6,800.00	0	0.00	0.00
31	0	6,200.00	0	0.00	0.00
61	0	23,545.00	0	0.00	0.00
60	0	23,545.00	0	0.00	0.00
9	0	3,200.00	0	0.00	0.00
8	0	3,200.00	0	0.00	0.00
63	0	23,545.00	0	0.00	0.00
62	0	23,545.00	0	0.00	0.00
23	0	4,950.00	0	0.00	0.00
19	0	1,450.00	0	0.00	0.00
12	0	2,850.00	0	0.00	0.00
11	0	2,100.00	0	0.00	0.00
15	0	2,100.00	0	0.00	0.00
122	0	2,850.00	0	0.00	0.00
121	0	2,850.00	0	0.00	0.00
126	0	890.00	0	0.00	0.00
162	0	5,950.00	0	0.00	0.00
48	0	10,200.00	0	0.00	0.00
138	0	980.00	0	0.00	0.00
137	0	980.00	0	0.00	0.00
43	0	3,020.00	0	0.00	0.00
45	0	2,100.00	0	0.00	0.00
44	0	2,100.00	0	0.00	0.00
109	0	10,220.00	0	0.00	0.00
108	0	10,220.00	0	0.00	0.00
74	0	8,900.00	0	0.00	0.00
79	0	17,000.00	0	0.00	0.00
22	0	1,500.00	0	0.00	0.00

Table F.1. E 34 Model Classified by Total Monetary Value. (Continued)

Code	Unit sales	Price E34	Annual Sales	Total	Annual Price
38	0	4,800.00	0	0.00	0.00
132	0	680.00	0	0.00	0.00
131	0	680.00	0	0.00	0.00
134	0	885.00	0	0.00	0.00
7	0	3,200.00	0	0.00	0.00
111	0	1,850.00	0	0.00	0.00
18	0	7,200.00	0	0.00	0.00
130	0	785.00	0	0.00	0.00
129	0	785.00	0	0.00	0.00
135	0	885.00	0	0.00	0.00
156	0	9,800.00	0	0.00	0.00
81	0	1,200.00	0	0.00	0.00
119	0	2,200.00	0	0.00	0.00
16	0	24,500.00	0	0.00	0.00
51	0	11,580.00	0	0.00	0.00
50	0	11,580.00	0	0.00	0.00
90	0	490.00	0	0.00	0.00
89	0	490.00	0	0.00	0.00
36	0	850.00	0	0.00	0.00
118	0	1,450.00	0	0.00	0.00
117	0	1,450.00	0	0.00	0.00
77	0	15,680.00	0	0.00	0.00
76	0	15,680.00	0	0.00	0.00
2	0	8,900.00	0	0.00	0.00
4	0	8,900.00	0	0.00	0.00
3	0	8,900.00	0	0.00	0.00
160	0	8,950.00	0	0.00	0.00
161	0	7,500.00	0	0.00	0.00
75	0	7,200.00	0	0.00	0.00
67	0	7,850.00	0	0.00	0.00
66	0	7,850.00	0	0.00	0.00

Table F.1. E 34 Model Classified by Total Monetary Value. (Continued)

Code	Unit sales	Price E34	Annual Sales	Total	Annual Price
80	0	16,900.00	0	0.00	0.00
71	0	5,200.00	0	0.00	0.00
70	0	5,200.00	0	0.00	0.00
147	0	2,450.00	0	0.00	0.00
146	0	2,540.00	0	0.00	0.00
148	0	2,540.00	0	0.00	0.00
17*	0	4,200.00	0	0.00	0.00
				2,417,935.00	3,223,913.33

Remark

(1)   * Prices are subjected to change without notice

(2)   ** Prices are included for 2 pieces

E 34 Model Classified by Total Monetary Value.

Class A of E 34 Model Classified by Total Monetary Value.

Class B of E 34 Model Classified by Total Monetary Value.

Class C of E 34 Model Classified by Total Monetary Value.

APPENDIX G

E 34 CLASSIFIED BY UNIT

Table G.1. E 34 Model Classified by Unit.

Code	Average Unit	Unit sales	Price E34	Annual Sale	Total	Annual Price
21	-	-	-	-	-	-
39	-	-	-	-	-	-
6	-	-	-	-	-	-
5	-	-	-	-	-	-
159	-	-	-	-	-	-
94	-	-	-	-	-	-
93	-	-	-	-	-	-
158	21	190	100.00	253	19,000.00	25,333.33
141	10	92	980.00	123	90,160.00	120,213.33
140	10	89	120.00	119	10,680.00	14,240.00
83	10	88	400.00	117	35,200.00	46,933.33
152	9	85	350.00	113	29,750.00	39,666.67
53	9	82	890.00	109	72,980.00	97,306.67
55*	8	68	1,450.00	91	98,600.00	131,466.67
120	7	59	1,250.00	79	73,750.00	98,333.33
68	5	49	3,200.00	65	156,800.00	209,066.67
145	5	48	140.00	64	6,720.00	8,960.00
127	5	42	60.00	56	2,520.00	3,360.00
69	4	38	3,200.00	51	121,600.00	162,133.33
128	3	30	80.00	40	2,400.00	3,200.00
116	3	24	1,100.00	32	26,400.00	35,200.00
96	3	24	10,500.00	32	252,000.00	336,000.00
86	3	23	790.00	31	18,170.00	24,226.67
73	2	22	1,350.00	29	29,700.00	39,600.00
42*	2	22	6,200.00	29	136,400.00	181,866.67
41*	2	19	8,200.00	25	155,800.00	207,733.33
155	2	18	18,500.00	24	333,000.00	444,000.00
64	2	18	3,100.00	24	55,800.00	74,400.00
115	2	18	1,100.00	24	19,800.00	26,400.00
157	2	18	400.00	24	7,200.00	9,600.00
143	2	18	1,450.00	24	26,100.00	34,800.00

Table G.1. E 34 Model Classified by Unit. (Continued)

Code	Aerage Unit	Unit sales	Price E34	Annual Sale	Total	Annual Price
142	2	18	1,450.00	24	26,100.00	34,800.00
153	2	15	500.00	20	7,500.00	10,000.00
144	2	15	500.00	20	7,500.00	10,000.00
37	2	14	450.00	19	6,300.00	8,400.00
151	1	13	180.00	17	2,340.00	3,120.00
24	1	13	1,050.00	17	13,650.00	18,200.00
154	1	12	650.00	16	7,800.00	10,400.00
26	1	12	1,950.00	16	23,400.00	31,200.00
99	1	12	10,550.00	16	126,600.00	168,800.00
58	1	10	1,000.00	13	10,000.00	13,333.33
72	1	10	1,500.00	13	15,000.00	20,000.00
32*	1	8	4,200.00	11	33,600.00	44,800.00
97	1	6	11,500.00	8	69,000.00	92,000.00
40	1	5	900.00	7	4,500.00	6,000.00
27	1	5	1,950.00	7	9,750.00	13,000.00
98	1	5	11,500.00	7	57,500.00	76,666.67
85	1	5	850.00	7	4,250.00	5,666.67
112	0	4	420.00	5	1,680.00	2,240.00
25	0	4	1,050.00	5	4,200.00	5,600.00
150	0	4	3,800.00	5	15,200.00	20,266.67
126	0	4	2,850.00	5	11,400.00	15,200.00
100	0	3	1,200.00	4	3,600.00	4,800.00
84	0	3	1,100.00	4	3,300.00	4,400.00
57	0	3	350.00	4	1,050.00	1,400.00
59	0	3	250.00	4	75000	1,000.00
28	0	3	1,950.00	4	5,850.00	7,800.00
14	0	3	4,800.00	4	14,400.00	19,200.00
125	0	3	2,280.00	4	6,840.00	9,120.00
10	0	3	1,100.00	4	3,300.00	4,400.00
103	0	2	1,400.00	3	2,800.00	3,733.33
101	0	2	1,400.00	3	2,800.00	3,733.33

