CHAPTER II

EXISTING SYSTEMS

2.1 Company Introduction

The automotive part company analysed in this thesis is located at Amata Nakon Industrial Estate, Bangpakong. The main products are automotive parts such as oil pump, water pump, cooling fan, body engine, and small parts. In addition, the company also produces air-conditioners' components. Fig. 2.1 shows the main products of this company.

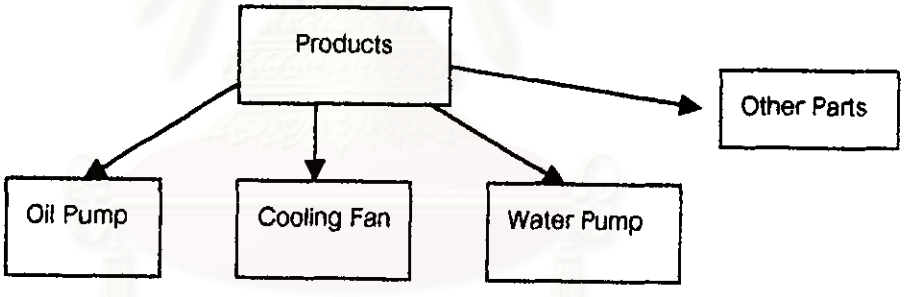

Fig. 2.1 : Diagram showing main products of the company.

The company has three main processing sections, they are die-casting, machining, and assembling. The factory layout is shown in Fig. 2.2 below.

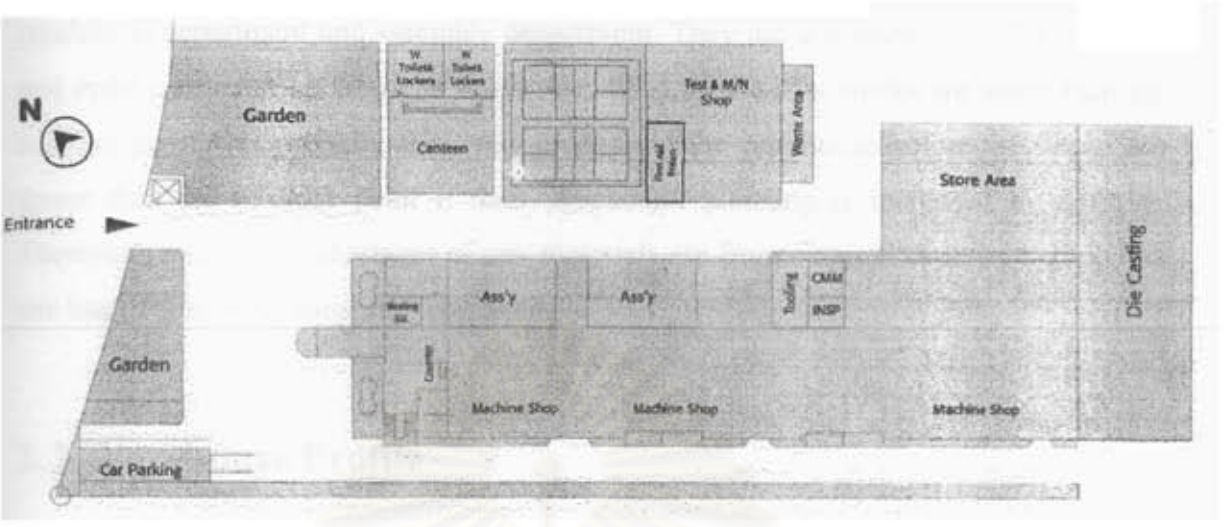

Fig. 2.2 : The layout of the factory.

The flow of materials is as follows in Fig. 2.3.