Table G.1. E 34 Model Classified by Unit. (Continued)

Code	Aerage Unit	Unit sales	Price E34	Annual Sale	Total	Annual Price
78	0	2	1,350.00	3	2,700.00	3,600.00
33*	0	2	3,200.00	3	6,400.00	8,533.33
113	0	2	420.00	3	840.00	1,120.00
56	0	2	1,450.00	3	2,900.00	3,866.67
20	0	2	2,850.00	3	5,700.00	7,600.00
52	0	2	1,100.00	3	2,200.00	2,933.33
88	0	2	1,280.00	3	2,560.00	3,413.33
104	0	2	2,100.00	3	4,200.00	5,600.00
133	0	2	885.00	3	1,770.00	2,360.00
95	0	2	19,850.00	3	39,700.00	52,933.33
124	0	2	2,850.00	3	5,700.00	7,600.00
46	0	2	1,950.00	3	3,900.00	5,200.00
149	0	2	2,540.00	3	5,080.00	6,773.33
102	0	1	1,200.00	1	1,200.00	1,600.00
114	0	1	4,500.00	1	4,500.00	6,000.00
139	0	1	8,500.00	1	8,500.00	11,333.33
82	0	1	150.00	1	150.00	200.00
92	0	1	1,450.00	1	1,450.00	1,933.33
91	0	1	1,450.00	1	1,450.00	1,933.33
54	0	1	2,100.00	1	2,100.00	2,800.00
107	0	1	2,800.00	1	2,800.00	3,733.33
106	0	1	2,800.00	1	2,800.00	3,733.33
49	0	1	10,200.00	1	10,200.00	13,600.00
87	0	1	1,280.00	1	1,280.00	1,706.67
105	0	1	2,100.00	1	2,100.00	2,800.00
47*	0	1	680.00	1	680.00	906.67
29	0	1	1,950.00	1	1,950.00	2,600.00
136	0	1	885.00	1	885.00	1,180.00
1	0	1	8,900.00	1	8,900.00	11,866.67
110	0	1	850.00	1	850.00	1,133.33
35	0	0	485.00	0	0.00	0.00

Table G.1. E 34 Model Classified by Unit. (Continued)

Code	Aerage Unit	Unit sales	Price E34	Annual Sale	Total	Annual Price
34	0	0	480.00	0	0.00	0.00
13	0	0	40,800.00	0	0.00	0.00
65	0	0	24,000.00	0	0.00	0.00
30	0	0	6,800.00	0	0.00	0.00
31	0	0	6,200.00	0	0.00	0.00
61	0	0	23,545.00	0	0.00	0.00
60	0	0	23,545.00	0	0.00	0.00
9	0	0	3,200.00	0	0.00	0.00
8	0	0	3,200.00	0	0.00	0.00
63	0	0	23,545.00	0	0.00	0.00
62	0	0	23,545.00	0	0.00	0.00
23	0	0	4,950.00	0	0.00	0.00
19	0	0	1,450.00	0	0.00	0.00
12	0	0	2,850.00	0	0.00	0.00
11	0	0	2,100.00	0	0.00	0.00
15	0	0	2,100.00	0	0.00	0.00
122	0	0	2,850.00	0	0.00	0.00
121	0	0	2,850.00	0	0.00	0.00
126	0	0	890.00	0	0.00	0.00
162	0	0	5,950.00	0	0.00	0.00
48	0	0	10,200.00	0	0.00	0.00
138	0	0	980.00	0	0.00	0.00
137	0	0	980.00	0	0.00	0.00
43	0	0	3,020.00	0	0.00	0.00
45	0	0	2,100.00	0	0.00	0.00
44	0	0	2,100.00	0	0.00	0.00
109	0	0	10,220.00	0	0.00	0.00
108	0	0	10,220.00	0	0.00	0.00
74	0	0	8,900.00	0	0.00	0.00
79	0	0	17,000.00	0	0.00	0.00
22	0	0	1,500.00	0	0.00	0.00

Table G.1. E 34 Model Classified by Unit. (Continued)

Code	Aerage Unit	Unit sales	Price E34	Annual Sale	Total	Annual Price
38	0	0	4,800.00	0	0.00	0.00
132	0	0	680.00	0	0.00	0.00
131	0	0	680.00	0	0.00	0.00
134	0	0	885.00	0	0.00	0.00
7	0	0	3,200.00	0	0.00	0.00
111	0	0	1,850.00	0	0.00	0.00
18	0	0	7,200.00	0	0.00	0.00
130	0	0	785.00	0	0.00	0.00
129	0	0	785.00	0	0.00	0.00
135	0	0	885.00	0	0.00	0.00
156	0	0	9,800.00	0	0.00	0.00
81	0	0	1,200.00	0	0.00	0.00
119	0	0	2,200.00	0	0.00	0.00
16	0	0	24,500.00	0	0.00	0.00
51	0	0	11,580.00	0	0.00	0.00
50	0	0	11,580.00	0	0.00	0.00
90	0	0	490.00	0	0.00	0.00
89	0	0	490.00	0	0.00	0.00
36	0	0	850.00	0	0.00	0.00
118	0	0	1,450.00	0	0.00	0.00
117	0	0	1,450.00	0	0.00	0.00
77	0	0	15,680.00	0	0.00	0.00
76	0	0	15,680.00	0	0.00	0.00
2	0	0	8,900.00	0	0.00	0.00
4	0	0	8,900.00	0	0.00	0.00
3	0	0	8,900.00	0	0.00	0.00
160	0	0	8,950.00	0	0.00	0.00
161	0	0	7,500.00	0	0.00	0.00
75	0	0	7,200.00	0	0.00	0.00
67	0	0	7,850.00	0	0.00	0.00
66	0	0	7,850.00	0	0.00	0.00

Table G.1. E 34 Model Classified by Unit. (Continued)

Code	Aerage Unit	Unit sales	Price E34	Annual Sale	Total	Annual Price
80	0	0	16,900.00	0	0.00	0.00
71	0	0	5,200.00	0	0.00	0.00
70	0	0	5,200.00	0	0.00	0.00
147	0	0	2,450.00	0	0.00	0.00
146	0	0	2,540.00	0	0.00	0.00
148	0	0	2,540.00	0	0.00	0.00
17*	0	0	4,200.00	0	0.00	0.00
					2,417,935.00	3,223,913

Remark

(1)   *Prices are subjected to change without notice

(2)   ** Prices are included for 2 pieces

E 34 Model Classified by Unit.

Class A of E 34 Model Classified by Unit.

00
tr)

N

bA

139

Class B of E 34 Model Classified by Unit.

140
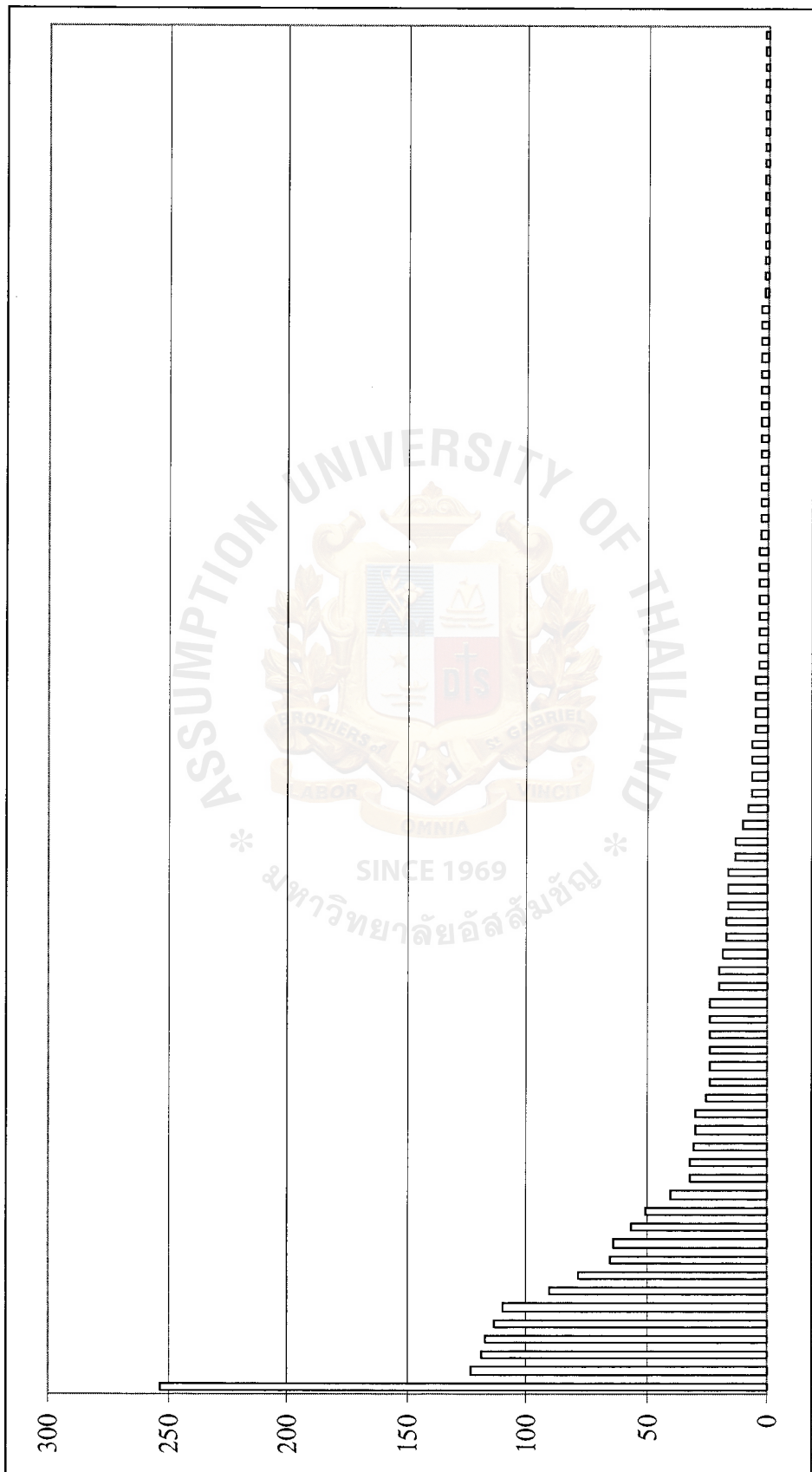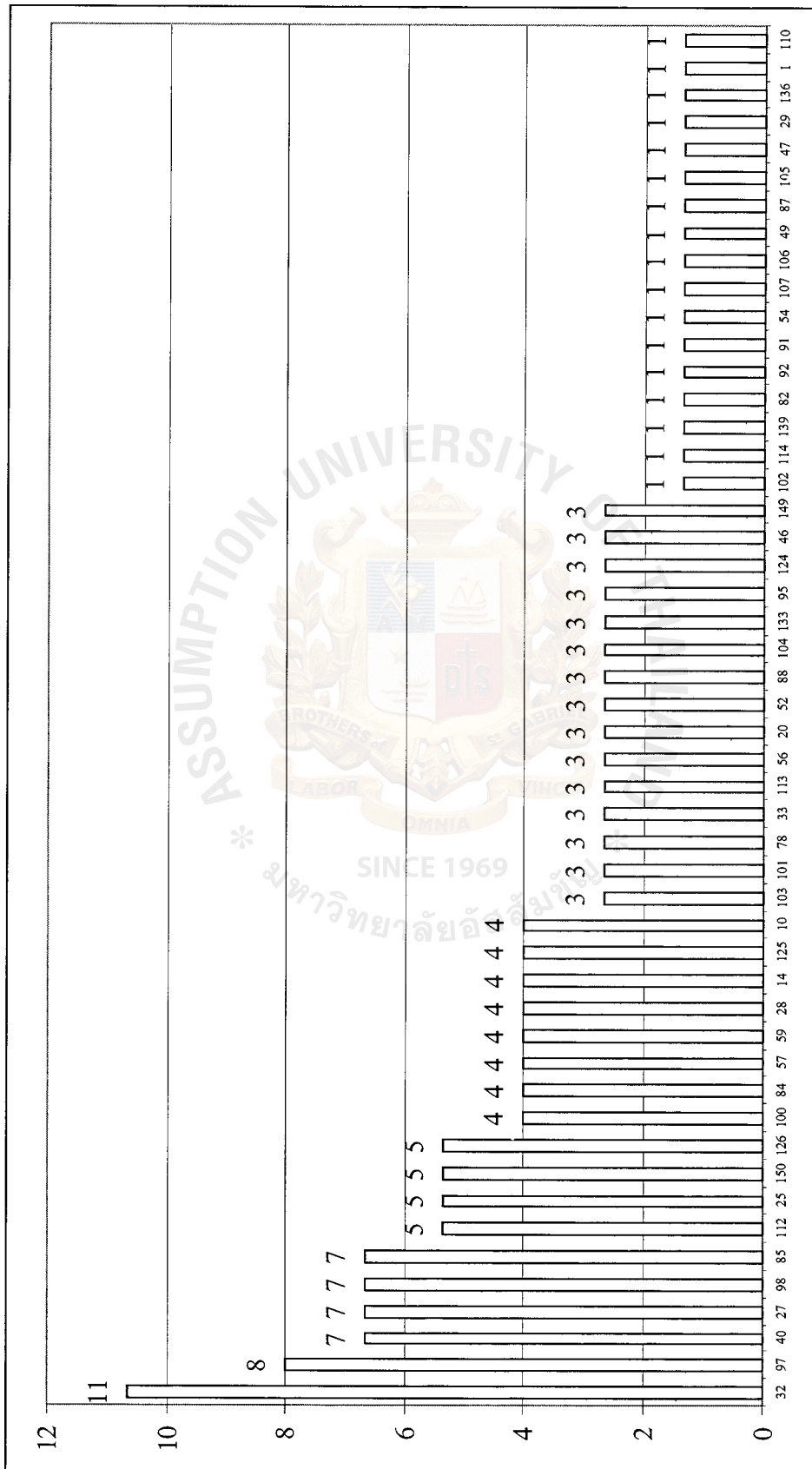
Figure G.4.   Class C of E 34 Model Classified by Unit.
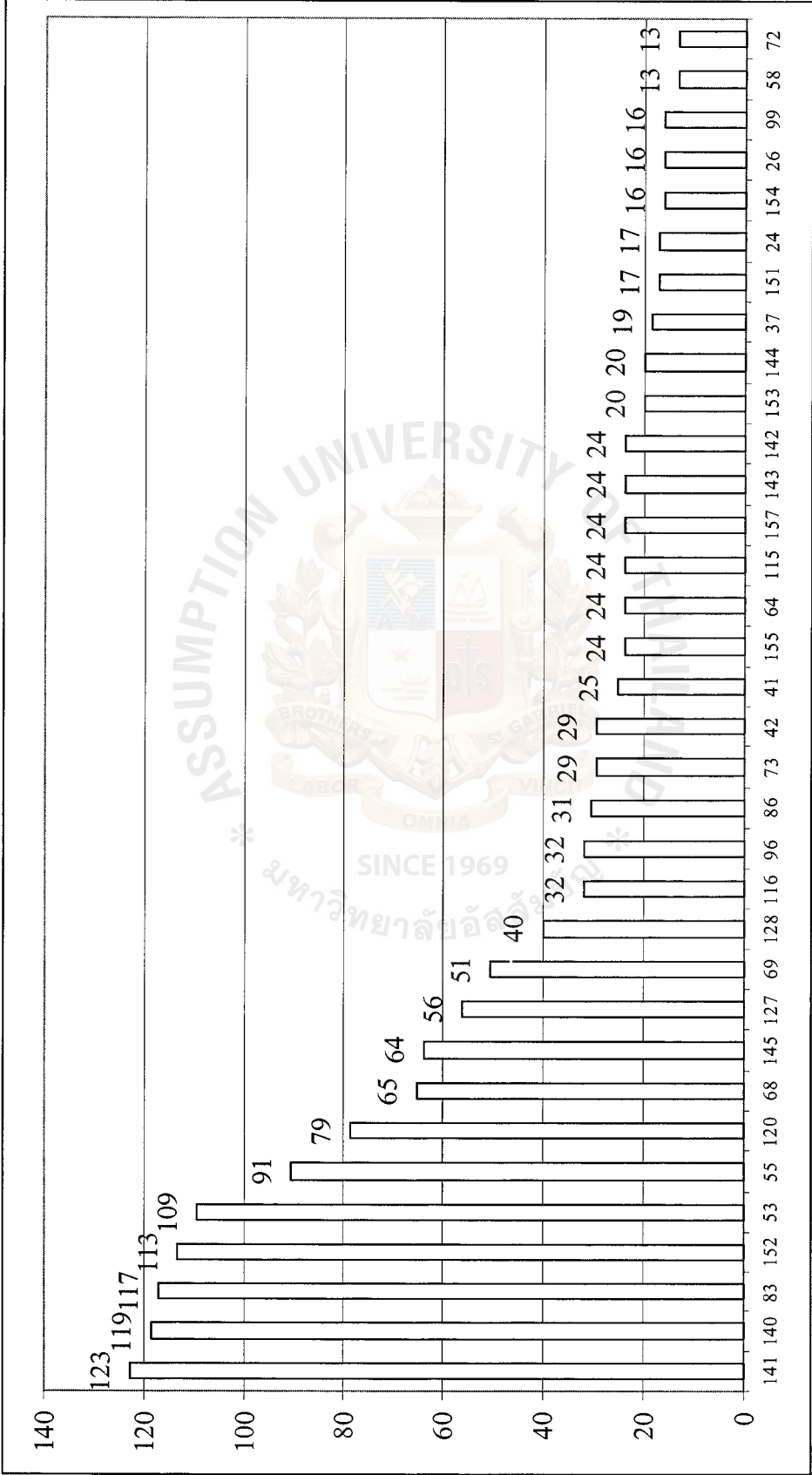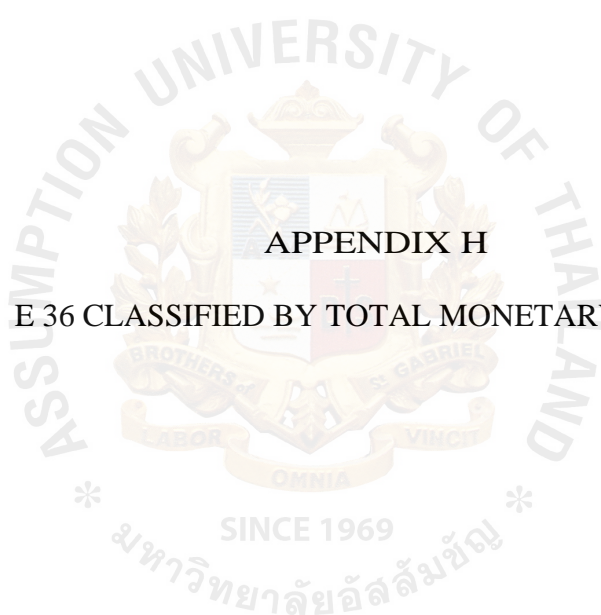
APPENDIX H