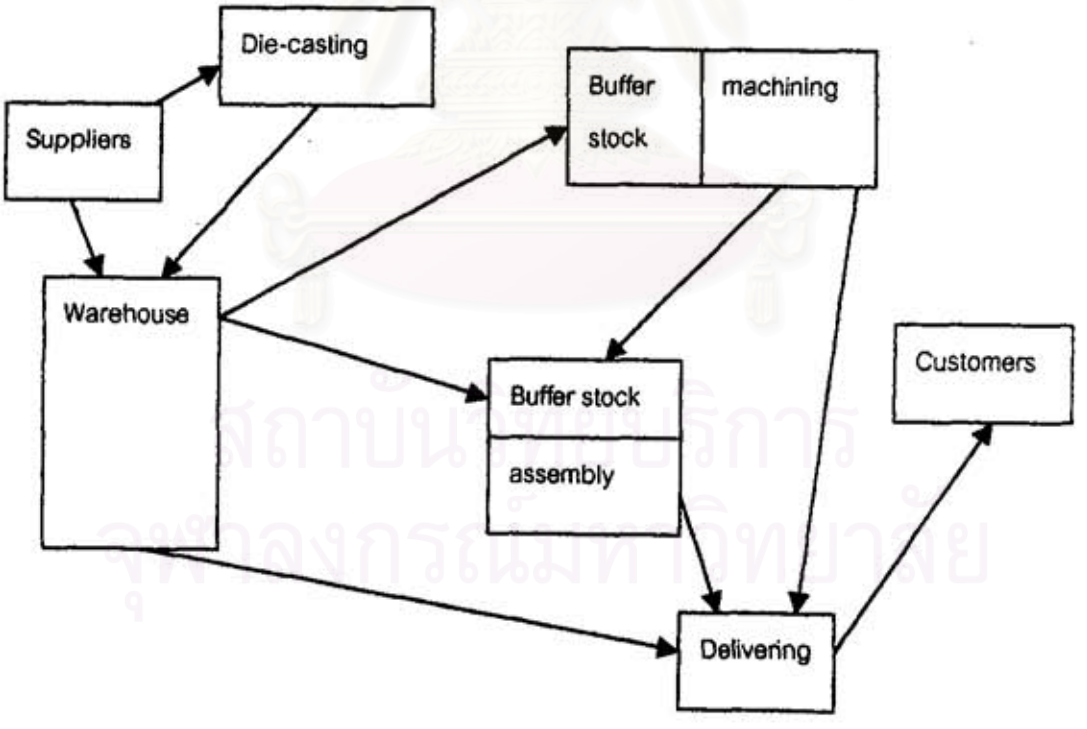

Fig. 2.3 : The flow of materials.

Raw materials from suppliers, products from die-casting department, and finished products from the machining department and the assembly department stored in

the warehouse. The raw materials and the casted products are then transferred to the machining department and assembly department. They use a system of buffer stocking and order raw materials from the warehouse when their buffer stocks are lower than the re-order point. Occasionally, they may order from the warehouse before the stocks are lower than the re-order point if their production planning is increased in capacity. Therefore, most of the shortages of raw materials are from external causes i.e. suppliers are late in delivering some raw materials.

2.2 Warehouse Profile

All items stored in this warehouse are fixed in the location strategy with a label attached at the shelf. This system is convenient when searching for items. Workers in the warehouse are familiar with this warehouse layout very well.

The assigned locations are model-based, that is items are grouped together in model and stored nearby for convenience in picking.

When there is any change of models in the production line, the stored space becomes out-of-date. The more recent model is stored next to the older model. When the newer model arrives, it is located further away from the first model. As a result, the latest model is stored at the furthermost location in the warehouse.

2.2.1 Warehouse Layout

The warehouse layout is displayed in Fig. 2.4.