E 36 CLASSIFIED BY TOTAL MONETARY VALUE

Table H.1. E 36 Model Classified by Total Monetary Value.

Code	Unit Sales	Price E36	Annual Sales	Total	Annual Price
39	-	-	-	-	-
115	-	-	-	-	-
86	-	-	-	-	-
85	-	-	-	-	-
143	91	1,850.00	121	168,350.00	224,466.67
142	88	1,900.00	117	167,200.00	222,933.33
41*	18	8,000.00	24	144,000.00	192,000.00
64	62	2,250.00	83	139,500.00	186,000.00
42*	22	5,800.00	29	127,600.00	170,133.33
55*	102	850.00	136	86,700.00	115,600.00
96	15	4,800.00	20	72,000.00	96,000.00
120	32	1,950.00	43	62,400.00	83,200.00
99	13	4,800.00	17	62,400.00	83,200.00
150	15	3,400.00	20	51,000.00	68,000.00
6	13	3,500.00	17	45,500.00	60,666.67
5	13	3,500.00	17	45,500.00	60,666.67
152	133	320.00	177	42,560.00	56,746.67
95	2	21,000.00	3	42,000.00	56,000.00
53	83	500.00	111	41,500.00	55,333.33
144	51	800.00	68	40,800.00	54,400.00
13	1	40,500.00	1	40,500.00	54,000.00
83	82	450.00	109	36,900.00	49,200.00
155	30	1,200.00	40	36,000.00	48,000.00
141	42	850.00	56	35,700.00	47,600.00
32*	10	3,200.00	13	32,000.00	42,666.67
72	22	1,450.00	29	31,900.00	42,533.33
73	24	1,250.00	32	30,000.00	40,000.00
98	5	5,800.00	7	29,000.00	38,666.67
54	13	2,200.00	17	28,600.00	38,133.33
31	4	6,220.00	5	24,880.00	33,173.33
18	3	7,080.00	4	21,240.00	28,320.00

Table H.1. E 36 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E36	Annual Sales	Total	Annual Price
97	3	5,800.00	4	17,400.00	23,200.00
139	2	7,800.00	3	15,600.00	20,800.00
145	108	140.00	144	15,120.00	20,160.00
87	15	980.00	20	14,700.00	19,600.00
1	2	7,200.00	3	14,400.00	19,200.00
26	7	1,850.00	9	12,950.00	17,266.67
154	22	580.00	29	12,760.00	17,013.33
30	2	6,300.00	3	12,600.00	16,800.00
88	12	980.00	16	11,760.00	15,680.00
162	2	5,800.00	3	11,600.00	15,466.67
20	4	2,850.00	5	11,400.00	15,200.00
158	142	80.00	189	11,360.00	15,146.67
33*	4	2,800.00	5	11,200.00	14,933.33
110	12	850.00	16	10,200.00	13,600.00
15	1	10,110.00	1	10,110.00	13,480.00
151	25	400.00	33	10,000.00	13,333.33
153	12	800.00	16	9,600.00	12,800.00
27	5	1,850.00	7	9,250.00	12,333.33
112	22	380.00	29	8,360.00	11,146.67
116	32	240.00	43	7,680.00	10,240.00
40	10	750.00	13	7,500.00	10,000.00
148	3	2,490.00	4	7,470.00	9,960.00
28	4	1,850.00	5	7,400.00	9,866.67
107	4	1,800.00	5	7,200.00	9,600.00
106	4	1,800.00	5	7,200.00	9,600.00
4	1	7,200.00	1	7,200.00	9,600.00
115	28	240.00	37	6,720.00	8,960.00
17*	2	3,300.00	3	6,600.00	8,800.00
157	16	380.00	21	6,080.00	8,106.67
125	3	2,020.00	4	6,060.00	8,080.00
35	24	250.00	32	6,000.00	8,000.00

Table H.1. E 36 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E36	Annual Sales	Total	Annual Price
34	24	250.00	32	6,000.00	8,000.00
38	2	3,000.00	3	6,000.00	8,000.00
140	50	120.00	67	6,000.00	8,000.00
117	5	1,180.00	7	5,900.00	7,866.67
113	15	380.00	20	5,700.00	7,600.00
147	2	2,850.00	3	5,700.00	7,600.00
104	3	1,800.00	4	5,400.00	7,200.00
21	9	580.00	12	5,220.00	6,960.00
23	1	5,200.00	1	5,200.00	6,933.33
56	3	1,600.00	4	4,800.00	6,400.00
118	4	1,180.00	5	4,720.00	6,293.33
91	4	1,100.00	5	4,400.00	5,866.67
36	8	550.00	11	4,400.00	5,866.67
126	2	2,100.00	3	4,200.00	5,600.00
119	2	1,855.00	3	3,710.00	4,946.67
37	13	280.00	17	3,640.00	4,853.33
105	2	1,800.00	3	3,600.00	4,800.00
59	5	690.00	7	3,450.00	4,600.00
58	4	850.00	5	3,400.00	4,533.33
22	2	1,600.00	3	3,200.00	4,266.67
47*	4	680.00	5	2,720.00	3,626.67
149	1	2,490.00	1	2,490.00	3,320.00
11	1	2,400.00	1	2,400.00	3,200.00
92	2	1,100.00	3	2,200.00	2,933.33
43	1	2,200.00	1	2,200.00	2,933.33
102	2	980.00	3	1,960.00	2,613.33
52	2	890.00	3	1,780.00	2,373.33
136	2	795.00	3	1,590.00	2,120.00
78	1	1,130.00	1	1,130.00	1,506.67
103	1	1,100.00	1	1,100.00	1,466.67
101	1	1,100.00	1	1,100.00	1,466.67

Table H.1. E 36 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E36	Annual Sales	Total	Annual Price
100	1	980.00	1	980.00	1,306.67
94	4	240.00	5	960.00	1,280.00
84	2	400.00	3	800.00	1,066.67
135	1	795.00	1	795.00	1,060.00
93	3	240.00	4	720.00	960.00
89	1	580.00	1	580.00	773.33
131	1	550.00	1	550.00	733.33
57	2	200.00	3	400.00	533.33
128	4	100.00	5	400.00	533.33
82	2	180.00	3	360.00	480.00
127	2	60.00	3	120.00	160.00
65	0	18,000.00	0	0.00	0.00
114	0	3,800.00	0	0.00	0.00
61	0	22,980.00	0	0.00	0.00
60	0	22,980.00	0	0.00	0.00
9	0	2,750.00	0	0.00	0.00
8	0	2,750.00	0	0.00	0.00
63	0	22,980.00	0	0.00	0.00
62	0	22,980.00	0	0.00	0.00
19	0	1,850.00	0	0.00	0.00
12	0	2,200.00	0	0.00	0.00
122	0	2,100.00	0	0.00	0.00
121	0	2,100.00	0	0.00	0.00
126	0	688.00	0	0.00	0.00
49	0	9,900.00	0	0.00	0.00
48	0	9,900.00	0	0.00	0.00
138	0	850.00	0	0.00	0.00
137	0	850.00	0	0.00	0.00
45	0	1,850.00	0	0.00	0.00
44	0	1,850.00	0	0.00	0.00
109	0	8,900.00	0	0.00	0.00

Table H.1. E 36 Model Classified by Total Monetary Value. (Continued)

Code	Unit Sales	Price E36	Annual Sales	Total	Annual Price
108	0	8,900	0	0.00	0.00
74	0	7,830.00	0	0.00	0.00
79	0	16,500.00	0	0.00	0.00
132	0	550.00	0	0.00	0.00
134	0	795.00	0	0.00	0.00
133	0	795.00	0	0.00	0.00
7	0	4,100.00	0	0.00	0.00
111	0	1,900.00	0	0.00	0.00
29	0	1,850.00	0	0.00	0.00
25	0	1,100.00	0	0.00	0.00
24	0	1,100.00	0	0.00	0.00
130	0	480.00	0	0.00	0.00
129	0	480.00	0	0.00	0.00
156	0	8,800.00	0	0.00	0.00
81	0	850.00	0	0.00	0.00
16	0	14,300.00	0	0.00	0.00
124	0	2,100.00	0	0.00	0.00
51	0	10,220.00	0	0.00	0.00
50	0	10,220.00	0	0.00	0.00
90	0	580.00	0	0.00	0.00
77	0	12,750.00	0	0.00	0.00
76	0	12,750.00	0	0.00	0.00
2	0	7,200.00	0	0.00	0.00
3	0	7,200.00	0	0.00	0.00
14	0	3,600.00	0	0.00	0.00
160	0	8,200.00	0	0.00	0.00
161	0	7,900.00	0	0.00	0.00
46	0	2,200.00	0	0.00	0.00
75	0	6,800.00	0	0.00	0.00
67	0	6,900.00	0	0.00	0.00
66	0	6,900.00	0	0.00	0.00

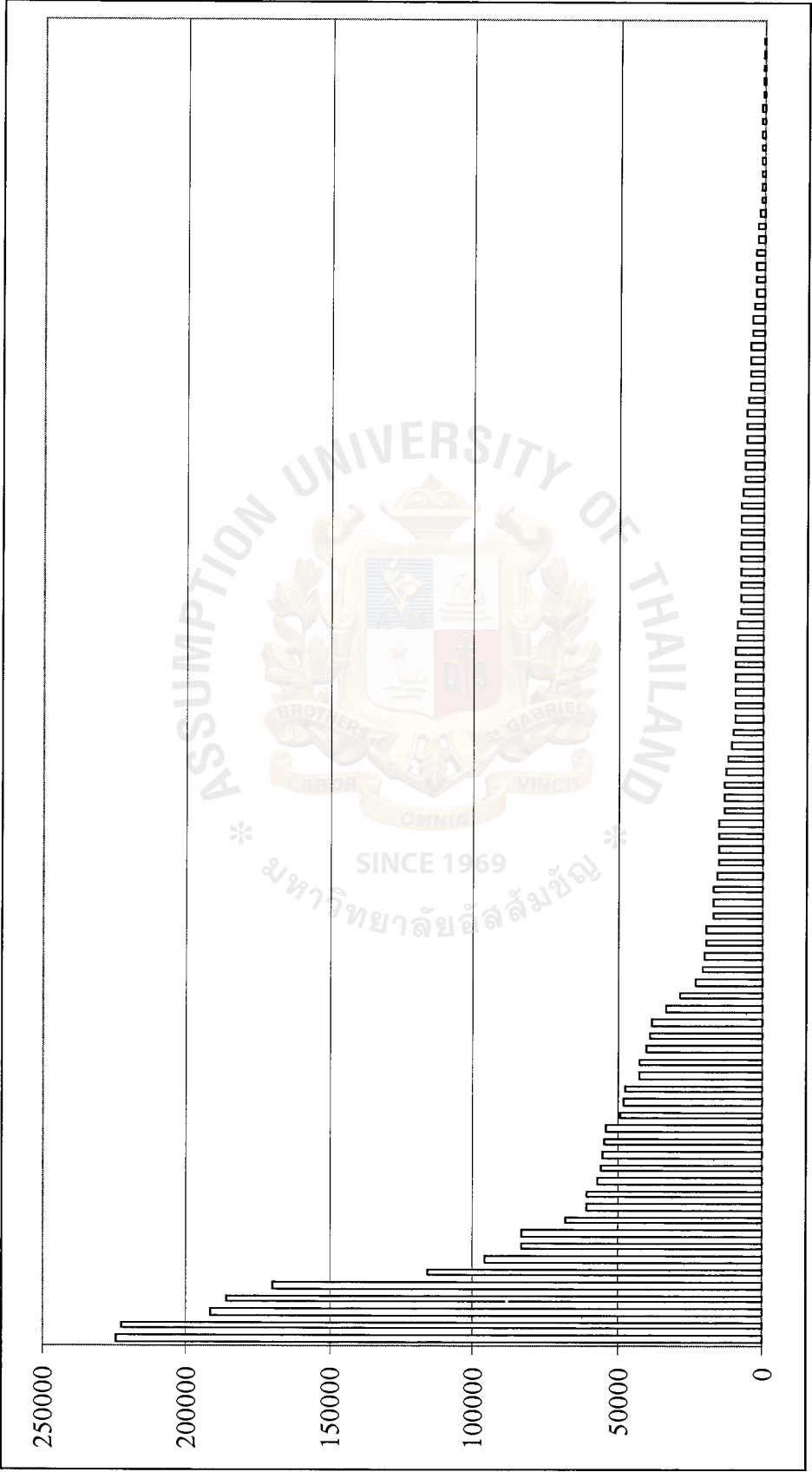Table H.1. E 36 Model Classified by Total Monetary Value. (Continued)