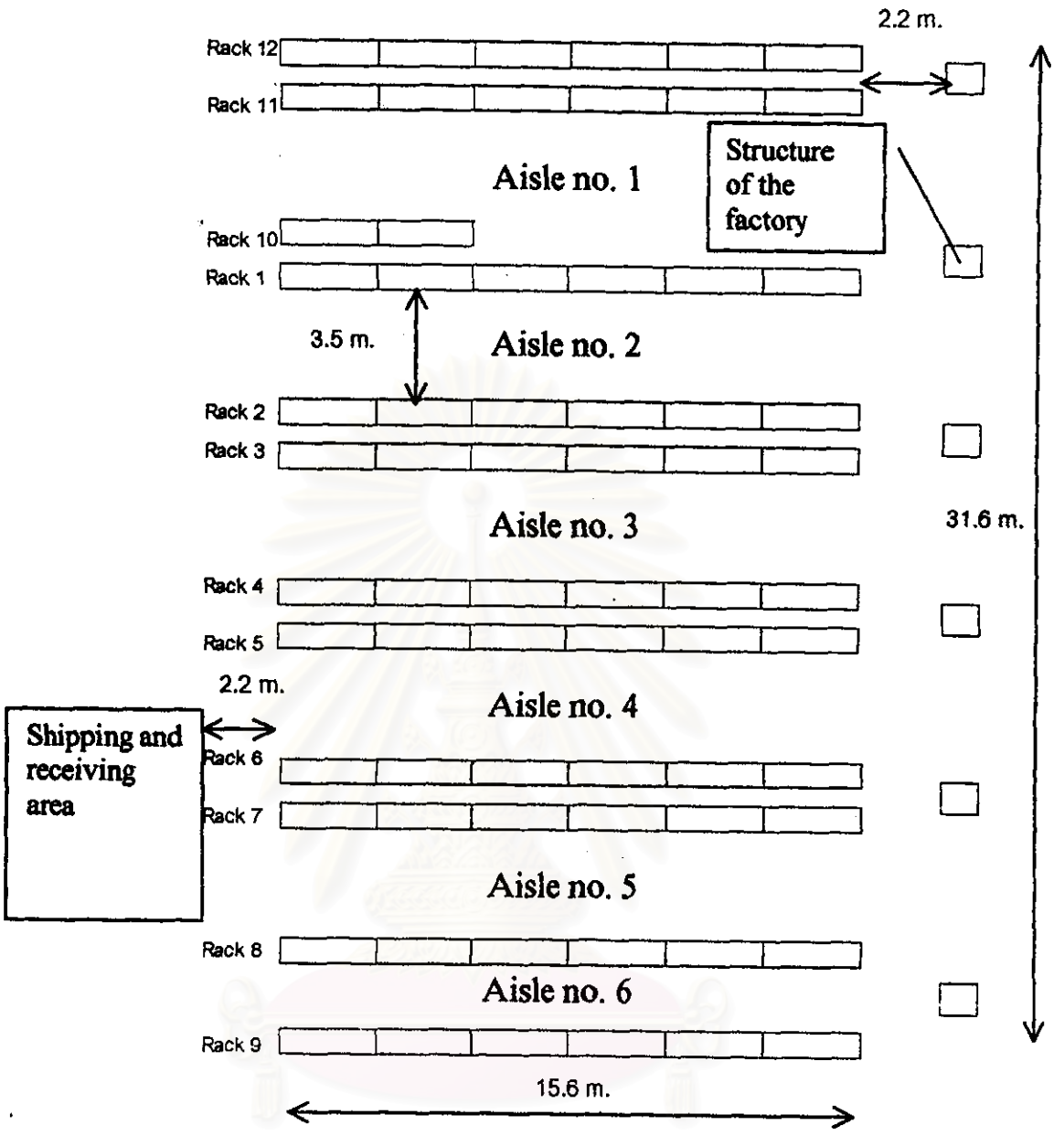

Fig. 2.4 : The layout of the warehouse.

There are twelve racks in the warehouse. The rack no. 7 is prepared to store all the imported products. Rack no. 9 is now used to store buffer stocks for the machining department. Most of Racks contain five levels of shelf. The top part of each rack is used for storing lightweight materials i.e. packaging and plastic materials. The existing rack layout is in Appendix 2. Therefore, the shape of this warehouse is rectangular with six aisles and two crossovers at the end of the aisles.

2.2.2 Materials Handling

There are many kinds of materials handling in this warehouse. The most important way is by a forklift which is shown in Fig. 2.5. There are three forklifts in this warehouse.

Fig. 2.5 : A forklift used in this warehouse for heavy items.

These forklifts are used to deliver heavy items in the warehouse. In addition, they are used to store items which are located in the high shelves. These forklifts are powered by electric engines to reduce air pollution. The recharging process for the battery takes a long time, about 10 hours for full charge. Nevertheless, the forklifts are usually recharged whenever they are free. The time allowance for each recharge is not much hence, the lifetime of these batteries are reduced.

For small and lightweight items, hand lifts and trolleys are used to deliver these items as shown in Fig. 2.6.

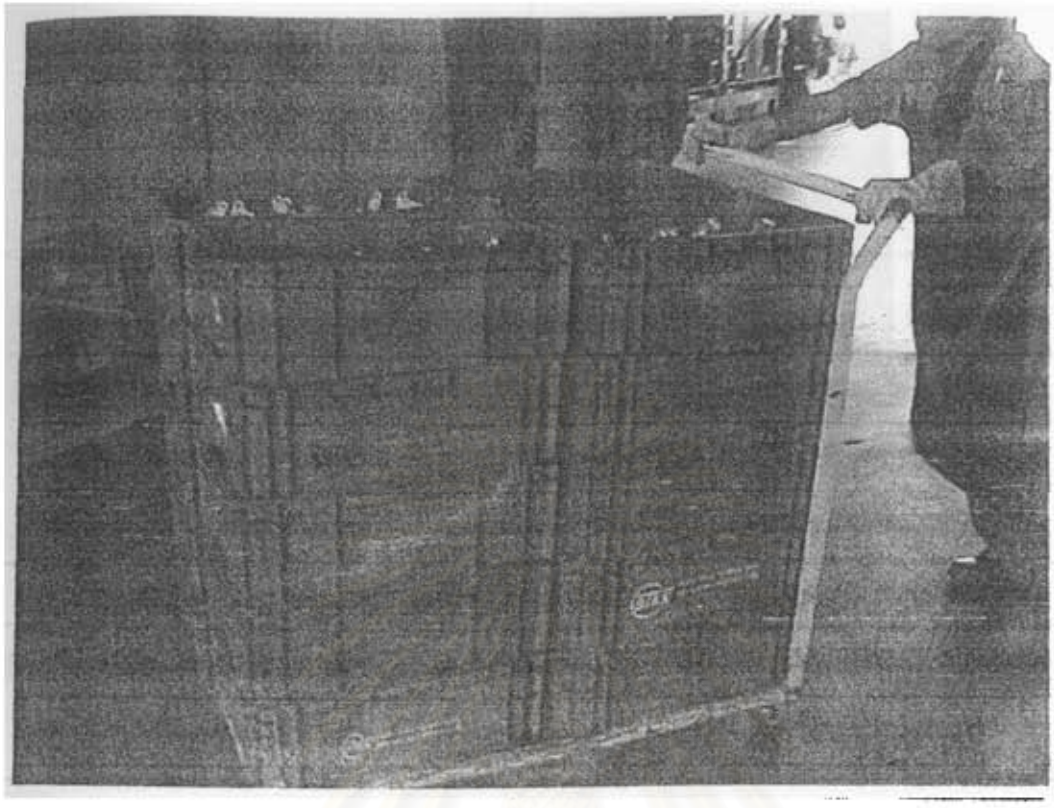

Fig. 2.6 : A trolley used in this warehouse for lightweight items.

2.2.3 Activity in the Warehouse

The warehouse in this company has many activities involved such as, receiving, storing, picking, and delivering. First of all, when raw materials are delivered from suppliers to the receiving area, most of items are stored in baskets and then pallets are used to carry the baskets as shown in Fig. 2.7.

Fig. 2.7 : Raw materials from a supplier stored in a basket on a pallet.

The amount of raw materials and invoices are checked by the warehouse workers. Next, the quality control operators inspect these items before these items within the specification are delivered into the warehouse. The warehouse operators move the raw materials to the specific place for each pallet. In the warehouse, all items are controlled using the FIFO (First In First Out) technique. The baskets are labeled with one of four colouring stickers to indicate the months they arrived in the warehouse.

Yellow	=	January, May, and September
Green	=	February, June, and October
Red	=	March, July, and November
Blue	=	April, August, and December

In addition, the warehouse has prepared some certain places for storing items which require FIFO. These items are imported materials and have high turn over. They may be deteriorated if stored in the warehouse for too long. The special rack for exact FIFO is that the items are put in on one side and picked up on the opposite side. Therefore, the item stored first will be dispatched first. Fig. 2.8 shows the shelf of exact FIFO.