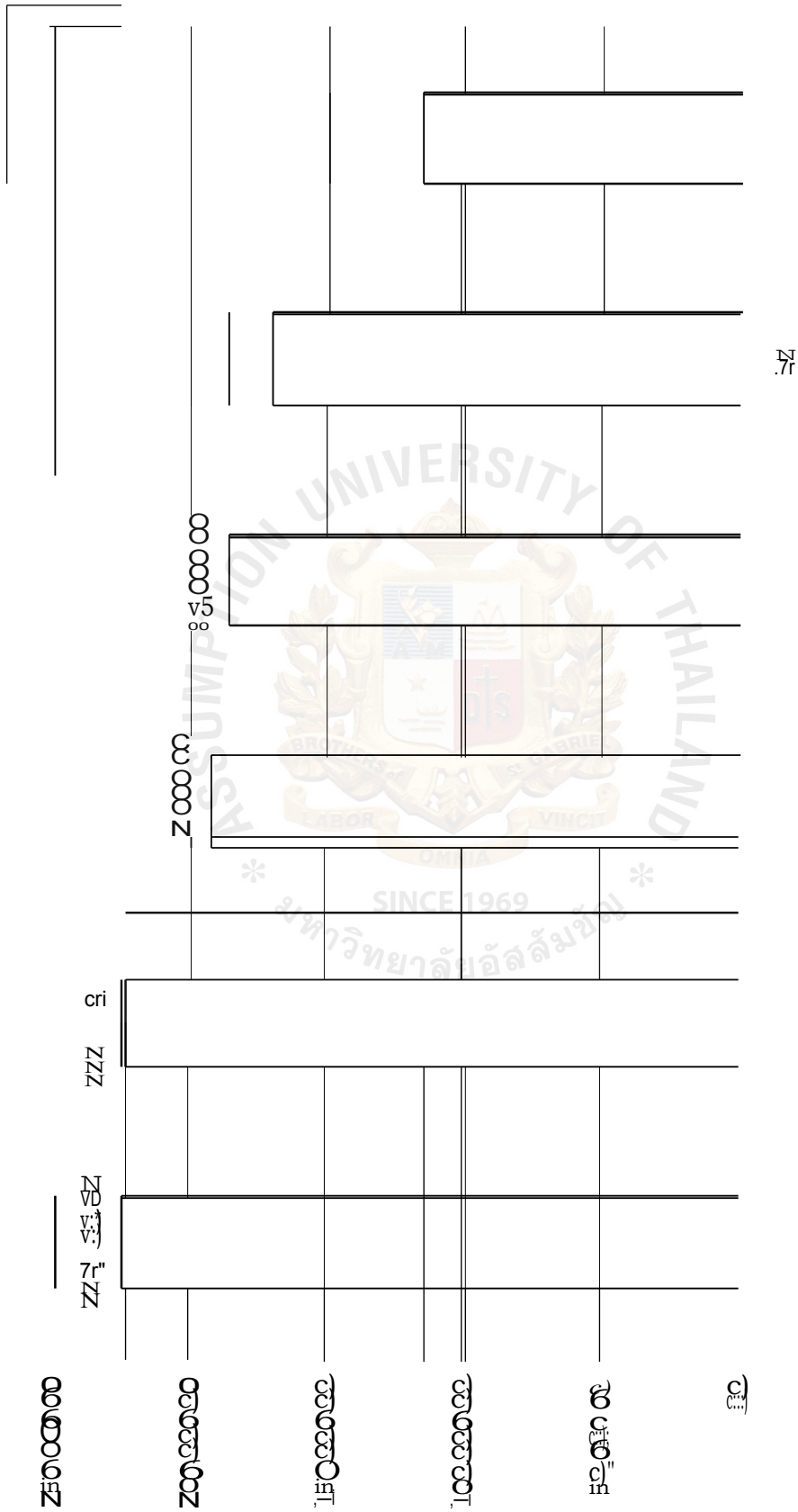| Code	Unit Sales	Price E36	Annual Sales	Total	Annual Price
80	0	1,550.00	0	0.00	0.00
71	0	4,500.00	0	0.00	0.00
70	0	4,500.00	0	0.00	0.00
10	0	1,200.00	0	0.00	0.00
146	0	2,850.00	0	0.00	0.00
69	0	3,800.00	0	0.00	0.00
68	0	3,800.00	0	0.00	0.00
				2,121,185.00	2,828,246.67

Remark

(1)   * Prices are subjected to change without notice

(2)   ** Prices are included for 2 pieces

E 36 Model Classified by Total Monetary Value.

Class A of E 36 Model Classified by Total Monetary Value.

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Class B of E 36 Model Classified by Total Monetary Value.

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Class C of E 36 Model Classified by Total Monetary Value.

APPENDIX I

E 36 CLASSIFIED BY UNIT

Table 1.1. E 36 Model Classified by Unit.

Code	Average Unit	Unit Sales	Price E36	Annual Sale	Total	Annual Price
39	-	-	-	-	-	-
159	-	-	-	-	-	-
86	-	-	-	-	-	-
85	-	-	-	-	-	-
158	16	142	80.00	189	11,360.00	15,146.67
152	15	133	320.00	177	42,560.00	56,746.67
145	12	108	140.00	144	15,120.00	20,160.00
55*	11	102	850.00	136	86,700.00	115,600.00
143	10	91	1,850.00	121	168,350.00	224,466.67
142	10	88	1,900.00	117	167,200.00	222,933.33
53	9	83	500.00	111	41,500.00	55,333.33
83	9	82	450.00	109	36,900.00	49,200.00
64	7	62	2,250.00	83	139,500.00	186,000.00
144	6	51	800.00	68	40,800.00	54,400.00
140	6	50	120.00	67	6,000.00	8,000.00
141	5	42	850.00	56	35,700.00	47,600.00
120	4	32	1,950.00	43	62,400.00	83,200.00
116	4	32	240.00	43	7,680.00	10,240.00
155	3	30	1,200.00	40	36,000.00	48,000.00
115	3	28	240.00	37	6,720.00	8,960.00
151	3	25	400.00	33	10,000.00	13,333.33
35	3	24	250.00	32	6,000.00	8,000.00
34	3	24	250.00	32	6,000.00	8,000.00
73	3	24	1,250.00	32	30,000.00	40,000.00
154	2	22	580.00	29	12,760.00	17,013.33
112	2	22	380.00	29	8,360.00	11,146.67
72	2	22	1,450.00	29	31,900.00	42,533.33
42*	2	22	5,800.00	29	127,600.00	170,133.33
41*	2	18	8,000.00	24	144,000.00	192,000.00
157	2	16	380.00	21	6,080.00	8,106.67
113	2	15	380.00	20	5,700.00	7,600.00