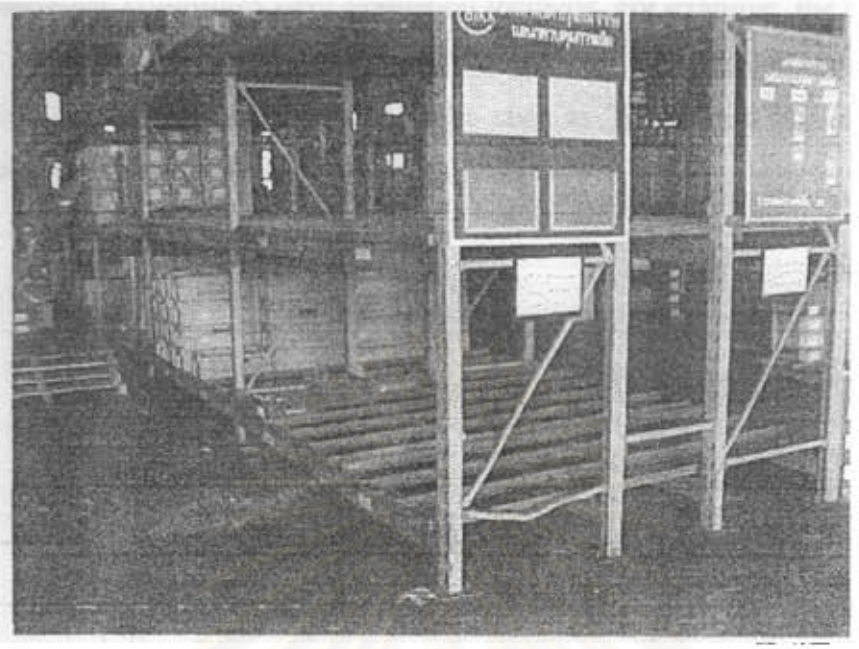

Fig. 2.8 : The FIFO shelf.

When the machining department or the assembly department requires raw materials, it places the order at the receiving and sending station. Workers then pick up all the items and deliver them to the machining department or the assembly department. For each order, workers can pick up all ordered items in a single trip for the assembly department because the amount of each ordered item is not too many and their weight is not heavy. As a result, the workers can use a trolley to pick up all ordered items in one trip. However, raw materials for the machining department are heavier than those for the assembly department. Therefore, forklifts are used to pick up the ordered items for the machining department. The forklifts must deliver each item in each trip.

2.3 Transportation Profile

The finish products from the machining department and the assembly department are ready to be delivered to customers. Most of the customers are Japanese companies and employ the supply chain technique. They need the company to deliver the products in small batches frequently so that their stocks can be minimised. In

addition, some companies have evaluation methods. For example, the companies in the Isuzu chain only allow Isuzu trucks to deliver the finished products to them. Furthermore, other automobile companies such as Toyota and Mitsubishi require the company to deliver the finished products everyday.

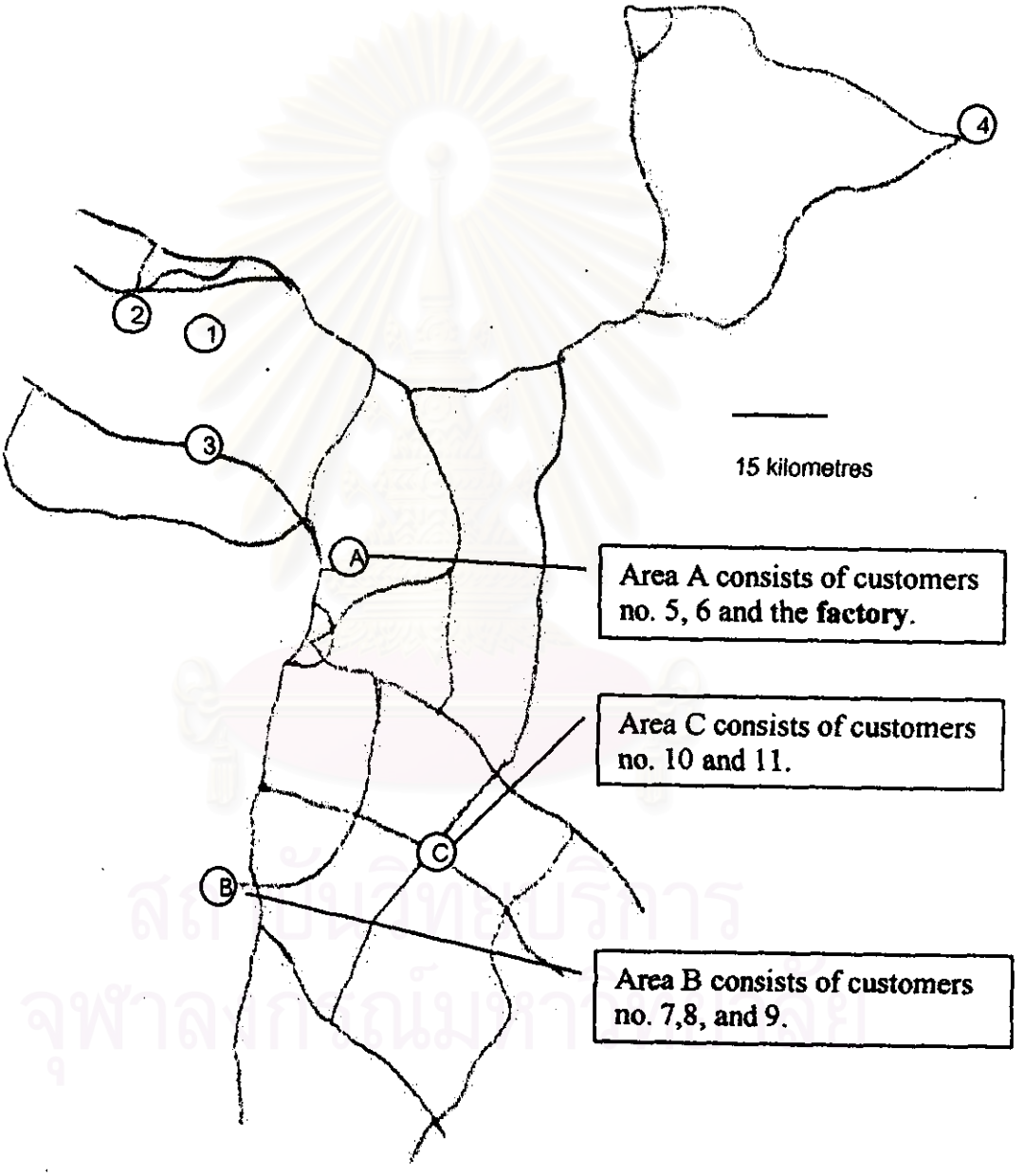

Fig. 2.9 : A map showing location of customers and the factory.

Some customers are located in the same area, therefore they are grouped together. The map in Fig. 2.9 exhibits the customer location indicated with numbers as

their coding in the transportation system. Those customers which are not far from one another are grouped into areas A, B, and C. These customers are within the proximity of 5 kilometres.

2.3.1 Transportation Routing

The existing tours planning for every customer has been made for a long time. Therefore, some routes may not be optimal. Nowadays, drivers plan the routes to customers with only some guidelines from the plan. If they have to deliver the products in a short period of time, they use the Motorway. Moreover, the company has assigned the subcontractors to deliver products when the company's trucks are not available.

2.3.2 Delivery Vehicles

There are two six wheels trucks and two small trucks in the company. The details of these trucks are shown in Table 2.1.

Table 2.1 : Details of the four company's trucks.

No.	Brand	Type	Plate number
1	ISUZU	Six wheels truck	83-0716
2	MITSUBISHI	Six wheels truck	82-4638
3	ISUZU	small truck	๑๓-8241
4	TOYOTA	small truck	๒๓-1311

2.4 Existing Problems

The problems are grouped into problems arising from the warehouse and from transportation. Both types of problems are totally different in their nature and problems' solving.

2.4.1 Problems in the Warehouse

- The location for each item is not determined by the frequency of picking.
- The shelf-filling and order picking tours are planned by experience and not by any system. As a result, the tour distance may not be optimal.

2.4.2 Transportation Problems.

- There are many routes to reach some customers. Some existing routes may not be optimal.
- The existing delivery schedule has been planned for a few years. The present data should be updated to prevent drivers from taking a time off unnecessarily during working period (idle time).
- The company has to meet the restrictions set by each customer such as some customers demand only 'Isuzu' trucks for delivery or some customers require the finished products everyday.

2.5 Summary

In this Chapter, the information of the company is reviewed such as the location, products and the flow of materials. In this thesis, the existing systems which are focused on, are problems from the warehouse department and the transportation department. For the warehouse, the materials handling tools, the features of shelves and the warehouse layout have been explained. The delivery routes, location of customers and the vehicles have been discussed in the transportation profile. Finally, the problems both from the warehouse and from the transportation departments are pinpointed.