Table D. E 36 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E36	Annual Sale	Total	Annual Price
87	2	15	980.00	20	14,700.00	19,600.00
150	2	15	3,400.00	20	51,000.00	68,000.00
96	2	15	4,800.00	20	72,000.00	96,000.00
54	1	13	2,200.00	17	28,600.00	38,133.33
6	1	13	3,500.00	17	45,500.00	60,666.67
5	1	13	3,500.00	17	45,500.00	60,666.67
37	1	13	280.00	17	3,640.00	4,853.33
99	1	13	4,800.00	17	62,400.00	83,200.00
88	1	12	980.00	16	11,760.00	15,680.00
53	1	12	800.00	16	9,600.00	12,800.00
110	1	12	850.00	16	10,200.00	13,600.00
32*	1	10	3,200.00	13	32,000.00	42,666.67
40	1	10	750.00	13	7,500.00	10,000.00
21	1	9	580.00	12	5,220.00	6,960.00
36	1	8	550.00	11	4,400.00	5,866.67
26	1	7	1,850.00	9	12,950.00	17,266.67
59	1	5	690.00	7	3,450.00	4,600.00
27	1	5	1,850.00	7	9,250.00	12,333.33
98	1	5	5,800.00	7	29,000.00	38,666.67
117	1	5	1,180.00	7	5,900.00	7,866.67
33*	0	4	2,800.00	5	11,200.00	14,933.33
31	0	4	6,220.00	5	24,880.00	33,173.33
91	0	4	1,100.00	5	4,400.00	5,866.67
58	0	4	850.00	5	3,400.00	4,533.33
20	0	4	2,850.00	5	11,400.00	15,200.00
107	0	4	1,800.00	5	7,200.00	9,600.00
106	0	4	1,800.00	5	7,200.00	9,600.00
47*	0	4	680.00	5	2,720.00	3,626.67
28	0	4	1,850.00	5	7,400.00	9,866.67
118	0	4	1,180.00	5	4,720.00	6,293.33
128	0	4	100.00	5	400.00	533.33

Table 1.1. E 36 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E36	Annual Sale	Total	Annual Price
94	0	4	240.00	5	960.00	1,280.00
56	0	3	1,600.00	4	4,800.00	6,400.00
104	0	3	1,800.00	4	5,400.00	7,200.00
18	0	3	7,080.00	4	21,240.00	28,320.00
97	0	3	5,800.00	4	17,400.00	23,200.00
93	0	3	240.00	4	720.00	960.00
125	0	3	2,020.00	4	6,060.00	8,080.00
148	0	3	2,490.00	4	7,470.00	9,960.00
102	0	2	980.00	3	1,960.00	2,613.33
30	0	2	6,300.00	3	12,600.00	16,800.00
139	0	2	7,800.00	3	15,600.00	20,800.00
84	0	2	400.00	3	800.00	1,066.67
82	0	2	180.00	3	360.00	480.00
92	0	2	1,100.00	3	2,200.00	2,933.33
52	0	2	890.00	3	1,780.00	2,373.33
162	0	2	5,800.00	3	11,600.00	15,466.67
105	0	2	1,800.00	3	3,600.00	4,800.00
57	0	2	200.00	3	400.00	533.33
22	0	2	1,600.00	3	3,200.00	4,266.67
38	0	2	3,000.00	3	6,000.00	8,000.00
136	0	2	795.00	3	1,590.00	2,120.00
119	0	2	1,855.00	3	3,710.00	4,946.67
95	0	2	21,000.00	3	42,000.00	56,000.00
126	0	2	2,100.00	3	4,200.00	5,600.00
1	0	2	7,200.00	3	14,400.00	19,200.00
127	0	2	60.00	3	120.00	160.00
147	0	2	2,850.00	3	5,700.00	7,600.00
17*	0	2	3,300.00	3	6,600.00	8,800.00
103	0	1	1,100.00	1	1,100.00	1,466.67
100	0	1	980.00	1	980.00	1,306.67
101	0	1	1,100.00	1	1,100.00	1,466.67

Table I.1. E 36 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E36	Annual Sale	Total	Annual Price
13	0	1	40,500.00	1	40,500.00	54,000.00
78	0	1	1,130.00	1	1,130.00	1,506.67
23	0	1	5,200.00	1	5,200.00	6,933.33
11	0	1	2,400.00	1	2,400.00	3,200.00
15	0	1	10,110.00	1	10,110.00	13,480.00
43	0	1	2,200.00	1	2,200.00	2,933.33
131	0	1	550.00	1	550.00	733.33
135	0	1	795.00	1	795.00	1,060.00
89	0	1	580.00	1	580.00	773.33
4	0	1	7,200.00	1	7,200.00	9,600.00
149	0	1	2,490.00	1	2,490.00	3,320.00
65	0	0	18,000.00	0	0.00	0.00
114	0	0	3,800.00	0	0.00	0.00
61	0	0	22,980.00	0	0.00	0.00
60	0	0	22,980.00	0	0.00	0.00
9	0	0	2,750.00	0	0.00	0.00
8	0	0	2,750.00	0	0.00	0.00
63	0	0	22,980.00	0	0.00	0.00
62	0	0	22,980.00	0	0.00	0.00
19	0	0	1,850.00	0	0.00	0.00
12	0	0	2,200.00	0	0.00	0.00
122	0	0	2,100.00	0	0.00	0.00
121	0	0	2,100.00	0	0.00	0.00
126	0	0	688.00	0	0.00	0.00
49	0	0	9,900.00	0	0.00	0.00
48	0	0	9,900.00	0	0.00	0.00
138	0	0	850.00	0	0.00	0.00
137	0	0	850.00	0	0.00	0.00
45	0	0	1,850.00	0	0.00	0.00
44	0	0	1,850.00	0	0.00	0.00
109	0	0	8,900.00	0	0.00	0.00

Table 1.1. E 36 Model Classified by Unit. (Continued)

| Code	Average Unit	Unit Sales	Price E36	Annual Sale	Total	Annual Price
108	0	0	8,900	0	0.00	0.00
74	0	0	7,830.00	0	0.00	0.00
79	0	0	16,500.00	0	0.00	0.00
132	0	0	550.00	0	0.00	0.00
134	0	0	795.00	0	0.00	0.00
133	0	0	795.00	0	0.00	0.00
7	0	0	4,100.00	0	0.00	0.00
111	0	0	1,900.00	0	0.00	0.00
29	0	0	1,850.00	0	0.00	0.00
25	0	0	1,100.00	0	0.00	0.00
24	0	0	1,100.00	0	0.00	0.00
130	0	0	480.00	0	0.00	0.00
129	0	0	480.00	0	0.00	0.00
156	0	0	8,800.00	0	0.00	0.00
81	0	0	850.00	0	0.00	0.00
16	0	0	14,300.00	0	0.00	0.00
124	0	0	2,100.00	0	0.00	0.00
51	0	0	10,220.00	0	0.00	0.00
50	0	0	10,220.00	0	0.00	0.00
90	0	0	580.00	0	0.00	0.00
77	0	0	12,750.00	0	0.00	0.00
76	0	0	12,750.00	0	0.00	0.00
2	0	0	7,200.00	0	0.00	0.00
3	0	0	7,200.00	0	0.00	0.00
14	0	0	3,600.00	0	0.00	0.00
160	0	0	8,200.00	0	0.00	0.00
161	0	0	7,900.00	0	0.00	0.00
46	0	0	2,200.00	0	0.00	0.00
75	0	0	6,800.00	0	0.00	0.00
67	0	0	6,900.00	0	0.00	0.00
66	0	0	6,900.00	0	0.00	0.00

Table 1.1. E 36 Model Classified by Unit. (Continued)

Code	Average Unit	Unit Sales	Price E36	Annual Sale	Total	Annual Price
80	0	0	1,550.00	0	0.00	0.00
71	0	0	4,500.00	0	0.00	0.00
70	0	0	4,500.00	0	0.00	0.00
10	0	0	1,200.00	0	0.00	0.00
146	0	0	2,850.00	0	0.00	0.00
69	0	0	3,800.00	0	0.00	0.00
68	0	0	3,800.00	0	0.00	0.00
					2,121,185.00	2,828,246.67

Remark
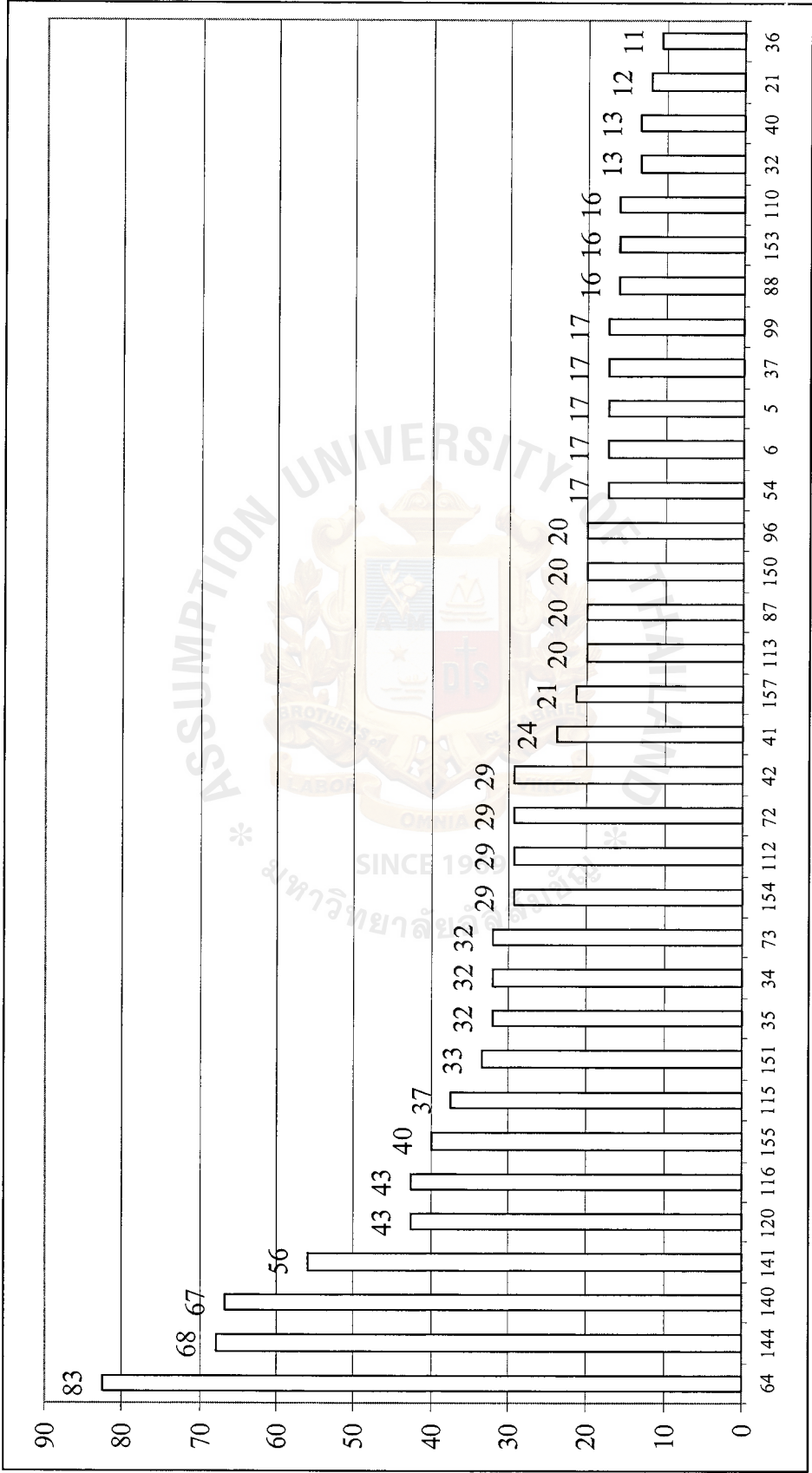
(1)   *Prices are subjected to change without notice

(2)   ** Prices are included for 2 pieces

E 36 Model Classified by Unit.
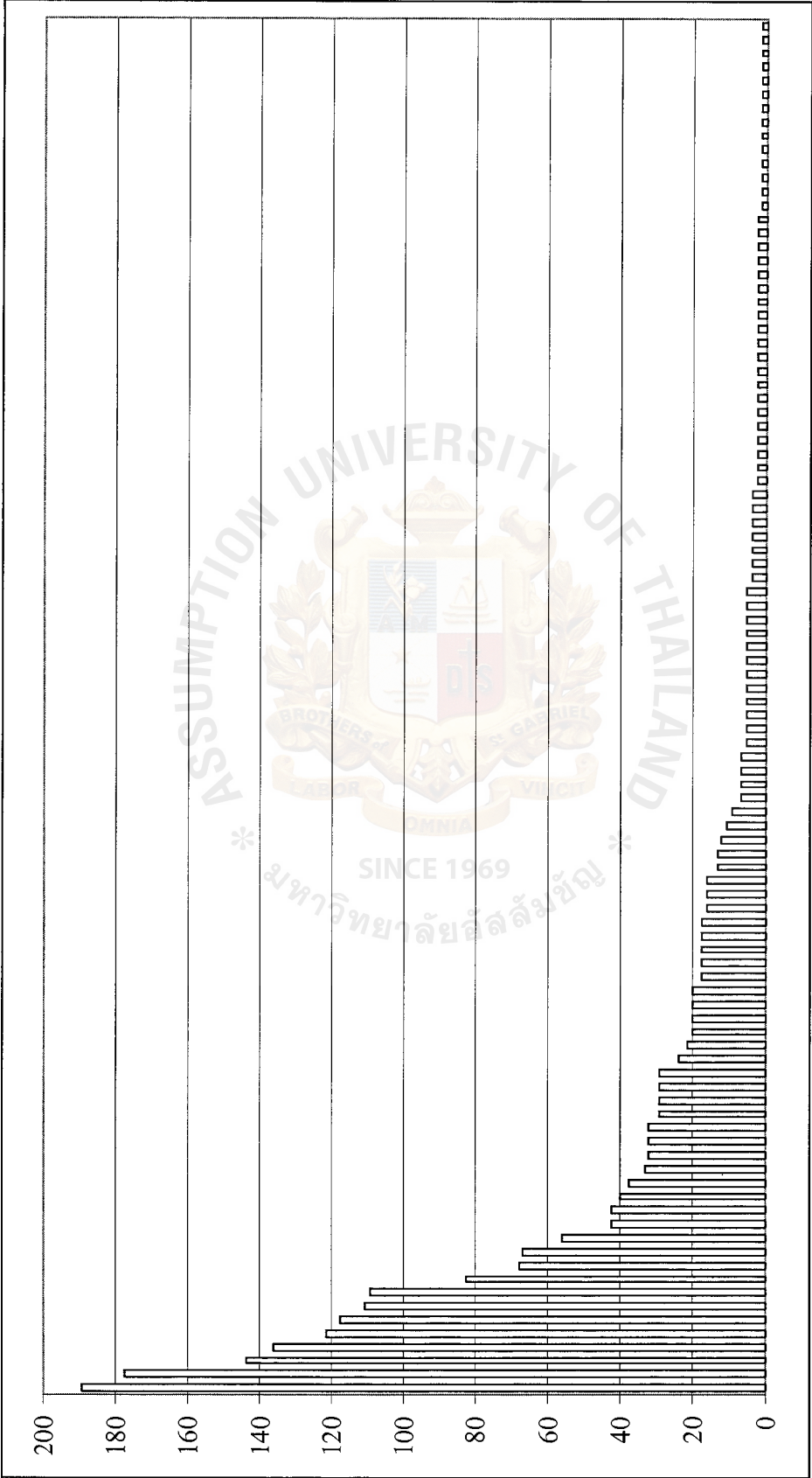
Class A of E 36 Model Classified by Unit.

Class B of E 36 Model Classified by Unit.

Class C of E 36 Model Classified by Unit.

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